YASKAWA

# Sigma-7 200V

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# Quick. Fast. Reliable.

## Amplifiers

- Single & three-phase input
- Embedded fieldbus
  - » Pulse train / analog input
  - » MECHATROLINK-II
  - » MECHATROLINK-III
  - » EtherCAT
  - » PROFINET
  - » Command Option Type
- Single & dual axis amplifier
- Dual axis amplifier with built-in controller
- Single axis amplifier with IEC-based built-in controller

## Motors

- Rotary, Linear and Direct Drive Motors available
- Very compact design
- Available from 50 W to 15 kW

# Contents

## Rotary Servomotors


| | |
|---|---|
| SGMMV | 34 |
| SGM7A | 44 |
| SGM7J | 68 |
| SGM7G | 82 |


## Direct Drive Servomotors


| | |
|---|---|
| SGM7D (Outer Rotor, with Core) | 106 |
| SGM7E (Inner Rotor, Coreless) | 133 |
| SGM7F (Inner Rotor, with Core) | 148 |
| SGMCS | 170 |
| SGMCV | 191 |


## Linear Servomotors


| | |
|---|---|
| SGLG (Corless Models) | 206 |
| SGLFW /SGLFW2 (Models with F-Type Iron Cores) | 231 |
| SGLT (Models with T-Type Iron Cores) | 286 |
| Recommended Linear Encoders & Cables | 313 |


## SERVOPACKs


| | |
|---|---|
| Sigma-7S Analog Voltage/Pulse Train | 332 |
| Sigma-7S MECHATROLINK-II | 346 |
| Sigma-7S MECHATROLINK-III | 360 |
| Sigma-7S MECHATROLINK-III with RJ45 | 374 |
| Sigma-7S EtherCAT | 388 |
| Sigma-7S PROFINET | 403 |
| Sigma-7W MECHATROLINK-III | 415 |
| Sigma-7C with built-in Controller | 426 |
| Sigma-7S Command Option Attachable Type | 442 |
| Sigma-7Siec with integrated iec-Controller | 463 |
| Connector Specifications and Front Cover Dimensions | 474 |


## Option Modules


| | |
|---|---|
| Feedback Option Modules | 477 |
| Safety Option Module | 484 |
| INDEXER Module | 488 |
| DeviceNet Modules | 498 |
| MP2600iec Single Axis Machine Controller Option | 504 |
| Dimensions | 508 |


## Periphery


| | |
|---|---|
| Periphery | 510 |
| Software | 522 |


## Appendix


| | |
|---|---|
| Capacity Selection for Servomotors | 526 |
| Capacity Selection for Regenerative Resistors | 534 |
| International Standards | 552 |
| Warranty | 553 |

# Seven Reasons for Sigma-7

The Sigma Series of Servo Drives has evolved into the Sigma-7 Servo Drives, which provides you with the ultimate experience in seven key areas and delivers the optimal solution that only YASKAWA can offer.

## 1 Comprehensive Motor and Amplifier Power Range

**Wide power range**

- Very compact motors from 50 W to 15 kW
- Linear motors iron core and ironless with a peak force up to 7,560 N

## 2 Savings through Performance

**Lower production costs**

- Speed loop bandwidth of 3.1 kHz
- Shorter settling time, reduced positioning time, higher throughput

**No additional cooling necessary**

- Ambient temperature -5 – 55 °C (max. 60 °C with derating)

**Energy savings and higher productivity**

- High peak torque, fast acceleration, no amplifier oversizing
- Lightweight mechanics

**Higher performance**

- Overload 350 % for 3 – 5 seconds
- High peak torque, fast acceleration

## 3 Safety Features

**Smooth integration of mandatory legal safety standards**

- The STO function is implemented by default in all Sigma-7 series servo amplifiers
- Build safer machines - Sigma-7 satisfies the requirements of SIL 3 and PL-e
- The safety functions SS1, SS2 and SLS can be integrated by using the safety module

## 4 High Efficiency

**Very low heat generation**

- Optimized magnetic circuit improves motor efficiency
- Improved motor efficiency reduces heat generation by about 20 %

## 5 High Accuracy

**Next level 24-bit absolute encoder for maximum accuracy**

- Resolution of 16 million pulses per revolution for extremely precise positioning

## 6 Impressive System Performance

**Very high precision teamed up with fast, smooth operation**

- Ripple compensation for highest demands in smoothness and dynamics
- Even for machines for which speed loop gains cannot be set high

## 7 Outstanding Reliability

**Even more reliability for your production**

- More than 15 million servo systems in the field
- Improved machine reliability, reduced service and maintenance costs, less downtime

# Servomotors

## Rotary

### SGMMV

- Low inertia, ultra-small capacity
- 10 W - 30 W

### SGM7A

- Low inertia, high speed
- 50 W - 7 kW

### SGM7J

- Medium inertia, high speed
- 50 W - 750 W

### SGM7G

- Medium inertia, large torque
- 300 W - 15 kW

## Direct Drive

### SGM7D

- Medium capacity, with core
- Rated: 1.3 Nm - 240 Nm
  Peak: 4 Nm - 400 Nm

### SGM7E

- Coreless, inner rotor
- Rated: 2 Nm - 35 Nm
  Peak: 6 Nm - 105 Nm

### SGM7F

- With core, inner rotor
- Rated: 2 Nm - 200 Nm
  Peak: 6 Nm - 600 Nm

### SGMCS

- Small capacity, coreless or Medium capacity, with core
- Rated: 2 Nm - 200 Nm
  Peak: 6 Nm - 600 Nm

### SGMCV

- Small capacity, with core
- Rated: 4 Nm - 35 Nm
  Peak: 12 Nm - 105 Nm

## Linear

### SGLG

- Coreless model
- Rated: 12.5 N - 750 N
  Peak: 40 N - 3000 N

### SGLFW / SGLFW2

- Model with F-type iron core
- Rated: 25 N - 2520 N
  Peak: 86 N - 7560 N

### SGLT

- Model with T-type iron core
- Rated: 130 N - 2000 N
  Peak: 380 N - 7500 N

Note: Readily available up to 1.5 kW. Others available on request.

## SERVOPACKs

### SGD7S-□□□A00A

Single-axis
Analog Voltage/
Pulse Train Refe-
rence

### SGD7S-□□□A10A

Single-axis
MECHATROLINK-II
Communication
Reference

### SGD7S-□□□A20A

Single-axis
MECHATROLINK-III
Communication
Reference

### SGD7S-□□□A30A

Single-axis
MECHATROLINK-III
Communication
Reference
with RJ45 connector

### SGD7S-□□□AA0A

Single-axis
EtherCAT
Communication
Reference

### SGD7S-□□□AC0A

Single-axis
PROFINET
Communication
Reference

### SGD7S-□□□AE0A

Single-axis
Command Option
Attachable Type

### SGD7S-□□□M0A

Single-axis
Sigma-7Siec
(with integrated
iec-Controller)

### SGD7W-□□□A20A

Dual-axis
MECHATROLINK-III
Communication
Reference

### SGD7C-□□□AMAA□□□

Dual-axis
SERVOPACK
with built-in
controller

## Option Modules

### SGDV-OF□0□A

Fully-Closed /
Feedback Option
Modules

### SGDV-OSA01A

Safety Module

### SGDV-OCA03A

INDEXER Module

### SGDV-OCA0□A

DeviceNet Modules

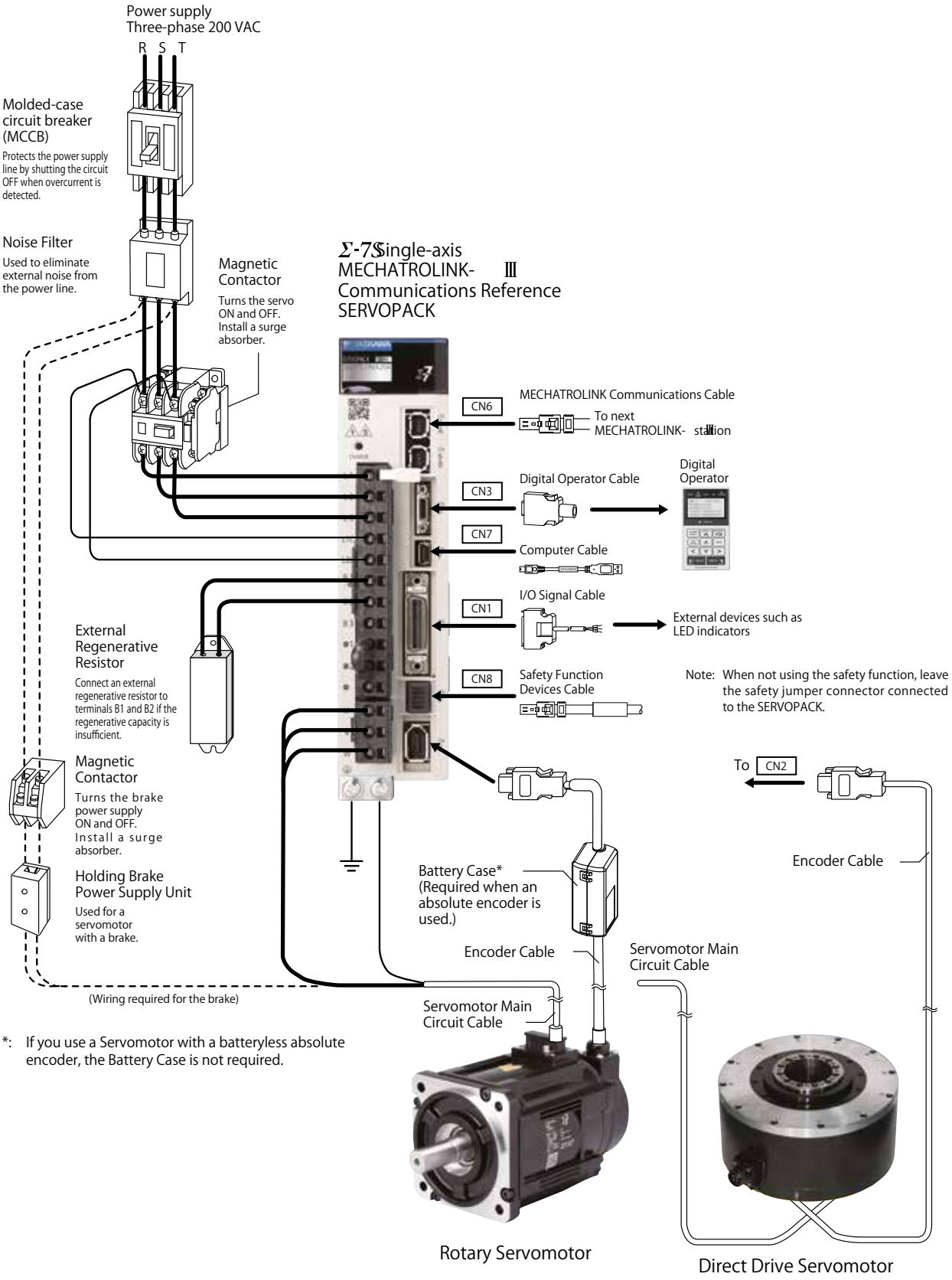
### SGDV-OCC02A

MP2600iec Module

Note: Readily available up to 1.5 kW. Others available on request.

# Sigma-7S SERVOPACK and Rotary/Direct Drive Servomotor for MECHATRONLINK-III Communications

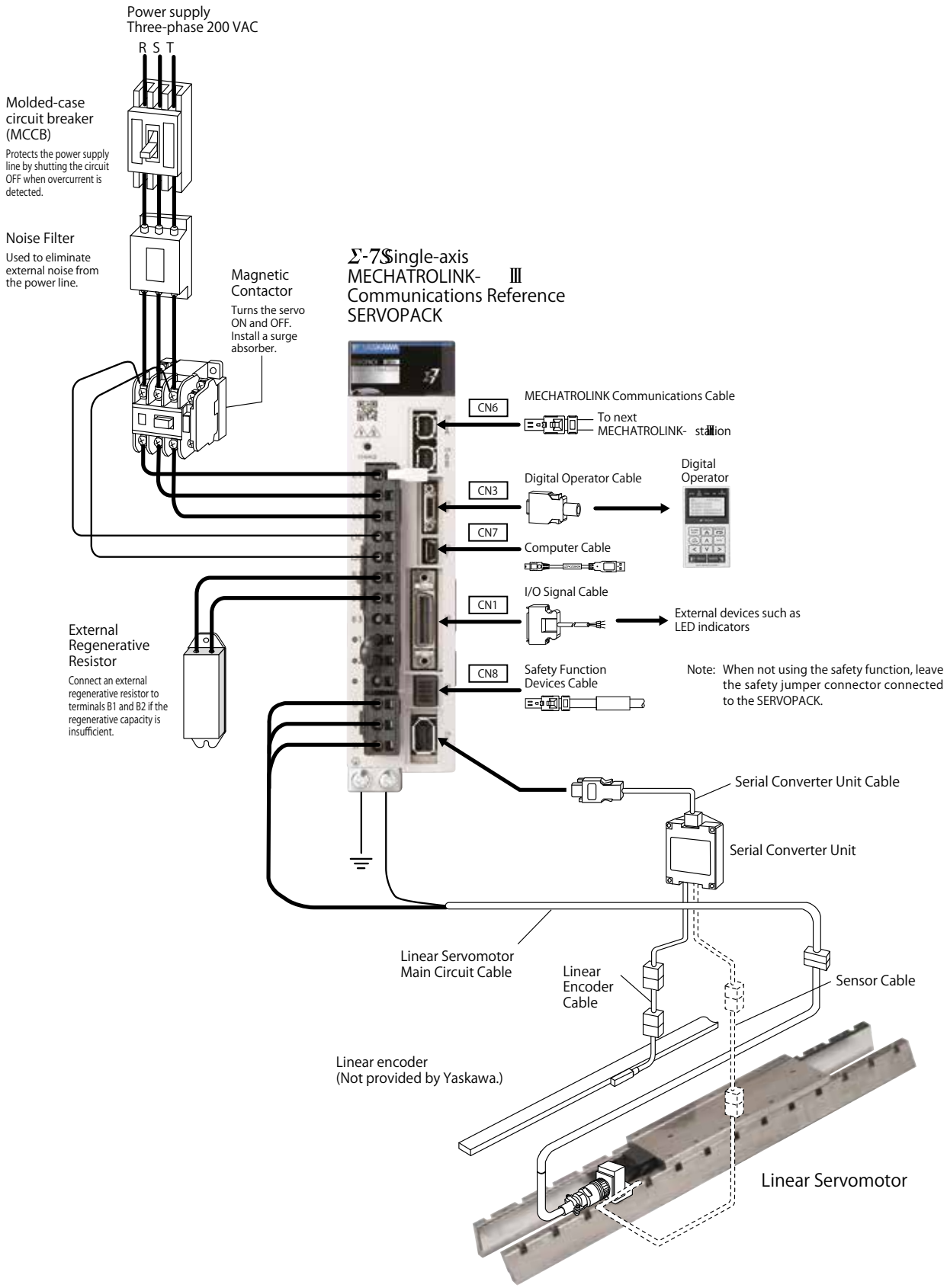
### Three-phase 200 VAC




*: If you use a Servomotor with a batteryless absolute encoder, the Battery Case is not required.

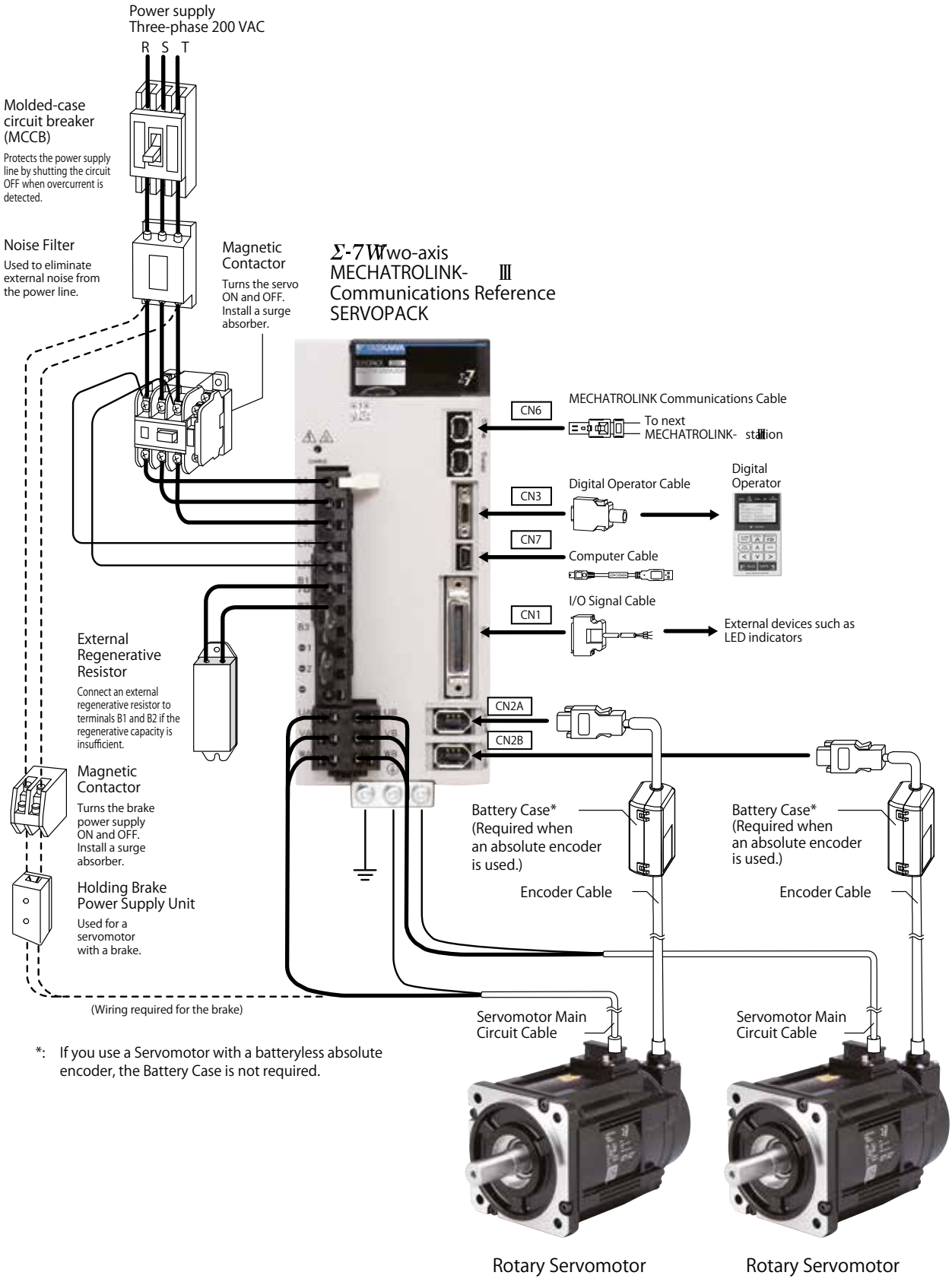
# Sigma-7S SERVOPACK and Linear Servomotor for MECHATRONLINK-III Communications

## Three-phase 200 VAC



# Sigma-7W SERVOPACK and Rotary/Direct Drive Servomotor for MECHATROLINK-III Communications

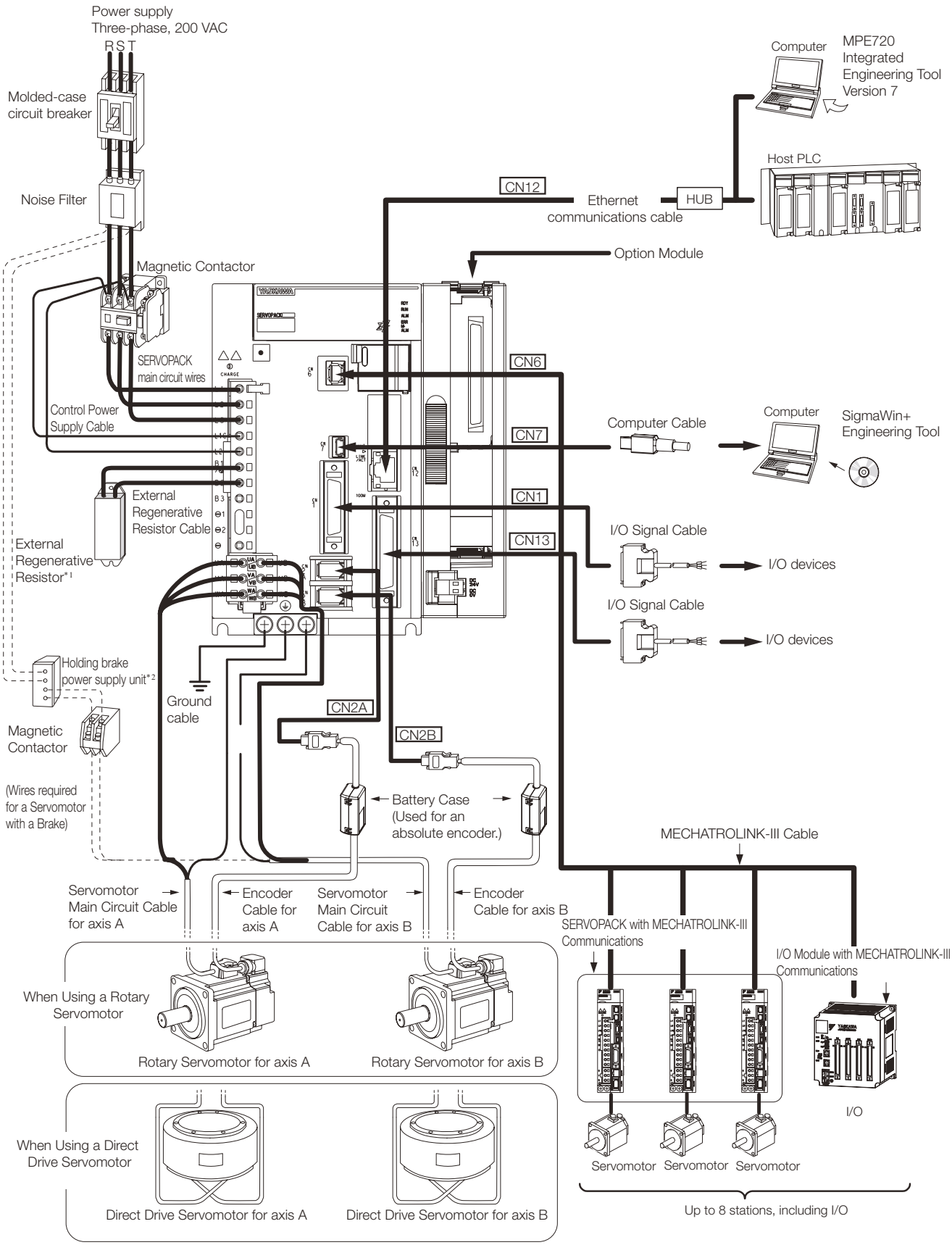
### Three-phase 200 VAC




*: If you use a Servomotor with a batteryless absolute encoder, the Battery Case is not required.

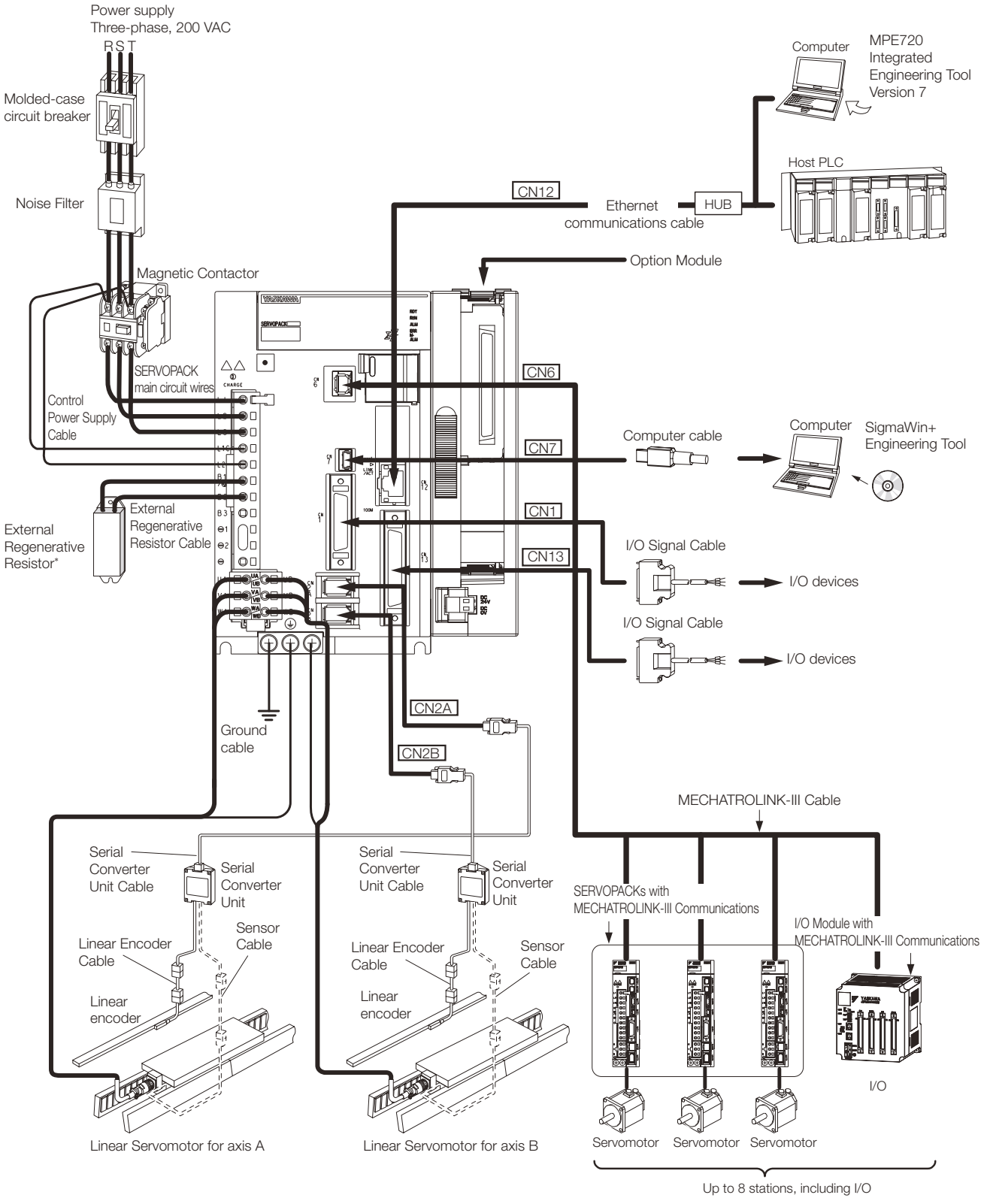
# Sigma-7C SERVOPACK with integrated Controller and Rotary/Direct Drive Servomotor

### Three-phase 200 VAC



# Sigma-7C SERVOPACK with integrated Controller and Linear Servomotor

### Three-phase 200 VAC



## Combination of Rotary Servomotors and SERVOPACKs

| Rotary Servomotor Model | | Rated Output [W] | SERVOPACK Model | |
|---|---|---|---|---|
| | | | SGD7S-□□□□ | SGD7W-□□□□<br>SGD7C-□□□□ |

Note: Readily available up to 1.5 kW. Others available on request.

*1. If you use this combination, performance may not be as good, e.g., the control gain may not increase, in comparison with using a Sigma-7 SERVOPACK.
*2. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.

## Combination of Direct Drive Servomotors and SERVOPACKs

| Direct Drive Servomotor Model | | Rated torque [Nm] | Instantaneous Max. Torque [Nm] | SERVOPACK Model | |
|---|---|---|---|---|---|
| | | | | SGD7S-□□□□ | SGD7W-□□□□<br>SGD7C-□□□□ |
| SGM7D<br>(With core, outer rotor) | SGM7D-30F | 30 | 50 | 120A*1 | – |
| | SGM7D-58F | 58 | 100 | | |
| | SGM7D-90F | 90 | 150 | | |
| | SGM7D-1AF | 110 | 200 | | |
| | SGM7D-01G | 1.3 | 4 | 2R8A*1, 2R8F*1 | |
| | SGM7D-05G | 5 | 6 | | |
| | SGM7D-08G | 8 | 15 | 120A*1 | |
| | SGM7D-18G | 18 | 30 | | |
| | SGM7D-24G | 24 | 45 | | |
| | SGM7D-34G | 34 | 60 | | |
| | SGM7D-45G | 45 | 75 | | |
| | SGM7D-03H | 3 | 4 | 2R8A*1, 2R8F*1 | |
| | SGM7D-28I | 28 | 50 | 120A*1 | |
| | SGM7D-70I | 70 | 100 | | |
| | SGM7D-1ZI | 100 | 150 | | |
| | SGM7D-1CI | 130 | 200 | | |
| | SGM7D-2BI | 220 | 300 | | |
| | SGM7D-2DI | 240 | 400 | | |
| | SGM7D-06J | 6 | 8 | | |
| | SGM7D-09J | 9 | 15 | | |
| | SGM7D-18J | 18 | 30 | | |
| | SGM7D-20J | 20 | 45 | | |
| | SGM7D-38J | 38 | 60 | | |
| | SGM7D-02K | 2.06 | 5 | 2R8A*1, 2R8F*1 | |
| | SGM7D-06K | 6 | 10 | | |
| | SGM7D-08K | 8 | 15 | | |
| | SGM7D-06L | 6 | 10 | | |
| | SGM7D-12L | 12 | 20 | | |
| | SGM7D-30L | 30 | 40 | 120A*1 | |
| SGM7E<br>(Coreless, inner rotor) | SGM7E-02B | 2 | 6 | 2R8A, 2R1F | 2R8A |
| | SGM7E-05B | 5 | 15 | | |
| | SGM7E-07B | 7 | 21 | | |
| | SGM7E-04C | 4 | 12 | 2R8A, 2R8F | |
| | SGM7E-10C | 10 | 30 | | |
| | SGM7E-14C | 14 | 42 | | |
| | SGM7E-08D | 8 | 24 | | |
| | SGM7E-17D | 17 | 51 | | |
| | SGM7E-25D | 25 | 75 | | |
| | SGM7E-16E | 16 | 48 | 5R5A | |
| | SGM7E-35E | 35 | 105 | | |
| SGM7F<br>(With core, inner rotor) | SGM7F-02A | 2 | 6 | 2R8A, 2R1F | 2R8A |
| | SGM7F-05A | 5 | 15 | | |
| | SGM7F-07A | 7 | 21 | 2R8A, 2R8F | |
| | SGM7F-04B | 4 | 12 | | |
| | SGM7F-10B | 10 | 30 | | |
| | SGM7F-14B | 14 | 42 | 5R5A | |
| | SGM7F-08C | 8 | 24 | 2R8A, 2R8F | 2R8A |
| | SGM7F-17C | 17 | 51 | 5R5A | |
| | SGM7F-25C | 25 | 75 | 7R6A | |
| | SGM7F-16D | 16 | 48 | 5R5A | |
| | SGM7F-35D | 35 | 105 | 7R6A*2, 120A | 7R6A*2 |
| | SGM7F-45M | 45 | 135 | 7R6A | |
| | SGM7F-80M | 80 | 240 | 120A | – |
| | SGM7F-1AM | 110 | 330 | 180A | |
| | SGM7F-80N | 80 | 240 | 120A | |
| | SGM7F-1EN | 150 | 450 | 200A | |
| | SGM7F-2ZN | 200 | 600 | | |

## Combination of Direct Drive Servomotors and SERVOPACKs

| Direct Drive Servomotor Model | | Rated torque [Nm] | Instantaneous Max. Torque [Nm] | SERVOPACK Model | |
|---|---|---|---|---|---|
| | | | | SGD7S-□□□□ | SGD7W-□□□□<br>SGD7C-□□□□ |
| SGMCV<br>(Small capacity, with core, inner rotor) | SGMCV-04B | 4 | 12 | 2R8A, 2R8F | 2R8A |
| | SGMCV-10B | 10 | 30 | | |
| | SGMCV-14B | 14 | 42 | 5R5A | |
| | SGMCV-08C | 8 | 24 | 2R8A, 2R8F | 2R8A |
| | SGMCV-17C | 17 | 51 | 5R5A | |
| | SGMCV-25C | 25 | 75 | 7R6A | |
| | SGMCV-16D | 16 | 48 | 5R5A | |
| | SGMCV-35D | 35 | 105 | 7R6A*2, 120A | 7R6A*2 |
| SGMCS<br>(Small capacity, coreless, inner rotor) | SGMCS-02B | 2 | 6 | 2R8A, 2R1F | 2R8A |
| | SGMCS-05B | 5 | 15 | | |
| | SGMCS-07B | 7 | 21 | | |
| | SGMCS-04C | 4 | 12 | 2R8A, 2R8F | |
| | SGMCS-10C | 10 | 30 | | |
| | SGMCS-14C | 14 | 42 | | |
| | SGMCS-08D | 8 | 24 | | |
| | SGMCS-17D | 17 | 51 | | |
| | SGMCS-25D | 25 | 75 | | |
| | SGMCS-16E | 16 | 48 | 5R5A | |
| | SGMCS-35E | 35 | 105 | | |
| SGMCS<br>(Medium capacity, with core, inner rotor) | SGMCS-45M | 45 | 135 | 7R6A | |
| | SGMCS-80M | 80 | 240 | 120A | – |
| | SGMCS-1AM | 110 | 330 | 180A | |
| | SGMCS-80N | 80 | 240 | 120A | |
| | SGMCS-1EN | 150 | 450 | 200A | |
| | SGMCS-2ZN | 200 | 600 | | |

*1: An SGM7D Servomotor is used together with an FT-specification SERVOPACK. The following SERVOPACK models can be used.
- SGD7S-□□□□□□A□□□F82□
- SGD7S-□□□□00A□□□F83□
- SGD7S-□□□□20A□□□F84□

*2: Use the derated values given in the table below for the rated output and rated motor speed of this combination.

| SERVOPACK Model | | SGD7S-□□□□ | SGD7W-□□□□<br>SGD7C-□□□□ |
|---|---|---|---|
| Rated Output | [W] | 1,000 | |
| Rated Motor Speed | [min$^{-1}$] | 270 | |

## Combination of SERVOPACKs and Option Modules

| SERVOPACK Model | Option Module* | |
|---|---|---|
| | Safety Module (SGDV-OSA01A) | Feedback Module (SGDV-OF□□A) |
| Single-axis Analog Voltage/Pulse Train Reference Type (SGD7S-□□□A00A) | ✓ | ✓ |
| Single-axis MECHATROLINK- II Communications Reference Type (SGD7S-□□□A10A) | ✓ | ✓ |
| Single-axis MECHATROLINK- III Communications Reference Type (SGD7S-□□□A20A) | ✓ | ✓ |
| Single-axis MECHATROLINK- III Communications Reference Type (SGD7S-□□□A30A) with RJ45-Connector | ✓ | ✓ |
| Single-axis EtherCAT Communications Reference Type (SGD7S-□□□AA0A) | ✓ | ✓ |
| Single-axis Command Option Attachable Type (SGD7S-□□□AE0A) | ✓ | ✓ |
| Single-axis PROFINET Communications Reference Type (SGD7S-□□□AC0A) | ✓ | ✓ |
| Single-axis Sigma-7 Siec SERVOPACK with built-in Controller IEC 61131 (SGD7S-□□□AM0A000F50) | ✓ | ✓ |
| Dual-axis MECHATROLINK-III Communications Reference Type (SGD7W-□□□A20A) | – | – |
| Dual-axis SERVOPACK with built-in Controller (SGD7C-□□□AMA□□□) | – | – |

| SERVOPACK Model | Command Option Type | Model Designation | | |
|---|---|---|---|---|
| Command Option Attachable Type (SGD7S-□□□AE0A) | INDEXER | SGDV-OCA03A | – | ✓ |
| | DeviceNet (Driven by control power supply) | SGDV-OCA04A | – | ✓ |
| | DeviceNet (Driven by external power supply) | SGDV-OCA05A | – | ✓ |
| | 1.5 Axis Controller IEC 61131 MP2600iec | VMK-U-MP26A01R001 | – | – |

*Feedback Module and Safety Module cannot be combined.

✓ : Possible – : Not Possible

## Combination of Linear Servomotors and SERVOPACKs

| Linear Servomotor Model | | Rated force [N] | Peak Force [N] | SERVOPACK Model | |
|---|---|---|---|---|---|
| | | | | SGD7S-□□□□ | SGD7W-□□□□<br>SGD7C-□□□□ |
| SGLG<br>(Coreless model, with standard magnetic way) | SGLGW-30A050C | 12.5 | 40 | R70A, R70F | |
| | SGLGW-30A080C | 25 | 80 | R90A, R90F | 1R6A |
| | SGLGW-40A140C | 47 | 140 | | |
| | SGLGW-40A253C | 93 | 280 | 1R6A, 2R1F | |
| | SGLGW-40A365C | 140 | 420 | 2R8A, 2R8F | 2R8A |
| | SGLGW-60A140C | 70 | 220 | 1R6A, 2R1F | 1R6A |
| | SGLGW-60A253C | 140 | 440 | 2R8A, 2R8F | 2R8A |
| | SGLGW-60A365C | 210 | 660 | 5R5A | |
| | SGLGW-90A200C | 325 | 1,300 | 120A | |
| | SGLGW-90A370C | 550 | 2,200 | 180A | – |
| | SGLGW-90A535C | 750 | 3,000 | 200A | |
| SGLG<br>(Coreless model, with high-force magnetic way) | SGLGW-40A140C | 57 | 230 | 1R6A, 2R1F | 1R6A |
| | SGLGW-40A253C | 114 | 460 | 2R8A, 2R8F | 2R8A |
| | SGLGW-40A365C | 171 | 690 | 3R8A | 5R5A |
| | SGLGW-60A140C | 85 | 360 | 1R6A, 2R1F | 1R6A |
| | SGLGW-60A253C | 170 | 720 | 3R8A | 5R5A |
| | SGLGW-60A365C | 255 | 1,080 | 7R6A | |
| SGLFW2<br>(Model with F-type iron core) | SGLFW2-20A090A | 25 | 86 | | |
| | SGLFW2-20A120A | 40 | 125 | 1R6A, 2R1F | 1R6A |
| | SGLFW2-35A120A | 80 | 220 | | |
| | SGLFW2-35A230A | 160 | 440 | 3R8A | 5R5A |
| | SGLFW2-50A200B | 280 | 600 | 5R5A | |
| | SGLFW2-50A380B | 560 | 1,200 | 120A | – |
| | SGLFW2-1ZA200B | | | | |
| | SGLFW2-1ZA380B | 1,120 | 2,400 | 200A | |
| | SGLFW2-30A070A | 45 | 135 | 1R6A, 2R1F | 1R6A |
| | SGLFW2-30A120A | 90 | 270 | | |
| | SGLFW2-30A230A | 180 | 540 | 3R8A | – |
| | | 170 | 500 | 2R8A, 2R8F | 2R8A |
| | SGLFW2-45A200A | 280 | 840 | 5R5A | |
| | SGLFW2-45A380A | 560 | 1,680 | 180A | – |
| | | | 1,500 | 120A | |
| | SGLFW2-90A200A | 560 | 1,680 | | |
| | SGLFW2-90A380A | 1,120 | 3,360 | 200A | |
| | SGLFW2-90A560A | 1,680 | 5,040 | 330A | |
| | SGLFW2-1DA380A | 1,680 | 5,040 | 200A | |
| | SGLFW2-1DA560A | 2,520 | 7,560 | 330A | |
| SGLT<br>(Model with T-type iron core) | SGLTW-20A170A | 130 | 380 | 3R8A | 5R5A |
| | SGLTW-20A320A | 250 | 760 | 7R6A | |
| | SGLTW-20A460A | 380 | 1,140 | 120A | – |
| | SGLTW-35A170A | 220 | 660 | 5R5A | |
| | SGLTW-35A170H | 300 | 600 | | |
| | SGLTW-35A320A | 440 | 1,320 | 120A | – |
| | SGLTW-35A320H | 600 | 1,200 | | |
| | SGLTW-35A460A | 670 | 2,000 | 180A | |
| | SGLTW-40A400B | 670 | 2,600 | | |
| | SGLTW-40A600B | 1,000 | 4,000 | 330A | |
| | SGLTW-50A170H | 450 | 900 | 5R5A | |
| | SGLTW-50A320H | 900 | 1,800 | 120A | |
| | SGLTW-80A400B | 1,300 | 5,000 | 330A | – |
| | SGLTW-80A600B | 2,000 | 7,500 | 550A | |

# Recommended Encoders

## Incremental Linear Encoders

| Output Signal | Manufacturer | Encoder Type | Model | | | Encoder Pitch [μm] | Resolution [nm] | Maximum Speed*3 [m/s] | Support for Polarity Sensor Input | Application to Linear Motors | Application to Fully-closed Loop Control |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Scale | Sensor Head | Interpolator (Serial Converter Unit) | | | | | | |
| 1Vp-p Analog Voltage*1 | Heidenhain Corporation | Exposed | LIDA48□ | | (JZDP-H003/-H006)*5 | 20 | 78.1 | 5 | ✓ | ✓ | ✓ |
| | | | | | (JZDP-J003/-J006)*5 | | 4.9 | 2 | ✓ | ✓ | *9 |
| | | | LIF48□ | | (JZDP-H003/-H006)*5 | 4 | 15.6 | 1 | ✓ | ✓ | ✓ |
| | | | | | (JZDP-J003/-J006)*5 | | 1.0 | 0.4 | ✓ | *9 | *9 |
| | Renishaw plc*4 | Exposed | RGS20 | RGH22B | (JZDP-H005/-H008)*5 | 20 | 78.1 | 5 | ✓ | ✓ | ✓ |
| | | | | | (JZDP-J005/-J008)*5 | | 4.9 | 2 | ✓ | ✓ | *9 |
| Encoder for YASKAWA Serial Interface*2 | Magnescale Co., Ltd. | Exposed | SL7□0 | PL101-RY*6 | | 800 | 97.7 | 5 | — | ✓ | ✓ |
| | | | | PL101 | MJ620-T13*7 | | | | ✓ | ✓ | *9 |
| | | | SQ10 | PQ10 | MQ10-FLA | 400 | 48.83 | 3 | — | ✓ | ✓ |
| | | | | | MQ10-GLA | | | | ✓ | ✓ | |
| | | Sealed | SR75-□□□□□LF | | — | 80 | 9.8 | 3.33 | — | ✓ | ✓ |
| | | | SR75-□□□□□MF | | — | 80 | 78.1 | 3.33 | — | ✓ | ✓ |
| | | | SR85-□□□□□LF | | — | 80 | 9.8 | 3.33 | — | ✓ | ✓ |
| | | | SR85-□□□□□MF | | — | 80 | 78.1 | 3.33 | — | ✓ | ✓ |

## Absolute Linear Encoders

| Output Signal | Manufacturer | Encoder Type | Model | | | Encoder Pitch [μm] | Resolution [nm] | Maximum Speed*3 [m/s] | Support for Polarity Sensor Input | Application to Linear Motors | Application to Fully-closed Loop Control |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Scale | Sensor Head | Interpolator (Serial Converter Unit) | | | | | | |
| Encoder for YASKAWA Serial Interface*2 | Magnescale Co., Ltd. | Sealed | SR77-□□□□□LF | | — | 80 | 9.8 | 3.33 | — | ✓ | ✓ |
| | | | SR77-□□□□□MF | | — | 80 | 78.1 | 3.33 | — | ✓ | ✓ |
| | | | SR87-□□□□□LF | | — | 80 | 9.8 | 3.33 | — | ✓ | ✓ |
| | | | SR87-□□□□□MF | | — | 80 | 78.1 | 3.33 | — | ✓ | ✓ |
| | Mitutoyo Corporation | Exposed | ST781A | | — | 256 | 500 | 5 | — | ✓ | ✓ |
| | | | ST782A | | — | 256 | 500 | 5 | — | ✓ | ✓ |
| | | | ST783A | | — | 51.2 | 100 | 5 | — | ✓ | ✓ |
| | | | ST784A | | — | 51.2 | 100 | 5 | — | ✓ | ✓ |
| | | | ST788A | | — | 51.2 | 100 | 5 | — | ✓ | ✓ |
| | | | ST789A*10 | | — | 25.6 | 50 | 5 | — | ✓ | ✓ |
| | | | ST1381 | | — | 5.12 | 10 | 8 | — | ✓ | ✓ |
| | | | ST1382 | | — | 0.512 | 1 | 3.6*11 | — | ✓ | ✓ |
| | Heidenhain Corporation | Exposed | LIC4100 series | | EIB339IY*8 | 20.48 | 5 | 10 | — | ✓ | ✓ |
| | | | LIC2100 series | | | 204.8 | 50 | 10 | — | ✓ | ✓ |
| | | | | | | 409.6 | 100 | 10 | — | ✓ | ✓ |
| | | Sealed | LC115 | | | 40.96 | 10 | 3 | — | ✓ | ✓ |
| | | | LC415 | | | 40.96 | 10 | 3 | — | ✓ | ✓ |
| | Renishaw plc | Exposed | EL36Y-□□050F□□□ | | — | 12.8 | 50 | 100 | — | ✓ | ✓ |
| | | | EL36Y-□□100F□□□ | | — | 25.6 | 100 | 100 | — | ✓ | ✓ |
| | | | EL36Y-□□500F□□□ | | — | 128 | 500 | 100 | — | ✓ | ✓ |
| | | | RL36Y-□□050□□□ | | — | 12.8 | 50 | 100 | — | ✓ | ✓ |
| | | | RL36Y-□□001□□□ | | — | 0.256 | 1 | 3.6 | — | ✓ | ✓ |

* 1. You must also use a YASKAWA Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.
* 2. The multiplier (number of divisions) depends on the Linear Encoder. Also, you must write the motor constant file to the Linear Encoder in advance.
* 3. These are reference values for setting SERVOPACK parameters. Contact the manufacturer for actual linear encoder scale pitches.
* 4. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a YASKAWA SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
* 5. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected. If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
* 6. Use this model number to purchase the Serial Converter Unit.
* 7. Use this model number to purchase the Sensor Head with Interpolator.
* 8. Use this model number to purchase the Interpolator.
* 9. Contact your YASKAWA representative.
*10. Contact Mitutoyo Corporation for details on the Linear Encoders.
*11.The speed is restricted for some SERVOPACKs.

Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Encoder before you use it.

## Absolute Rotary Encoder

| Output Signal | Manufacturer | Encoder Type | Model | | Relay Device between Fully-Closed Module and Rotary Encoder | Resolution [Bits] | Maximum Speed*1 [min$^{-1}$] |
|---|---|---|---|---|---|---|---|
| | | | Scale | Sensor Head | | | |
| Encoder for YASKAWA Serial Interface (∑-LINK) | Magnescale Co., Ltd. | Sealed | RU77-4096ADF*2 | | – | 20 | 2,000 |
| | | | RU77-4096AFFT01*2 | | | 22 | 2,000 |
| | Heidenhain Corporation | Exposed | ECA4412*2 | | EIB3391Y | 27 | 1,600 |
| | | | | | | 28 | 800 |
| | | | | | | 29 | 400 |
| | | Sealed | RCN2□10*2 | | | 26 | 3,000 |
| | | | RCN5□10*2 | | | 28 | 800 |
| | | | RCN8□10*2 | | | 29 | 400 |
| | | | ROC2310*2 | | | 26 | 3,000 |
| | | | ROC7310*2 | | | 28 | 800 |
| | Renishaw PLC | Exposed | RA23Y-□□□□□□□□□*2 | | – | 23 | 14,600 |
| | | | RA26Y-□□□□□□□□□*2 | | | 26 | 3,250 |
| | | | RA30Y-□□□□□□□□□*2 | | | 30 | 200 |

* 1. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a YASKAWA SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
* 2. This is a single-turn absolute encoder.
Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Encoder before you use it.

# Model Designations

## Rotary Servomotors

### SGM7J - 01 A 7 A 2 1

Sigma-7 series Servomotors: SGM7J

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| A5 | 50 W |
| 01 | 100 W |
| C2 | 150 W |
| 02 | 200 W |
| 04 | 400 W |
| 06 | 600 W |
| 08 | 750 W |

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 6 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap |
| B | With two flat seats |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 VDC) |
| E | With oil seal and holding brake (24 VDC) |
| S | With oil seal |

### SGM7A - 01 A 7 A 2 1

Sigma-7 series Servomotors: SGM7A

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| A5 | 50 W |
| 01 | 100 W |
| C2 | 150 W |
| 02 | 200 W |
| 04 | 400 W |
| 06 | 600 W |
| 08 | 750 W |
| 10 | 1.0 kW |
| 15 | 1.5 kW |
| 20 | 2.0 kW |
| 30 | 3.0 kW |
| 40 | 4.0 kW |
| 50 | 5.0 kW |
| 70 | 7.0 kW |

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 6 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

Note: Readily available up to 1.5 kW. Others available on request.

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap |
| B* | With two flat seats |

* Code B is not supported for models with a rated output of 1.5 kW or higher.

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C* | With holding brake (24 VDC) |
| E | With oil seal and holding brake (24 VDC) |
| S | With oil seal |

### SGM7G - 03 A 7 A 2 1

Sigma-7 series Servomotors: SGM7G

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| 03 | 300 W |
| 05 | 450 W |
| 09 | 850 W |
| 13 | 1.3 kW |
| 20 | 1.8 kW |
| 30 | 2.9 kW* |
| 44 | 4.4 kW |
| 55 | 5.5 kW |
| 75 | 7.5 kW |
| 1A | 11.0 kW |
| 1E | 15.0 kW |

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 6 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight shaft with key and tap |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 VDC) |
| E | With oil seal and holding brake (24 VDC) |
| S | With oil seal |

Note: Readily available up to 1.5 kW. Others available on request.

* The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.

# Model Designations

SGMMV - A1 A 2 A 2 1

Sigma-5 mini series Servomotors: SGMMV

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| A1 | 10 W |
| A2 | 20 W |
| A3 | 30 W |

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 2 | 17-bit absolute |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| A | Straight with fl at seats (optional) |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 VDC) |

## Direct Drive Servomotors

SGM7D - 30 F 7 C 4 1

Direct Drive Servomotors

1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

**1st + 2nd digit - Rated Output**

| Code | Specification | Code | Specification |
|---|---|---|---|
| 01 | 1.3 Nm | 30 | 30 Nm |
| 02 | 2.06 Nm | 34 | 34 Nm |
| 03 | 3 Nm | 38 | 38 Nm |
| 05 | 5 Nm | 45 | 45 Nm |
| 06 | 6 Nm | 58 | 58 Nm |
| 08 | 8 Nm | 70 | 70 Nm |
| 09 | 9 Nm | 90 | 90 Nm |
| 12 | 12 Nm | 1Z | 100 Nm |
| 18 | 18 Nm | 1A | 110 Nm |
| 20 | 20 Nm | 1C | 130 Nm |
| 24 | 24 Nm | 2B | 220 Nm |
| 28 | 28 Nm | 2D | 240 Nm |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| F | 264 mm dia. |
| G | 160 mm dia. |
| H | 116 mm dia. |
| I | 264 mm dia. |
| J | 150 mm dia. |
| K | 107 mm dia. |
| L | 224 mm x 224 mm |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 7 | 24-bit multi-turn absolute encoder*1 |
| F | 24-bit incremental encoder*1 |

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| C | |

**6th digit - Flange**

| Code | Mounting | Servomotor Outer Diameter Code (3rd digit) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | F | G | H | I | J | K | L |
| 4 | Non-load side with cable on side | ✓ | ✓ | ✓ | — | — | — | ✓ |
| 5 | Non-load side with cable on bottom | ✓ | ✓*2 | — | ✓ | ✓ | ✓ | — |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Standard machine precision |
| 2 | High machine precision*3 |

*1. Both multiturn absolute encoder and incremental encoder can be used as a single-turn absolute encoder by setting parameters.
*2. SGM7D-01G and -05G are not available with a cable extending from the bottom.
*3. The SGM7D-01G, -05G, and -03H are available only with high mechanical precision.

## SGM7E - 02 B 7 A 1 1

Direct Drive Servomotors — 1st + 2nd — 3rd — 4th — 5th — 6th — 7th digit

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| 02 | 2 Nm |
| 04 | 4 Nm |
| 05 | 5 Nm |
| 07 | 7 Nm |
| 08 | 8 Nm |
| 10 | 10 Nm |
| 14 | 14 Nm |
| 16 | 16 Nm |
| 17 | 17 Nm |
| 25 | 25 Nm |
| 35 | 35 Nm |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |
| E | 290 mm dia. |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 7 | 24-bit multiturn absolute encoder* |
| F | 24-bit incremental encoder* |

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**6th digit - Flange**

| Code | Mounting |
|---|---|
| 1 | Non-load side |
| 4 | Non-load side (with cable on side) |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| 4 | High machine precision (runout at end of shaft and runout of shaft surface: 0.01 mm) |

* Both multiturn absolute encoder and incremental encoder can be used as a single-turn absolute encoder by setting parameters.
Note: 1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## SGM7F - 02 A 7 A 1 1

Direct Drive Servomotors — 1st + 2nd — 3rd — 4th — 5th — 6th — 7th digit

**1st + 2nd digit - Rated Output**

| Code | Specification | Code | Specification |
|---|---|---|---|
| Small-capacity Series, coreless | | Medium-capacity Series, with core | |
| 02 | 2 Nm | 45 | 45 Nm |
| 04 | 4 Nm | 80 | 80 Nm |
| 05 | 5 Nm | 1A | 110 Nm |
| 07 | 7 Nm | 1E | 150 Nm |
| 08 | 8 Nm | 2Z | 200 Nm |
| 10 | 10 Nm | | |
| 14 | 14 Nm | | |
| 16 | 16 Nm | | |
| 17 | 17 Nm | | |
| 25 | 25 Nm | | |
| 35 | 35 Nm | | |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| A | 100 mm dia. |
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |
| M | 280 mm dia. |
| N | 360 mm dia. |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 7 | 24-bit multiturn absolute encoder* |
| F | 24-bit incremental encoder* |

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**6th digit - Flange**

| Code | Mounting | Servomotor Outer Diameter Code (3rd digit) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | M | N |
| 1 | Non-load side | ✓ | ✓ | ✓ | ✓ | — | — |
| | Load side | — | — | — | — | ✓ | ✓ |
| 3 | Non-load side | — | — | — | — | ✓ | ✓ |
| 4 | Non-load side (with cable on side) | ✓ | ✓ | ✓ | ✓ | — | — |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| 2 | High machine precision (runout at end of shaft and runout of shaft surface: 0.01 mm) |

* Both multiturn absolute encoder and incremental encoder can be used as a single-turn absolute encoder by setting parameters.
Note: 1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# Model Designations

## SGMCS - 02 B 3 C 1 1 - E

Direct Drive Servomotors — 1st + 2nd | 3rd | 4th | 5th | 6th | 7th | 8th digit

### 1st + 2nd digit - Rated Output

| Code | Specification | Code | Specification |
|---|---|---|---|
| Small-capacity Series, coreless | | Medium-capacity Series, with core | |
| 02 | 2 Nm | 45 | 45 Nm |
| 04 | 4 Nm | 80 | 80 Nm |
| 05 | 5 Nm | 1A | 110 Nm |
| 07 | 7 Nm | 1E | 150 Nm |
| 08 | 8 Nm | 2Z | 200 Nm |
| 10 | 10 Nm | | |
| 14 | 14 Nm | | |
| 16 | 16 Nm | | |
| 17 | 17 Nm | | |
| 25 | 25 Nm | | |
| 35 | 35 Nm | | |

### 3rd digit - Servomotor Outer Diameter

| Code | Specification |
|---|---|
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |
| E | 290 mm dia. |
| M | 280 mm dia. |
| N | 360 mm dia. |

### 4th digit - Serial Encoder

| Code | Specification |
|---|---|
| 3 | 20-bit single-turn absolute encoder |
| D | 20-bit incremental encoder |

### 5th digit - Design Revision Order

| Code | Specification |
|---|---|
| A | Model with servomotor outer diameter code M or N |
| B | Model with servomotor outer diameter code E |
| C | Model with servomotor outer diameter code B, C, or D |

### 6th digit - Flange

| Code | Mounting | Servomotor Outer Diameter Code (3rd digit) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | C | D | E | M | N |
| 1 | Non-load side | ✓ | ✓ | ✓ | ✓ | — | — |
| | Load side | — | — | — | — | ✓ | ✓ |
| 3 | Non-load side | — | — | — | — | ✓ | ✓ |
| 4 | Non-load side (with cable on side) | ✓ | ✓ | ✓ | ✓ | — | — |

### 7th digit - Options

| Code | Specification |
|---|---|
| 1 | Without options |

### 8th digit

| Code | Specification |
|---|---|
| E | RoHS II Suffix |

Note:
1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## SGMCV - 04 B E A 1 1

Direct Drive Servomotors — 1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit

### 1st + 2nd digit - Rated Output

| Code | Specification |
|---|---|
| 04 | 4 Nm |
| 08 | 8 Nm |
| 10 | 10 Nm |
| 14 | 14 Nm |
| 17 | 17 Nm |
| 25 | 25 Nm |
| 35 | 35 Nm |

### 3rd digit - Servomotor Outer Diameter

| Code | Specification |
|---|---|
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |

### 4th digit - Serial Encoder

| Code | Specification |
|---|---|
| E | 22-bit single-turn absolute encoder |
| I | 22-bit multiturn absolute encoder |

### 9th digit - Design Revision Order

| Code | Specification |
|---|---|
| A | Standard Model |

### 6th digit - Flange

| Code | Mounting |
|---|---|
| 1 | Non-load side |
| 4 | Non-load side (with cable on side) |

### 7th digit - Options

| Code | Specification |
|---|---|
| 1 | Without options |
| 5 | High machine precision (runout at end of shaft and runout of shaft surface: 0.01 mm) |

Note:
1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# Linear Servomotors SGLG (Coreless Models)

## Moving Coil

SGL G W - 30 A 050 C P □ - E

Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th | 6th - 8th | 9th | 10th | 11th | 12th digit

**1st digit - Servomotor Type**

| Code | Specifications |
|---|---|
| G | Coreless model |

**2nd digit - Moving Coil/ Magnetic Way**

| Code | Specification |
|---|---|
| W | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 40 | 40 mm |
| 60 | 60 mm |
| 90 | 86 mm |

**5th digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**6th ... 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 050 | 50 mm |
| 080 | 80 mm |
| 140 | 140 mm |
| 200 | 199 mm |
| 253 | 252.5 mm |
| 365 | 365 mm |
| 370 | 367 mm |
| 535 | 535 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |

**10th digit - Sensor Specification and Cooling Method**

| Code | Specifications | | Applicable Models |
|---|---|---|---|
| | Polarity Sensor | Cooling Method | |
| None | None | Self-cooled | All models |
| C | None | Air-cooled | SGLGW-40A, -60A, -90A |
| H | Yes | Air-cooled | |
| P | Yes | Self-cooled | All models |

**11th digit - Connector for Servomotor Main Circuit Cable**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Connector from Tyco Electronics Japan G.K. | All models |
| D | Connector from Interconnectron GmbH | SGLGW-30A, -40A, -60A |

**12th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## Magnetic Way

SGL G M - 30 108 C □ - E

Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th - 7th | 8th | 9th | 10th digit

**1st digit - Servomotor Type**

| Code | Specifications |
|---|---|
| G | Coreless model |

**2nd digit - Moving Coil/ Magnetic Way**

| Code | Specifications |
|---|---|
| M | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specifications |
|---|---|
| 30 | 30 mm |
| 40 | 40 mm |
| 60 | 60 mm |
| 90 | 86 mm |

**5rd ... 7th digit - Length of Magnetic Way**

| Code | Specifications |
|---|---|
| 090 | 90 mm |
| 108 | 108 mm |
| 216 | 216 mm |
| 225 | 225 mm |
| 252 | 252 mm |
| 360 | 360 mm |
| 405 | 405 mm |
| 432 | 432 mm |
| 450 | 450 mm |
| 504 | 504 mm |

**8th digit - Design Revision Order**

| Code | Specifications |
|---|---|
| A, B, C* | Revision |

**9th digit - Options**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Standard-force | All models |
| -M | High-force | SGLGM-40, -60 |

**10th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

*: SGLGM-40 and SGLGM-60 also have a CT Code.
C = Without mounting holes on the bottom.
CT = With mounting holes on the bottom.

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# Linear Servomotors (Models with F-type Iron Cores)

## Moving Coil

| S | G | L | | F | W2 | - | 30 | A | 070 | A | S | 1 | E | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series Linear Servomotors | | | | 1st | 2nd | | 3rd + 4th | 5th | 6th - 8th | 9th | 10th | 11th | 12th | digit |

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| W2 | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

**5th digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**6th ... 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 070 | 70 mm |
| 120 | 125 mm |
| 200 | 205 mm |
| 230 | 230 mm |
| 380 | 384 mm |
| 560 | 563 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**10th digit - Sensor Specification**

| Code | Specification |
|---|---|
| S | With polarity sensor and thermal protector |
| T | Without polarity sensor, with thermal protector |

**11th digit - Options**

| Code | Cooling Method |
|---|---|
| 1 | Self-cooled |
| L | Water-cooled* |

**12th digit - Options**

| Code | Connection |
|---|---|
| E | Metal round connector (Phoenix) |

* Contact your YASKAWA representative for information on water-cooled model.
Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## Magnetic Way

| S | G | L | | F | M2 | - | 30 | 270 | A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series Linear Servomotors | | | | 1st | 2nd | | 3rd + 4th | 5th - 7th | 8th | digit |

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| M2 | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

**5th ... 7th digit - Length of Magnetic Way**

| Code | Specification |
|---|---|
| 270 | 270 mm |
| 306 | 306 mm |
| 450 | 450 mm |
| 510 | 510 mm |
| 630 | 630 mm |
| 714 | 714 mm |

**8th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# SGLFW (Models with F-type Iron Cores)

## Moving Coil

S G L F W - 20 A 090 A P □ - E

| Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th | 6th - 8th | 9th | 10th | 11th | 12th | digit |
|---|---|---|---|---|---|---|---|---|---|---|

**1st digit - Specification**

| Code | Servomotor Type |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/ Magnetic Way**

| Code | Specification |
|---|---|
| W | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 20 | 20 mm |
| 35 | 36 mm |
| 50 | 47.5 mm |
| 1Z | 95 mm |

**5th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**6th - 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 090 | 91 mm |
| 120 | 127 mm |
| 200 | 215 mm |
| 230 | 235 mm |
| 380 | 395 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |

**10th digit - Sensor Specification**

| Code | Specification |
|---|---|
| P | With polarity sensor |
| None | Without polarity sensor |

**11th digit - Connector for Servomotor Main Circuit Cable**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Connector from Tyco Electronics Japan G.K. | All models |
| D | Connector from Interconnectron GmbH | SGLFW-35, -50, -1Z□200B |

**12th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## Magnetic Way

S G L F M - 20 324 A □ - E

| Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th - 7th | 8th | 9th | 10th | digit |
|---|---|---|---|---|---|---|---|---|

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| M | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 20 | 20 mm |
| 35 | 36 mm |
| 50 | 47.5 mm |
| 1Z | 95 mm |

**5rd ... 7th digit - Length of Magnetic Way**

| Code | Specification |
|---|---|
| 324 | 324 mm |
| 405 | 405 mm |
| 540 | 540 mm |
| 675 | 675 mm |
| 756 | 756 mm |
| 945 | 945 mm |

**8th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |

**9th digit - Options**

| Code | Specification |
|---|---|
| None | Without options |
| C | With magnet cover |

**10th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# SGLT (Models with T-type Iron Cores)

## Moving Coil

SGL T W - 20 A 170 A P □ - E

Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th | 6th ... 8th | 9th | 10th | 11th | 12th | digit

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| T | With T-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| W | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 20 | 20 mm |
| 35 | 36 mm |
| 40 | 40 mm |
| 50 | 51 mm |
| 80 | 76.5 mm |

**5th digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**6th ... 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 170 | 170 mm |
| 320 | 315 mm |
| 400 | 394.2 mm |
| 460 | 460 mm |
| 600 | 574.2 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |
| H | High-efficiency model |

**10th digit - Sensor Specifications and Cooling Method**

| Code | Specifications | | Applicable Models |
|---|---|---|---|
| | Polarity Sensor | Cooling Method | |
| None | None | Self-cooled | All models |
| C* | None | Water-cooled | SGLTW-40, -80 |
| H* | Yes | Water-cooled | |
| P | Yes | Self-cooled | All models |

**11th digit - Connector for Servomotor Main Circuit Cable**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Connector from Tyco Electronics Japan G.K. | SGLTW-20A□□□□□<br>-35A□□□□□ |
| | MS connector | SGLTW-40A□□□□B□<br>-80A□□□□B□ |
| | Loose lead wires with no connector | SGLTW-35A□□□H□<br>-50A□□□H□ |

**12th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

* Contact your YASKAWA representative for the characteristics, dimensions, and other details on servomotors with these specifications.

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combination of codes.

## Magnetic Way

SGL T M - 20 324 A □ - E

Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th ... 7th | 8th | 9th | 10th | digit

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| T | With T-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| M | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 20 | 20 mm |
| 35 | 36 mm |
| 40 | 40 mm |
| 50 | 51 mm |
| 80 | 76.5 mm |

**5th ... 7th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 324 | 324 mm |
| 405 | 405 mm |
| 540 | 540 mm |
| 675 | 675 mm |
| 756 | 756 mm |
| 945 | 945 mm |

**8th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |
| H | High-efficiency model |

**9th digit - Options**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without options | – |
| C | With magnet cover | All models |
| Y | With base and magnet cover | SGLTM-20, -35*, -40, -80 |

**10th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

* The SGLTM-35□□□H (high-efficiency models) do not support this specification.

## SERVOPACKs

SGD7S - R70 A 00 A 001 F50

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |
|---|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5*1 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120*2 | 1.5 kW |
| 180 | 2.0 kW |
| 200*3 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| 00 | Analog Voltage/ Pulse train reference |
| 10 | MECHATROLINK-II communication reference |
| 20 | MECHATROLINK-III communication reference |
| 30 | MECHATROLINK-III communication reference with RJ45 connector |
| A0 | EtherCAT communication reference |
| C0 | PROFINET communication reference |
| E0 | Command Option Attachable Type*5 |
| M0 | Sigma-7Siec (with integrated iec-Controller) |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 001 | Rack-mounted | SGD7S-R70A to -330A |
| | Duct-ventilated | SGD7S-470A to -780A |
| 002 | Varnished | All models |
| 008 | Single-phase, 200 V power input | SGD7S-120A |
| 020*6 | No dynamic brake | SGD7S-R70A to -2R8A |
| | External dynamic brake resistor | SGD7S-3R8A to -780A |
| 00A | Varnished and single-phase power input | All models |

**11th ... 13th digit - FT/EX Specifications**

| Code | Specifications |
|---|---|
| None | None |
| F50*8 | Application function for integrated MPiec |
| F82*7 | Application function option for special motors, SGM7D motor drive |
| F83*7 | Application function option for special motors, SGM7D motor drive, indexing |

Note:

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)
*8. Applicable for Sigma-7Siec models.

# Model Designations

## SGD7W - 1R6 A 20 A 700

| Sigma-7 Series Sigma-7W Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | digit |
|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity per Axis**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 5R5*2 | 0.75 kW |
| 7R6 | 1.0 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*3**

| Code | Specification |
|---|---|
| 20 | MECHATROLINK-III communication Reference |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 700*4 | HWBB Option | All models |

Note:
Additional accessories and software for SERVOPACKs is described in the Periphery section.
*1. You can use these models with either a single-phase or three-phase power supply input. For more information, please contact your YASKAWA representative.
*2. If you use the SGD7W-5R5A with a single-phase 200-VAC power supply input, derate the load ratio to 65%. An example is given below.
If the load ratio of the fi rst axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65% ((90% + 40%)/2 = 65%).
*3. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*4. Refer to the following manual for details.
Sigma-7 Series AC Servo Drive Sigma-7W/Sigma-7C SERVOPACK with Hardware Option Specifications HWBB Function Product Manual (Manual No.: SIEP S800001 72)

## SGD7C - 1R6 A MA A 700

| Sigma-7 Series Sigma-7C Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | digit |
|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity per Axis**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 5R5*2 | 0.75 kW |
| 7R6 | 1.0 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*3**

| Code | Specification |
|---|---|
| 20 | MECHATROLINK-III communication Reference |
| MA | Bus connection with references |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 700*4 | HWBB Option | All models |

Note:
Additional accessories and software for SERVOPACKs is described in the Periphery section.
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. If you use the SGD7W-5R5A with a single-phase 200-VAC power supply input, derate the load ratio to 65%. An example is given below.
If the load ratio of the fi rst axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65% ((90% + 40%)/2 = 65%).
*3. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*4. Refer to the following manual for details.
Sigma-7 Series AC Servo Drive Sigma-7W/Sigma-7C SERVOPACK with Hardware Option Specifications HWBB Function Product Manual (Manual No.: SIEP S800001 72)

# Related Documents

The documents that are related to the MP3300 Machine Controllers and Sigma-7 series AC Servo Drives are shown in the following table. Refer to these documents as required.

| Document Name (Document No.) | | Description of Document |
|---|---|---|
| **MP3300 Documents**<br>Machine Controller MP3300<br>(KAEP C880725 03) | **MP3000 Series Manual** | Describes the functions, specifications, operating methods, maintenance, inspections, and troubleshooting of the MP3000-Series MP3300 Machine Controllers. |
| | MP3300 Product Manual<br>(SIEP C880725 21) | |
| | MP3300iec Machine Controller Hardware Manual<br>(YAI-SIA-IEC-7) | |
| **Sigma-7 Series Documents**<br>AC Servo Drives<br>Sigma-7 Series | **Sigma-7 Series SERVOPACK Product Manual** | Provide detailed information on selecting Sigma-7 Series SERVOPACKs and information on installing, connecting, setting, performing trial operation for, tuning, and monitoring the Servo Drives. |
| | Sigma-7S SERVOPACK with MECHATROLINK-III Communications References<br>(SIEP S800001 28) | |
| | Sigma-7S SERVOPACK with MECHATROLINK-II Communications References<br>(SIEP S800001 27) | |
| | Sigma-7S SERVOPACK with Analog Voltage/Pulse Train References<br>(SIEP S800001 26) | |
| | Sigma-7S SERVOPACK Command Option Attachable Type with INDEXER Module<br>(SIEP S800001 64) | |
| | Sigma-7S SERVOPACK Command Option Attachable Type with DeviceNet Module<br>(SIEP S800001 70) | |
| | Sigma-7W SERVOPACK with MECHATROLINK-III Communications References<br>(SIEP S800001 29) | |
| | Sigma-5-Series/ -Series for Large-Capacity Models/ Sigma-7-Series User's Manual Safety Module<br>(SIEP C720829 06) | Provides details information required for the design and maintenance of a Safety Module. |
| | Sigma-7C SERVOPACK<br>(SIEP S800002 04) | Provides detailed information on selecting Sigma-7-Series Sigma-7C SERVOPACKs; installing, connecting, setting, testing in trial operation, and tuning Servo Drives; writing, monitoring, and maintaining programs; and other information. |
| | Sigma-7C SERVOPACK Motion Control User's Manual<br>(SIEP S800002 03) | Provides detailed information on the specifications, system configuration, and application methods of the Motion Control Function Modules (SVD, SVC4, and SVR4) for Sigma-7-Series Sigma-7C SERVOPACKS. |
| | Sigma-7C SERVOPACK Troubleshooting Manual<br>(SIEP S800002 07) | Provides detailed troubleshooting information for Sigma-7-Series Sigma-7C SERVOPACKs. |
| | Machine Controller MP3000 Series Communications User's Manual<br>(SIEP C880725 12) | Provides detailed information on the specifications, system configuration, and communications connection methods for the Ethernet communications that are used with Sigma-7-Series Sigma-7C SERVOPACKs. |
| | Sigma-7S / Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake<br>(SIEP S800001 73) | Provides detailed information on Hardware Options for Simga-7-Series SERVOPACKs. |
| | Sigma-7W / Sigma-7C SERVOPACK with Hardware Option Specifications HWBB Function<br>(SIEP S800001 72) | |
| | Sigma-7-Series AC Servo Drive Sigma-7S SERVOPACK with Hardware Option Specifications Dynamic Brake<br>(SIEP S800001 91) | Provides detailed information on Options for Sigma-7S SERVOPACK with FT/EX Specification. |
| | Sigma-7 PROFINET Hardware Manual<br>(SIEP YEUOC7P 01) | Provides detailed information required on Sigma-7 PROFINET SERVOPACKs. |
| | Sigma-7 Siec Hardware Manual<br>(IG.S7Siec.01) | Provides detailed information required on Sigma-7 Siec SERVOPACKs. |
| | Sigma-5-Series / Sigma-5-Series for Large-Capacity Models / Sigma-7-Series User's Manual Safety Module<br>(SIEP C720829 06) | Provides detailed information required for the design and maintenance of a Safety Module. |

Continued on next page.

# Related Documents

Continued on next page.

| Document Name (Document No.) | | Description of Document |
|---|---|---|
| **Sigma-7 Series Documents**<br>AC Servo Drives<br>Sigma-7 Series | **Sigma-7 Series Servomotor Product Manual** | Provides detailed information on selecting, installing, and connecting the Sigma-7 Series Servomotors. |
| | Rotary Servomotor<br>Product Manual<br>(SIEP S800001 36) | |
| | Linear Servomotor<br>Product Manual<br>(SIEP S800001 37) | |
| | Direct Drive Servomotor<br>Product Manual<br>(SIEP S800001 38) | |
| | **Others** | Provides detailed information on the MECHATROLINK-III communications standard servo profi le commands that are used for a Sigma-7 Series Servo System. |
| | MECHATROLINK-III Communications<br>Standard Servo Profi le Command Manual<br>(SIEP S800001 31) | |
| | MECHATROLINK-II Communications<br>Command Manual<br>(SIEP S800001 30) | Provides detailed information on the MECHATROLINK-II communications commands that are used for a Sigma-7 Series Servo System. |
| | Digital Operator Operating Manual<br>(SIEP S800001 33) | Describes the operating procedures for a Digital Operator for a Sigma-7 Series Servo System. |
| | Engineering Tool SigmaWin+ Operation Manual<br>(SIEP S800001 34) | Provides detailed operating procedures for the SigmaWin+ Engineering Tool for a Sigma-7 Series Servo System. |
| | Machine Controller MP2000/MP3000 Series<br>Engineering Tool MPE720 Version 7 User's Manual<br>(SIEP C880761 03) | Describes in detail how to operate MPE720 version 7. |
| | Machine Controller MP3000<br>Series Ladder Programming Manual<br>(SIEP C880725 13) | Provides detailed information on the ladder programming specifications and instructions for Sigma-7-Series Sigma-7C SERVOPACKs. SERVOPACKs. |
| | Machine Controller MP3000<br>Series Motion Prgramming Manual<br>(SIEP C880725 14) | Provides detailed information on the motion programming and sequence programming specifi cations and instructions for Sigma-7-Series Sigma-7C SERVOPACKs. |
| | Machine Controller MP2600iec Hardware Manual<br>(YEA-SIA-IEC-6) | |
| | Function Block Manual<br>(HB500 \| DM C-LIB_PN \| D MC-LIB_Sigma7-PN V1.0 \| en) | |

# FT Specifications

The know-how we have acquired in every market has resulted in the creation of a lineup of SERVOPACKs with FT specifications that have added functions to optimally suit a variety of applications.
Please contact your local YASKAWA representative for further information.

| FT Specifications | Applications | Additional Functions | Features | Interface | | | |
|---|---|---|---|---|---|---|---|
| | | | | A/P | ML-II | ML-III | EtherCAT |
| **FT19** | Tracking | Built-in Less Deviation Control | Little delay in motor operations for position reference as a result of built-in less deviation control. Ideal for applications that require reference tracking performance (high position accuracy) during movement. | ✓ | – | ✓ | – |
| **FT21** | Machining and Cutting | Feed Shaft Supporting | Improved tracking ability and high-accuracy machining operations with the use of clearance (constant distance) control, predictive control, and quadrant projection compensation functions. | – | – | ✓ | – |
| **FT40** | Press and Injection Molding | Pressure Feedback | Highly accurate pressure control with input of pressure sensor signals directly to the SERVOPACK. | – | – | ✓ | – |
| **FT41** | Press and Injection Molding | Pressure Feedback | Highly accurate pressure control by feeding back the signals of the pressure sensors directly to the SERVOPACK through the MECHATROLINK-I/O system. | – | – | ✓ | – |
| **FT60** | Conveyance | Three-Point Latching | The host controller can detect the orientation of the workpiece or offsets in multiple workpieces based on the information on the three positions input to the SERVOPACK. | – | – | ✓ | – |
| **FT62** | Conveyance and Alignment | Triggers at Pre-set Positions and Rotational Coordinate System | Addition of pass-through signals for designated points to enable coordinated operations with the use of trigger signals. Turntables can be easily controlled with infinite-length coordinates. | – | – | ✓ | – |
| **FT63** | Conveyance | Built-in Semi-Closed/ Fully-Closed Loop Control Online Switching Function | Allows loop control to be switched between semi-closed/fully-closed while online. | ✓ | – | ✓ | – |
| **FT70** | Gantry | Built-in Optimal Gantry Control | Three built-in functions (Position correction table, Synchronized stopping during alarms, and the Position deviation between axes overflow detection) effective for driving gantries. | – | – | ✓ | – |
| **FT77** | Conveyance | Built-in Torque/Force Assistance | Multiple SERVOPACKs can be used for applications that require more than one axis to easily build a system will increase the torque or force up to five times. | ✓ | – | ✓ | – |
| **FT79** | Indexing | Built-in INDEXER | Convenient positioning functions (ZONE signal outputs, job speed table, homing, other) added for high-precision and high-speed positioning without a motion controller. | ✓ | – | – | – |
| **FT81** | For Special Motors | Harmonic Drive Systems Actuator | SERVOPACKs with the capability to use Harmonic Drive Systems. | – | ✓ | ✓ | ✓ |
| **FT82** | For Special Motors | SGM7D Motor Drive | SERVOPACKs with high torque, high precision, and a user-friendly design for SGM7D motors. | ✓ | ✓ | ✓ | ✓ |
| **FT83** | For Special Motors | SGM7D Motor Drive | SERVOPACKs with built-in INDEXER for SGM7D motors. | ✓ | – | – | – |
| **FT84** | Conveyance and Alignment with SGM7D | Triggers at Pre-set Positions and Rotational Coordinate System | Addition of pass-through signals for designated points to enable coordinated operations with use of trigger signals. Turntables can be easily controlled with infinte-length coordinates. | – | – | ✓ | – |

✓ :Possible – :Not possible

## SGMMV

- Low inertia, ultra-small capacity
- 10 W - 30 W

## SGM7A

- Low inertia, high speed
- 50 W - 7 kW

## SGM7J

- Medium inertia, high speed
- 50 W - 750 W

## SGM7G

- Medium inertia, large torque
- 300 W - 15 kW

Note: Readily available up to 1.5 kW. Others available on request.

# Rotary Servomotors

SGMMV 34
SGM7A 44
SGM7J 68
SGM7G 82

# Model Designations

SGMMV - A1 A 2 A 2 1

| SGMMV | - | A1 | A | 2 | A | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 series Servomotors: SGMMV | | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th | digit |

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| A1 | 10 W |
| A2 | 20 W |
| A3 | 30 W |

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 V AC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 2 | 17-bit absolute |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight |
| A | Straight with flat seats |

**7th digit - Options**

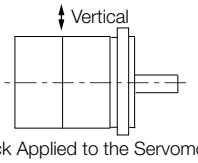
| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 V DC) |

# Specifications and Ratings

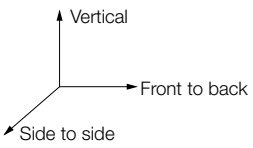
## Specifications

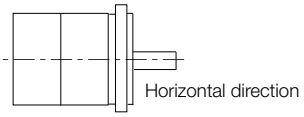
| Voltage | | 200 V | | |
|---|---|---|---|---|
| Model SGMMV- | | A1A | A2A | A3A |
| Time Rating | | Continuous | | |
| Thermal Class | | B | | |
| Insulation Resistance | | 500 VDC, 10 MOhm min. | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | |
| Excitation | | Permanent magnet | | |
| Mounting | | Flange-mounted | | |
| Drive Method | | Direct drive | | |
| Rotation Direction | | Counterclockwise (CCW) for forward reference when viewed from the load side | | |
| Vibration Class *1 | | V15 | | |
| Environmental Conditions | Surrounding Air Temperature | 0 °C to 40 °C | | |
| | Surrounding Air Humidity | 20% to 80% relative humidity (non-condensing) | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | |
| | Storage Environment | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>• Storage Temperature: -20 °C to 60 °C (with no freezing)<br>• Storage Humidity: 20% to 80% relative humidity (non-condensing) | | |
| Shock Resistance *2 | Impact Acceleration Rate at Flange | 490 m/s$^2$ | | |
| | Number of Impacts | 2 times | | |
| Vibration Resistance *2 | Vibration Acceleration Rate at Flange | 49 m/s$^2$ | | |
| Applicable SERVOPACKS | SGD7S- | R90A, R90F | | 1R6A, 2R1F |
| | SGD7W-<br>SGD7C- | 1R6A *3, 2R8A *3 | | 1R6A, 2R8A *3 |

*1 A Vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2 The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures. The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.



Shock Applied to the Servomotor



Vibration Applied to the Servomotor

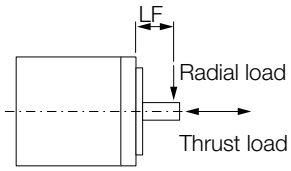
*3 If you use a Servomotor together with a Sigma-7W or Sigma-7C SERVOPACK, the control gain may not increase as much as with a Sigma-7S SERVOPACK and other performances may be lower than those achieved with a Sigma-7S SERVOPACK.

# Ratings

| Voltage | | | 200 V | | |
|---|---|---|---|---|---|
| Model SGMMV- | | | A1A | A2A | A3A |
| Rated Output *1 | | W | 10 | 20 | 30 |
| Rated Torque *1, *2 | | Nm | 0.0318 | 0.0637 | 0.0955 |
| Instantaneous Maximum Torque *1 | | Nm | 0.0955 | 0.191 | 0.286 |
| Rated Current *1 | | A | 0.70 | 0.66 | 0.98 |
| Instantaneous Maximum Current *1 | | A | 2.0 | 1.9 | 2.9 |
| Rated Motor Speed *1 | | $min^{-1}$ | 3000 | | |
| Maximum Motor Speed *1 | | $min^{-1}$ | 6000 | | |
| Torque Constant | | Nm/A | 0.0516 | 0.107 | 0.107 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg·$m^2$ | 2.72 (4.07) | 4.66 (6.02) | 6.68 (8.04) |
| Rated Power Rate *1 | | kW/s | 3.72 | 8.71 | 13.7 |
| Rated Angular Acceleration Rate *1 | | rad/s | 117,000 | 137,000 | 143,000 |
| Heat Sink Size (Aluminium) *3 | | mm | 150 × 150 × 3 | | 250 × 250 × 6 |
| Protective Structure *4 | | | Totally enclosed, self-cooled, IP55 (except for shaft opening) | | |
| Holding Brake Specifications *5 | Rated Voltage | V | 24 VDC±10% | | |
| | Capacity | W | 2.0 | 2.6 | |
| | Holding Torque | Nm | 0.0318 | 0.0637 | 0.0955 |
| | Coil Resistance | Ω (at 20 °C) | 320 | 221.5 | |
| | Rated Current | A (at 20 °C) | 0.075 | 0.108 | |
| | Time Required to Release Brake | ms | 40 | | |
| | Time Required to Brake | ms | 100 | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) *6 | | | 30 times | | |
| | With External Regenerative Resistor | | | | |
| Allowable Shaft Load *7 | LF | mm | 16 | | |
| | Allowable Radial Load | N | 34 | 44 | |
| | Allowable Thrust Load | N | 14.5 | | |

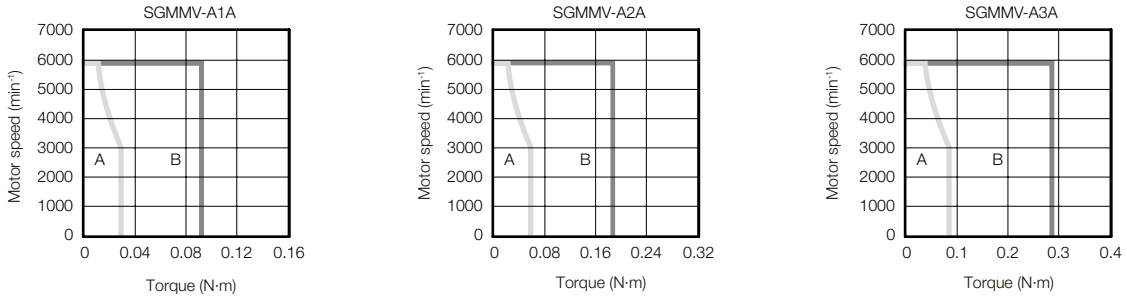
Notes:
The values in parentheses are for Servomotors with Holding Brakes.
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
*2. The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.
*3. Refer to the „Servomotor Heat Dissipation Conditions“ section for the relation between the heat sinks and derating rate.
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.
*7. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.



# Torque-motor Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone*

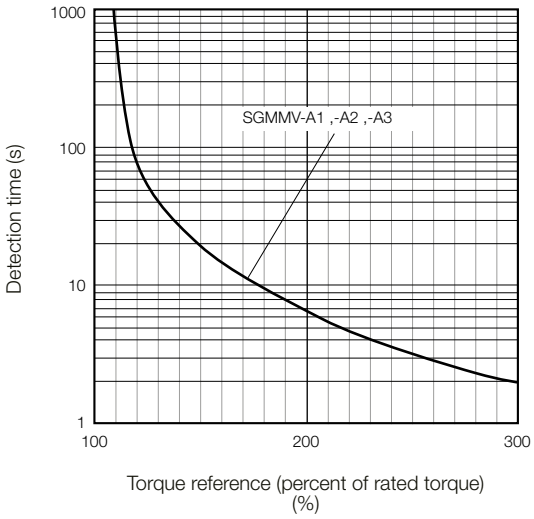



* The characteristics are the same for three-phase 200 V, single-phase 200 V and single-phase 100 V input..

Notes:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100 °C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque motor speed characteristics will become smaller because the voltage drop increases.

# Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Servomotor Ratings section. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required steps for each of the following cases. Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.

## Exceeding the allowable Load Moment of Inertia

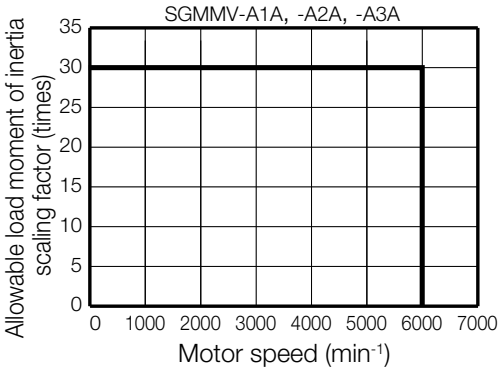
Use one of the following measures to adjust the load moment of inertia to within the allowable value.
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to Built-In Regenerative Resistor section for the regenerative power (W) that can be processed by the SERVOPACKs. Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

## SERVOPACKs without built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.




Note: Applicable SERVOPACK models: SGD7S-R90A, -1R6A, -R90F, and -2R1F

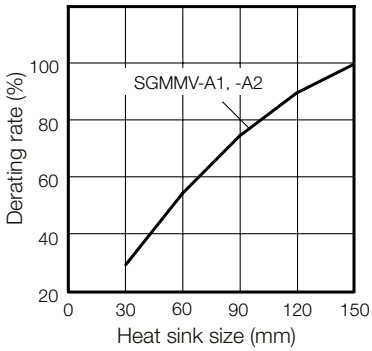
## When an external Regenerative Resistor is required

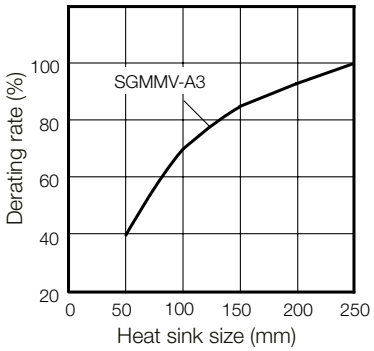
Install the External Regenerative Resistor. Refer to the “External Regenerative Resistors” section for the recommended products.

# Derating Rates

## Servomotor Heat Dissipation Conditions

The Servomotor ratings are the continuous allowable values when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.




Important

The actual temperature rise depends on how the heat sink (i.e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.

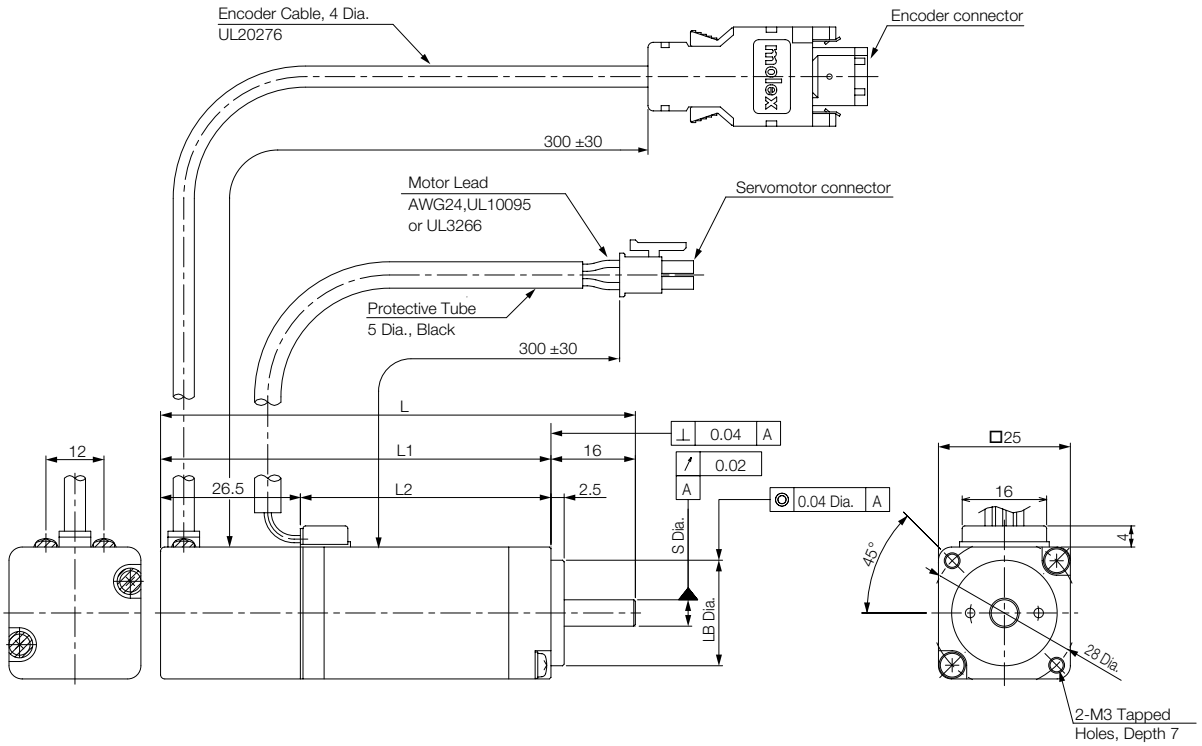
Information
When using Servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in “Servomotor Overload Protection Characteristics”.

Note
The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your YASKAWA representative.

# External Dimensions

## Servomotors without Holding Brakes

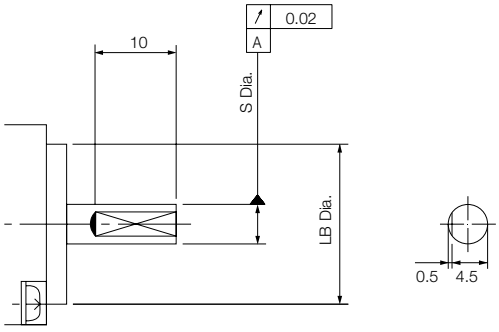
### SGMMV-A1, -A2 and -A3




| Model SGMMV | L | L1 | L2 | Flange Dimensions | | Approx. |
|---|---|---|---|---|---|---|
| | | | | S | LB | Mass [kg] |
| A1A2A□1 | 70 | 54 | 27.5 | 5 $^{0}_{-0.008}$ | 20 $^{0}_{-0.021}$ | 0.13 |
| A2A2A□1 | 80 | 64 | 37.5 | 5 $^{0}_{-0.008}$ | 20 $^{0}_{-0.021}$ | 0.17 |
| A3A2A□1 | 90 | 74 | 47.5 | 5 $^{0}_{-0.008}$ | 20 $^{0}_{-0.021}$ | 0.21 |

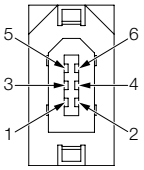
## Shaft End Specifications

### Straight with Flat Seats




## Connector Specifications

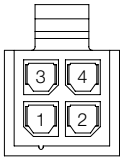
### Encoder Connector




| | | |
|---|---|---|
| 1 | PG5V | Red |
| 2 | PG0V | Black |
| 3* | BAT | Orange |
| 4* | BAT0 | Orange/ White |
| 5 | PS | Light blue |
| 6 | /PS | Light blue/ white |
| Connector Case | FG (frame ground) | Shield |

*) A battery is required only for an absolute encoder.
Model: 55102-0600
Manufacturer: Molex Japan LLC
Mating Connector: 54280-0609

### Servomotor Connector

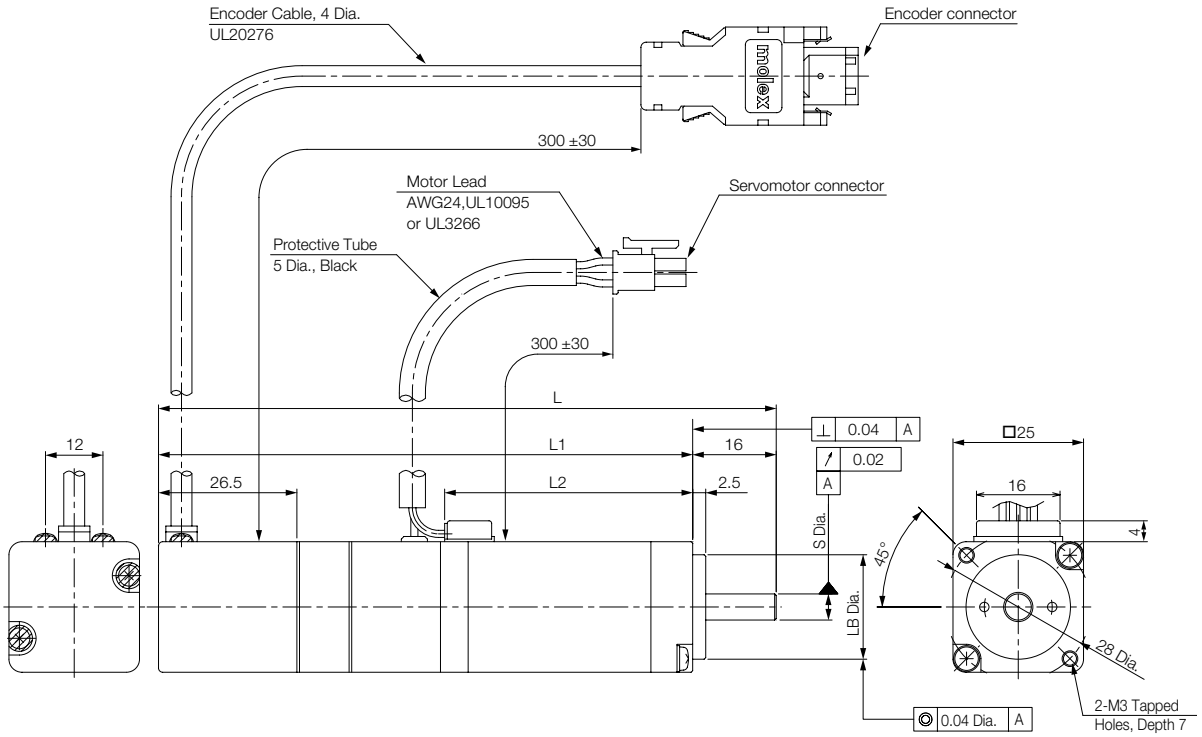



| | |
|---|---|
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | FG (frame ground) |

Receptacle: 43025-0400
Manufacturer: Molex Japan LLC

## Servomotors with Holding Brakes

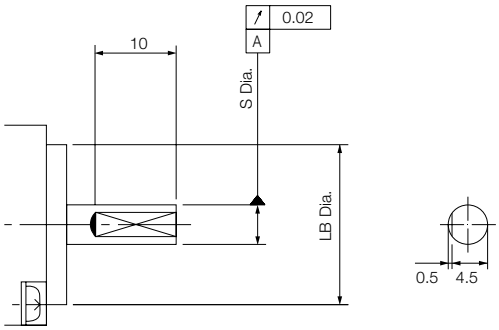
### SGMMV-A1, -A2 and -A3




| Model SGMMV | L | L1 | L2 | Flange Dimensions | | Approx. |
|---|---|---|---|---|---|---|
| | | | | S | LB | Mass [kg] |
| A1A2A□C | 94.5 | 78.5 | 27.5 | 5 $^{0}_{-0.008}$ | 20 $^{0}_{-0.021}$ | 0.215 |
| A2A2A□C | 108.5 | 92.5 | 37.5 | 5 $^{0}_{-0.008}$ | 20 $^{0}_{-0.021}$ | 0.27 |
| A3A2A□C | 118.5 | 102.5 | 47.5 | 5 $^{0}_{-0.008}$ | 20 $^{0}_{-0.021}$ | 0.31 |

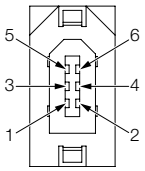
## Shaft End Specifications

### Straight with Flat Seats




## Connector Specifications

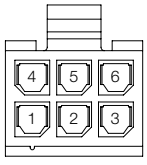
### Encoder Connector




| | | |
|---|---|---|
| 1 | PG5V | Red |
| 2 | PG0V | Black |
| 3* | BAT | Orange |
| 4* | BAT0 | Orange/ White |
| 5 | PS | Light blue |
| 6 | /PS | Light blue/ white |
| Connector Case | FG (frame ground) | Shield |

*) A battery is required only for an absolute encoder.
Model: 55102-0600
Manufacturer: Molex Japan LLC
Mating Connector: 54280-0609

### Servomotor Connector




| | |
|---|---|
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | FG (frame ground) |
| 5 | Brake |
| 6 | Brake |

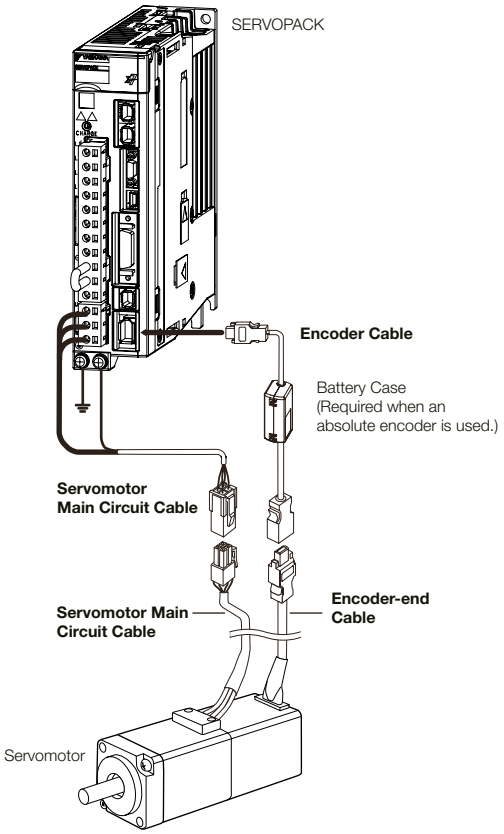
Receptacle: 43025-0600
Manufacturer: Molex Japan LLC

# Selecting Cables SGMMV

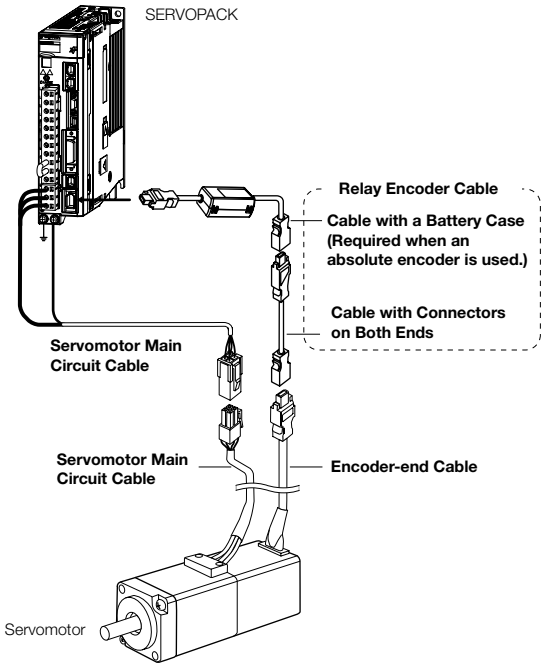
## Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

### Encoder Cable of 20 m or less

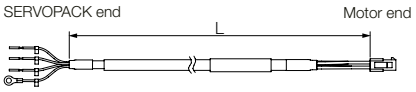
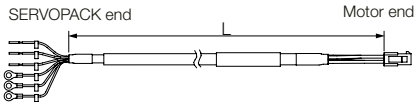



### Encoder Cable of 30 m to 50 m (Relay Cable)



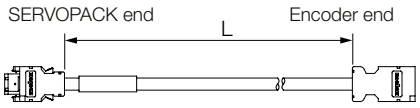
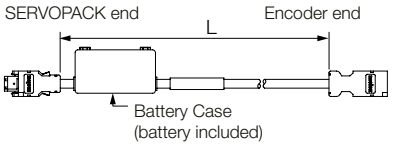

Note:
1. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
2. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials: Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

## Servomotor Main Circuit Cables

| Description | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable* | |
| For Servomotors without Holding Brakes | 3m | JZSP-CF1M00-03-E | JZSP-CF1M20-03-E |   |
| | 5m | JZSP-CF1M00-05-E | JZSP-CF1M20-05-E | |
| | 10m | JZSP-CF1M00-10-E | JZSP-CF1M20-10-E | |
| | 15m | JZSP-CF1M00-15-E | JZSP-CF1M20-15-E | |
| | 20m | JZSP-CF1M00-20-E | JZSP-CF1M20-20-E | |
| | 30m | JZSP-CF1M00-30-E | JZSP-CF1M20-30-E | |
| | 40m | JZSP-CF1M00-40-E | JZSP-CF1M20-40-E | |
| | 50m | JZSP-CF1M00-50-E | JZSP-CF1M20-50-E | |
| For Servomotors with Holding Brakes | 3m | JZSP-CF1M03-03-E | JZSP-CF1M23-03-E |   |
| | 5m | JZSP-CF1M03-05-E | JZSP-CF1M23-05-E | |
| | 10m | JZSP-CF1M03-10-E | JZSP-CF1M23-10-E | |
| | 15m | JZSP-CF1M03-15-E | JZSP-CF1M23-15-E | |
| | 20m | JZSP-CF1M03-20-E | JZSP-CF1M23-20-E | |
| | 30m | JZSP-CF1M03-30-E | JZSP-CF1M23-30-E | |
| | 40m | JZSP-CF1M03-40-E | JZSP-CF1M23-40-E | |
| | 50m | JZSP-CF1M03-50-E | JZSP-CF1M23-50-E | |

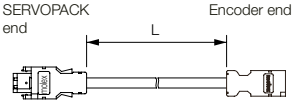
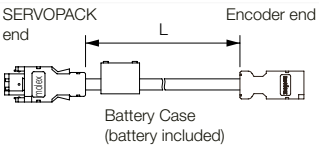
* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.

## Encoder Cables of 20 m or less

| Description | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable* | |
| Cables with Connectors on Both Ends (for incremental encoder) | 3m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |   |
| | 5m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | 10m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | 15m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | 20m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| Cables with Connectors on Both Ends (for absolute encoder: With Battery Case) | 3m | JZSP-CSP19-03-E | JZSP-CSP29-03-E |   |
| | 5m | JZSP-CSP19-05-E | JZSP-CSP29-05-E | |
| | 10m | JZSP-CSP19-10-E | JZSP-CSP29-10-E | |
| | 15m | JZSP-CSP19-15-E | JZSP-CSP29-15-E | |
| | 20m | JZSP-CSP19-20-E | JZSP-CSP29-20-E | |

* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.

## Encoder Extension Cables of 30 m to 50 m

| Description | Length | Order Number | Appearance |
|---|---|---|---|
| Cables with Connectors on Both Ends (for incremental or absolute encoder) | 30m | JZSP-UCMP00-30-E |   |
| | 40m | JZSP-UCMP00-40-E | |
| | 50m | JZSP-UCMP00-50-E | |
| Cable with a Battery Case (Required when an absolute encoder is used.)* | 0.3m | JZSP-CSP12-E |   |

Note: Encoder Extension cables can only be used together with suitable Encoder Cables.
* This Cable is not required if a battery is connected to the host controller.

# Model Designations

SGM7A - 01 A 7 A 2 1

| | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit |
|---|---|---|---|---|---|---|
| Sigma-7 series Servomotors: SGM7A | | | | | | |

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| A5 | 50 W |
| 01 | 100 W |
| C2 | 150 W |
| 02 | 200 W |
| 04 | 400 W |
| 06 | 600 W |
| 08 | 750 W |
| 10 | 1.0 kW |
| 15 | 1.5 kW |
| 20 | 2.0 kW |
| 30 | 3.0 kW |
| 40 | 4.0 kW |
| 50 | 5.0 kW |
| 70 | 7.0 kW |

Note: Readily available up to 1.5 kW. Others available on request.

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 6 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap |
| B* | With two flat seats |

* Code B is not supported for models with a rated output of 1.5 kW or higher.

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C* | With holding brake (24 VDC) |
| E | With oil seal and holding brake (24 VDC) |
| S | With oil seal |

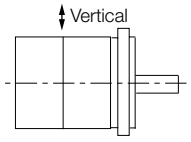
# Specifications and Ratings

## Specifications

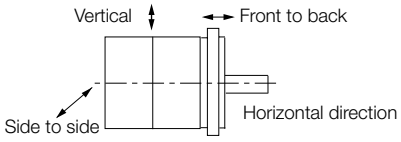
| Voltage | | | 200 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SGM7A- | | | A5A | 01A | C2A, 02A | 04A | 06A. 08A | 10A, 15A | 20A | 25A, 30A | 40A, 50A | 70A |
| Time Rating | | | Continuous | | | | | | | | | |
| Thermal Class | | | Models A5A to 10A: B; Models 15A to 70A: F | | | | | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MOhm min. | | | | | | | | | |
| Withstand Voltage | | | 1,500 VAC for 1 minute | | | | | | | | | |
| Excitation | | | Permanent magnet | | | | | | | | | |
| Mounting | | | Flange mounted | | | | | | | | | |
| Drive Method | | | Direct drive | | | | | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward reference when viewed from the load side | | | | | | | | | |
| Vibration Class*1 | | | V15 | | | | | | | | | |
| Environmental Conditions | Surrounding Air Temperature | | 0 °C to 40 °C (With derating, usage is possible between 40 °C and 60 °C)*3 | | | | | | | | | |
| | Surrounding Air Humidity | | 20% to 80% relative humidity (non-condensing) | | | | | | | | | |
| | Installation Site | | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*3<br>• Must be free of strong magnetic fields. | | | | | | | | | |
| | Storage Environment | | • Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>• Storage Temperature: -20 °C to 60 °C (with no freezing)<br>• Storage Humidity: 20% to 80% relative humidity (non-condensing) | | | | | | | | | |
| Shock Resistance*2 | Impact Acceleration Rate at Flange | | 490 m/s$^2$ | | | | | | | | | |
| | Number of Impacts | | 2 times | | | | | | | | | |
| Vibration Resistance*2 | Vibration Acceleration Rate at Flange | | 49 m/s$^2$ (Models 15A to 50A: 24.5 m/s$^2$ front to back) | | | | | | | | | 14.7 m/s$^2$ |
| Applicable SERVOPACKS | | SGD7S- | R70A, R70F | R90A, R90F | 1R6A, 2R1F | 2R8A, 2R8F | 5R5A | 120A | 180A | 200A | 330A | 550A |
| | | SGD7W- SGD7C- | 1R6A*4 | 2R8A*4 | 1R6A, 2R8A*4 | 2R8A, 5R5A*4, 7R6A*4 | 5R5A, 7R6A | – | | | | |

Note: Readily available up to 1.5 kW. Others available on request.

*1 A Vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2 The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures. The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.




Shock Applied to the Servomotor




Vibration Applied to the Servomotor

*3 Refer to the Derating Rates section.
*4 If you use a Servomotor together with a Sigma-7W or Sigma-7C SERVOPACK, the control gain may not increase as much as with a Sigma-7S SERVOPACK and other performances may be lower than those achieved with a Sigma-7S SERVOPACK.

# Ratings

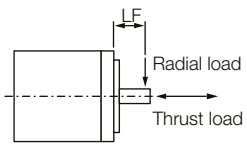
| Voltage | | | 200 V | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model SGM7A- | | | A5A | 01A | C2A | 02A | 04A | 06A | 08A | 10A |
| Rated Output *1 | | W | 50 | 100 | 150 | 200 | 400 | 600 | 750 | 1,000 |
| Rated Torque *1, *2 | | Nm | 0.159 | 0.318 | 0.477 | 0.637 | 1.27 | 1.91 | 2.39 | 3.18 |
| Instantaneous Maximum Torque *1 | | Nm | 0.557 | 1.11 | 1.67 | 2.23 | 4.46 | 6.69 | 8.36 | 11.1 |
| Rated Current *1 | | A | 0.57 | 0.89 | 1.5 | 1.5 | 2.4 | 4.5 | 4.4 | 6.4 |
| Instantaneous Maximum Current *1 | | A | 2.1 | 3.2 | 5.6 | 5.9 | 9.3 | 16.9 | 16.8 | 23.2 |
| Rated Motor Speed *1 | | $min^{-1}$ | 3000 | | | | | | | |
| Maximum Motor Speed | | $min^{-1}$ | 6000 | | | | | | | |
| Torque Constant | | Nm/A | 0.307 | 0.387 | 0.335 | 0.461 | 0.582 | 0.461 | 0.590 | 0.547 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg·$m^2$ | 0.0217 (0.0297) | 0.0337 (0.0417) | 0.0458 (0.0538) | 0.139 (0.209) | 0.216 (0.286) | 0.315 (0.385) | 0.775 (0.955) | 0.971 (1.15) |
| Rated Power Rate *1 | | kW/s | 11.7 (8.51) | 30.0 (24.2) | 49.7 (42.2) | 29.2 (19.4) | 74.7 (56.3) | 115 (94.7) | 73.7 (59.8) | 104 (87.9) |
| Rated Angular Acceleration Rate *1 | | rad/s | 73,200 (53,500) | 94,300 (76,200) | 104,000 (88,600) | 45,800 (30,400) | 58,700 (44,400) | 60,600 (49,600) | 30,800 (25,000) | 32,700 (27,600) |
| Derating Rate for Servomotor with Oil Seal | | % | 80 | | 90 | | 95 | | | |
| Heat Sink Size (Aluminium) | | mm | 200 × 200 × 6 | | 250 × 250 × 6 | | | 300 × 300 × 12 *7 | 250 × 250 × 6 | 300 × 300 × 12 |
| Protective Structure *3 | | | Totally enclosed, self-cooled, IP67 | | | | | | | |
| Holding Brake Specifications *4 | Rated Voltage | V | 24 VDC±10% | | | | | | | |
| | Capacity | W | | 5.5 | | 6 | | | 6.5 | |
| | Holding Torque | Nm | 0.159 | 0.318 | 0.477 | 0.637 | 1.27 | 1.91 | 2.39 | 3.18 |
| | Coil Resistance | Ω (at 20 °C) | | 104.8±10% | | 96±10% | | | 88.6±10% | |
| | Rated Current | A (at 20 °C) | | 0.23 | | 0.25 | | | 0.27 | |
| | Time Required to Release Brake | ms | | | 60 | | | | 80 | |
| | Time Required to Brake | ms | | | | 100 | | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | | 40 times | | | 30 times | 20 times | | 20 times | |
| | With External Regenerative Resistor and Dynamic Brake Resistor | | | | | | | | 30 times | |
| Allowable Shaft Load *5 | LF | mm | 20 | | | 25 | | | 35 | |
| | Allowable Radial Load | N | 78 | | | 245 | | | 392 | |
| | Allowable Thrust Load | N | 54 | | | 74 | | | 147 | |

Note: Readily available up to 1.5 kW. Others available on request.

Notes:
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.
*3. Refer to the Servomotor Heat Dissipation Conditions section for the relation between the heat sinks and derating rate.
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.
*7. To externally connect a dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

*8. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.



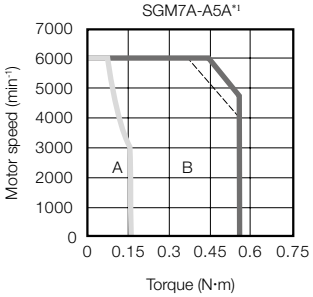

*9. If the heat sink is 250 mm × 250 mm × 6 mm, the rated output is 550 W and the rated torque is 1.75 N·m. Refer to the Servomotor Heat Dissipation Conditions section for details.

# Torque-Motor Speed Characteristics

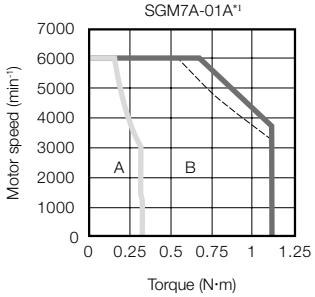
A : Continuous duty zone
B : Intermittent duty zone

——— (solid lines): With three-phase 200-V or single-phase 230-V input
- - - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input

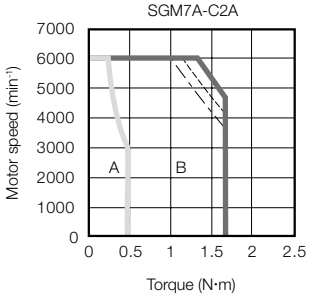
SGM7A-A5A*1



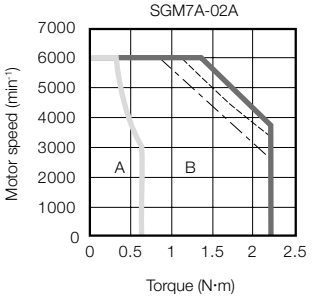

SGM7A-01A*1



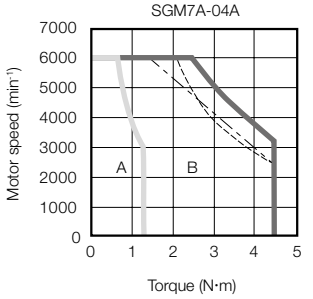

SGM7A-C2A



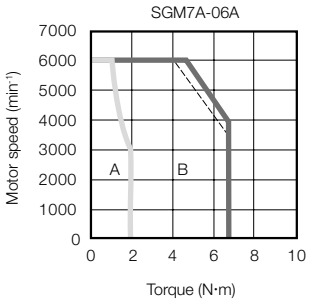

SGM7A-02A



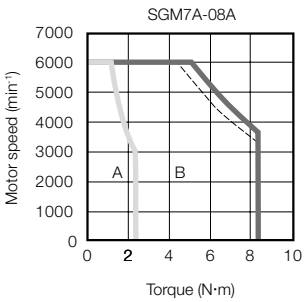

SGM7A-04A



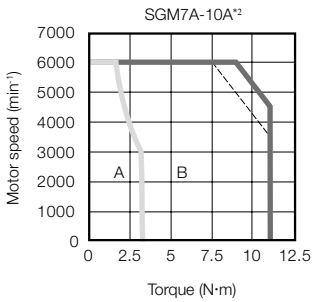

SGM7A-06A




SGM7A-08A




SGM7A-10A*2




* The characteristics are the same for three-phase 200 V and single-phase 200 V.
A single-phase power input can be used in combination with the SGD7S-120A□□A008.

Notes:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100 °C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

# Ratings continued

| Model SGM7A- | | | 15A | 20A | 25A | 30A | 40A | 50A | 70A |
|---|---|---|---|---|---|---|---|---|---|
| Rated Output *1 | | kW | 1.5 | 2.0 | 2.5 | 3.0 | 4.0 | 5.0 | 7.0 |
| Rated Torque *1, *2 | | Nm | 4.90 | 6.36 | 7.96 | 9.80 | 12.6 | 15.8 | 22.3 |
| Instantaneous Maximum Torque *1 | | Nm | 14.7 | 19.1 | 23.9 | 29.4 | 37.8 | 47.6 | 54.0 |
| Rated Current *1 | | A | 9.3 | 12.1 | 15.6 | 17.9 | 25.4 | 27.6 | 38.3 |
| Instantaneous Maximum Current *1 | | A | 28 | 42 | 51 | 56 | 77 | 84 | 105 |
| Rated Motor Speed *1 | | $min^{-1}$ | 3,000 | | | | | | |
| Maximum Motor Speed *1 | | $min^{-1}$ | 6,000*9 | | | | | | |
| Torque Constant | | Nm/A | 0.590 | 0.561 | 0.538 | 0.582 | 0.519 | 0.604 | 0.604 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg·$m^2$ | 2.00 | 2.47 | 3.19 | 7.00 | 9.60 | 12.3 | 12.3 |
| | with holding brake | | 2.25 | 2.72 | 3.44 | 9.20 | 11.8 | 14.5 | – |
| | with batteryless absolute encoder | | 2.00 | 2.47 | 3.19 | 7.00 | 9.60 | 12.3 | 12.3 |
| Rated Power Rate *1 | | kW/s | 120 | 164 | 199 | 137 | 165 | 203 | 404 |
| | with holding brake | | 106 | 148 | 184 | 104 | 134 | 172 | – |
| Rated Angular Acceleration Rate *1 | | $rad/s^2$ | 24,500 | 25,700 | 24,900 | 14,000 | 13,100 | 12,800 | 18,100 |
| | with holding brake | | 21,700 | 23,300 | 23,100 | 10,600 | 10,600 | 10,800 | – |
| Heat Sink Size*3 | | mm | 300 × 300 × 12 | | | 400 × 400 × 20 | | | |
| Protective Structure*4 | | | Totally enclosed, self-cooled, IP67 | | | | | | Totally enclosed, separately cooled (with fan), IP22 |
| Holding Brake Specifications *5 | Rated Voltage | V | 24 VDC +10% 0 | | | | | | – |
| | Capacity | W | 12 | | | 10 | | | |
| | Holding Torque | Nm | 7.84 | | 10 | 20 | | | |
| | Coil Resistance | Ω (at 20 °C) | 48 | | | 59 | | | |
| | Rated Current | A (at 20 °C) | 0.5 | | | 0.41 | | | |
| | Time Required to Release Brake | ms | 170 | | | 100 | | | |
| | Time Required to Brake | ms | 80 | | | | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio)*6 | | | 10 times | | | 5 times | | | |
| | With External Regenerative Resistor and Dynamic Brake Resistor*7 | | 20 times | | | 15 times | | | |
| Allowable Shaft Load *8 | LF | mm | 45 | | | 63 | | | |
| | Allowable Radial Load | N | 686 | | | 980 | 1,176 | | |
| | Allowable Thrust Load | N | 196 | | | 392 | | | |

Note: Readily available up to 1.5 kW. Others available on request.

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100 °C. The values for other items are at 20 °C. These are typical values.

*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40 °C with an aluminum heat sink of the dimensions given in the table.

*3. Refer to the Servomotor Heat Dissipation Conditions section for the relation between the heat sinks and derating rate.

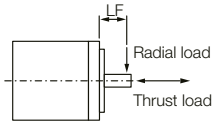
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.

*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.

*7. To externally connect a dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

*8. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.

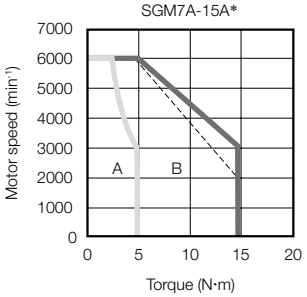



*9. For the SGM7A-25A or SGM7A-50A, the maximum motor speed for the continuous duty zone is 5,000 $min^{-1}$. Use the Servomotor within the continuous duty zone for the average motor speed and effective torque.

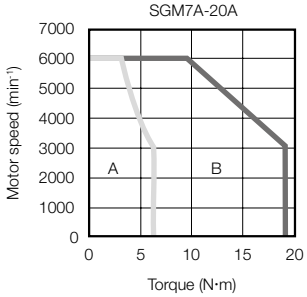
# Torque-Motor Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone
——— (solid lines): With three-phase 200-V or single-phase 230-V input
- - - - - - - (dotted lines): With single-phase 200-V input

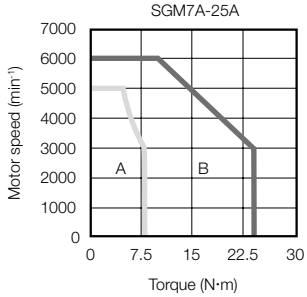
SGM7A-15A*



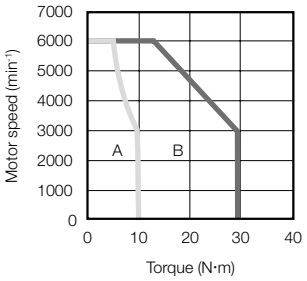

SGM7A-20A



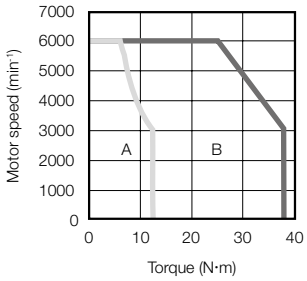

SGM7A-25A



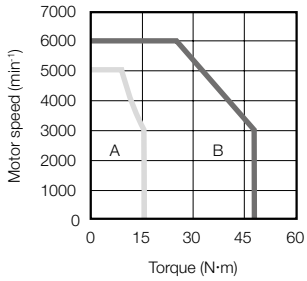

SGM7A-30A



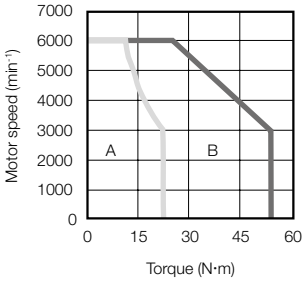

SGM7A-40A




SGM7A-50A




SGM7A-70A



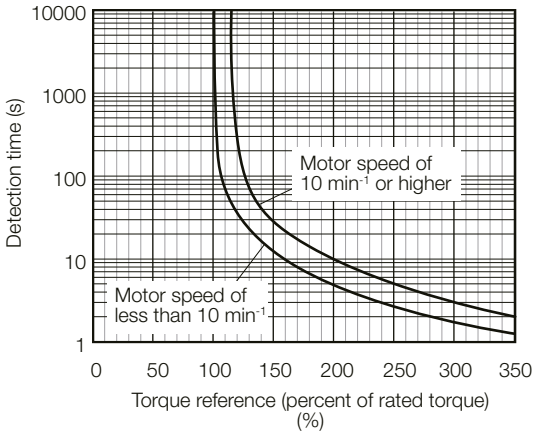

* A single-phase power input can be used in combination with the SGD7S-120A□□A008.

Notes:
1 These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20 °C. These are typical values.
2 The characteristics in the intermittent duty zone depend on the power supply voltage.
3 If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4 If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

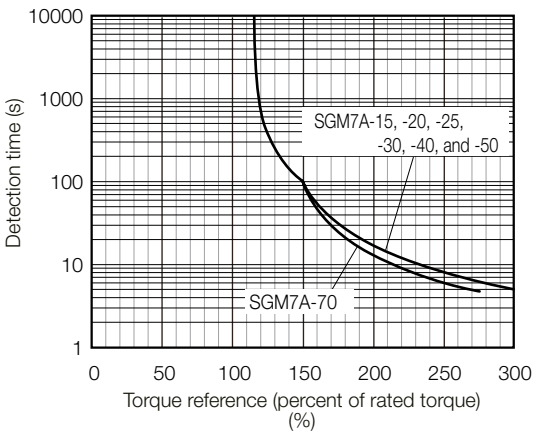
# Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.

SGM7A-A5, -01, -C2, -02, -04, -06, -08, and -10




SGM7A-15, -20, -25, -30, -40, -50, and -70

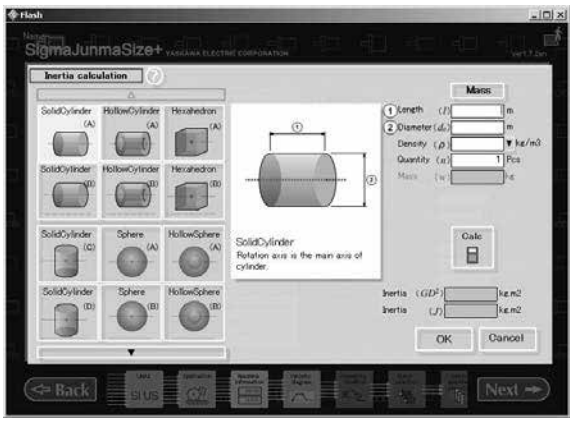



Note:

The above overload characteristics does not give permission to perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The load moment of inertia indicates the inertia of the load. The larger the load moment of inertia, the worse the response. If the moment of inertia is too large, operation will become unstable.
Refer to Servomotor Ratings. This value is provided strictly as a guideline and results depend on Servomotor driving conditions. Use the SigmaJunmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.



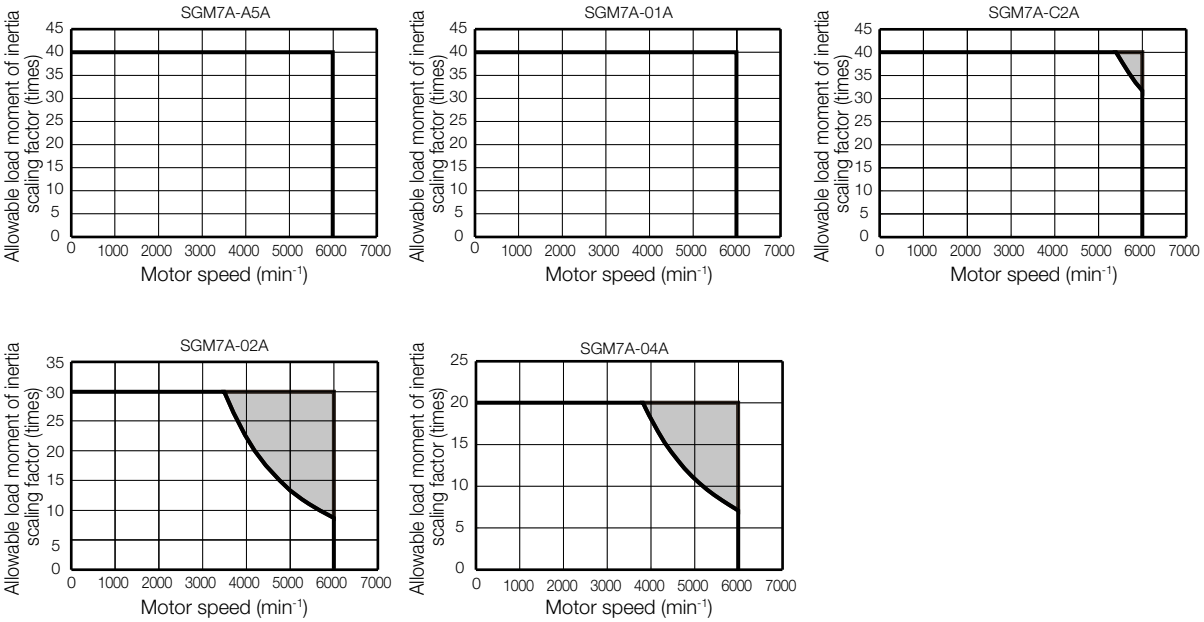

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Perform one of the following steps if this occurs.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.
- Install an External Regenerative Resistor if the alarm cannot be cleared using the above steps.

Regenerative resistors are not built into SERVOPACKs for 400-W Servomotors or smaller Servomotors. Even for SERVOPACKs with built-in regenerative resistors, an External Regenerative Resistor is required if the energy that results from the regenerative driving conditions exceeds the allowable loss capacity (W) of the built-in regenerative resistor.

# SERVOPACKs without built-in Regenative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.




Note: Applicable SERVOPACK models: SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F

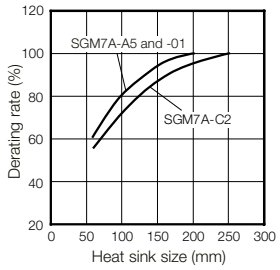
# When an External Regenerative Resistor Is Required

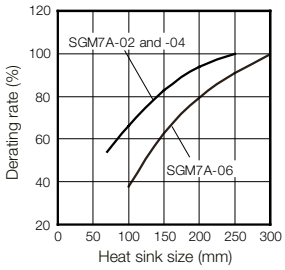
Install the External Regenerative Resistor. Refer to the External Regenerative Resistors section for the recommended products.

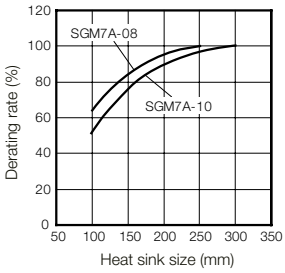
# Derating Rates

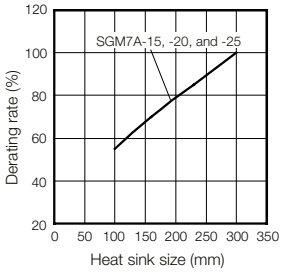
## Servomotor Heat Dissipation Conditions

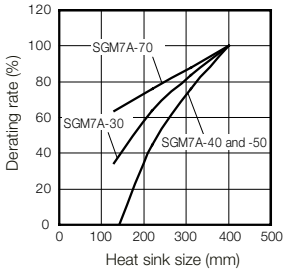
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.



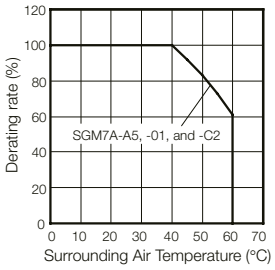



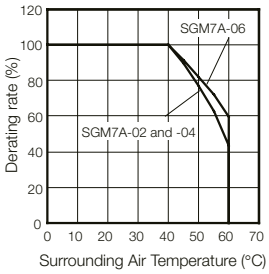

**Important**

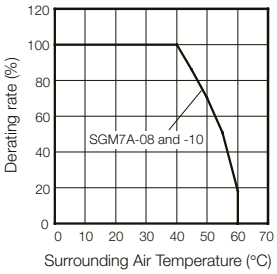
The actual temperature rise depends on how the heat sink (i.e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.

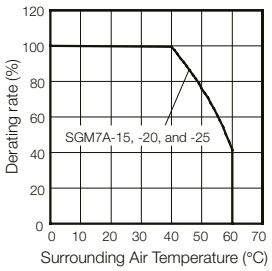
## Applications Where the Surrounding Air Temperature Exceeds 40°C

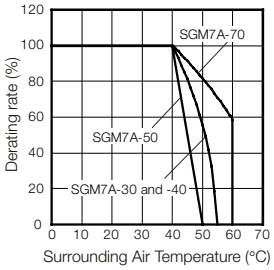
The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.



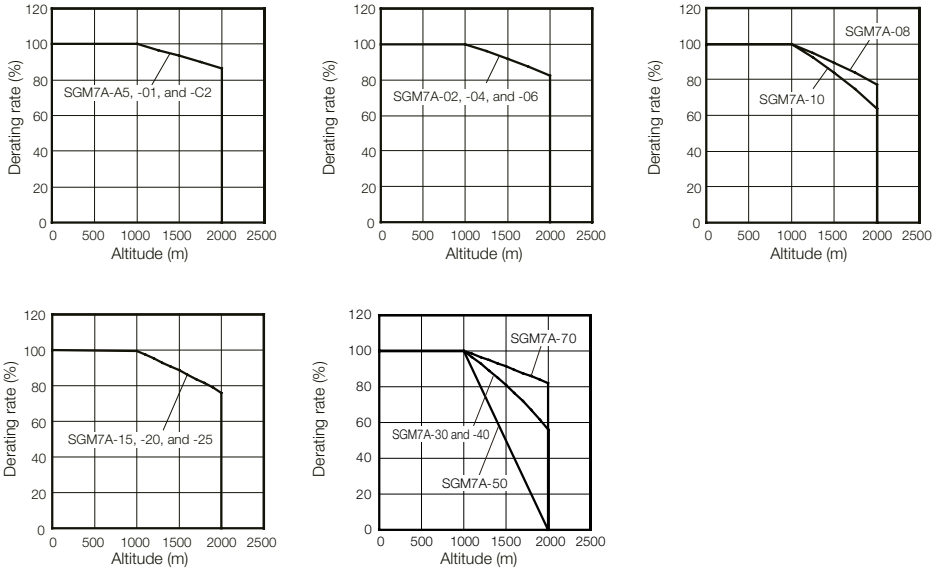



## Applications Where the Altitude Exceeds 1,000 m

The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



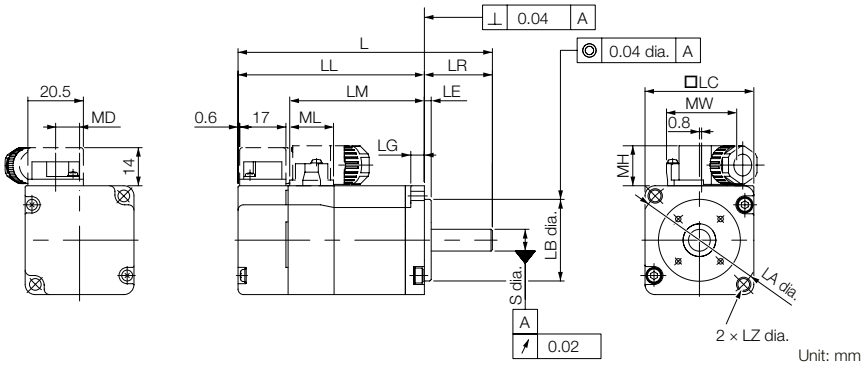

Information
When using Servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in “Servomotor Overload Protection Characteristics”.

Note
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your Yaskawa representative.

# External Dimensions

## Servomotors

### SGM7A-A5, -01, -C2




Unit: mm

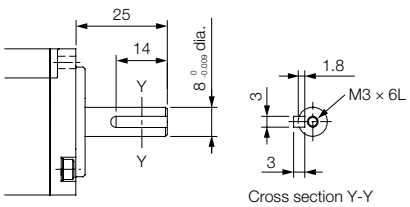
| Model SMG7A | L* | LL* | LM | Flange Dimensions | | | | | | | S | MD | MW | MH | ML | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LR | LE | LG | LC | LA | LB | LZ | | | | | | |
| A5A□A2□ | 81.5 (122) | 56.5 (97) | 37.9 | 25 | 2.5 | 5 | 40 | 46 | $30^{0}_{-0.021}$ | 4.3 | $8^{0}_{-0.009}$ | 8.8 | 25.8 | 14.7 | 16.1 | 0.3 (0.6) |
| 01A□A2□ | 93.5 (134) | 68.5 (109) | 49.9 | 25 | 2.5 | 5 | 40 | 46 | $30^{0}_{-0.021}$ | 4.3 | $8^{0}_{-0.009}$ | 8.8 | 25.8 | 14.7 | 16.1 | 0.4 (0.7) |
| C2A□A2□ | 105.5 (153.5) | 80.5 (128.5) | 61.9 | 25 | 2.5 | 5 | 40 | 46 | $30^{0}_{-0.021}$ | 4.3 | $8^{0}_{-0.009}$ | 8.8 | 25.8 | 14.7 | 16.1 | 0.5 (0.8) |

* For models that have a batteryless absolute encoder, L and LL are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

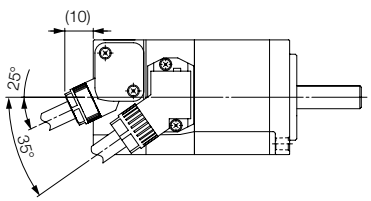
Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

### Straight with Key and Tap

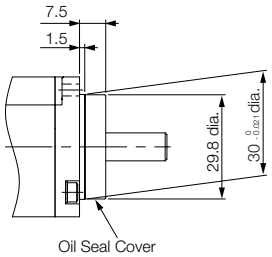



### With Two Flat Seats

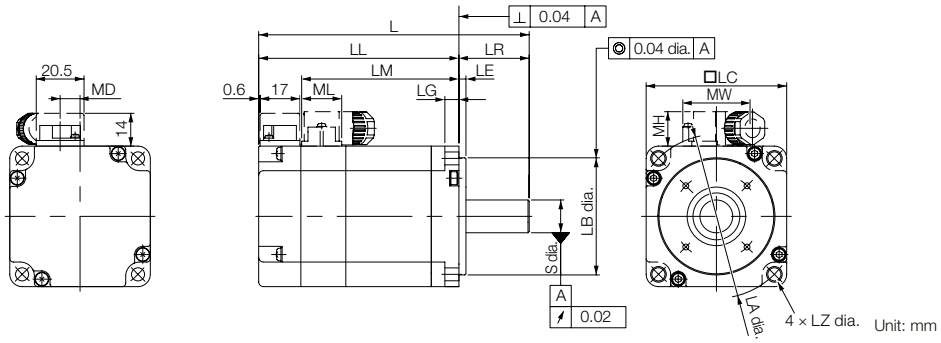



## Specification of Options

### Oil Seal



### SGM7A-02, -04 and -06



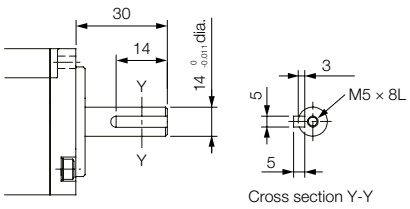

| Model SMG7A | L* | LL* | LM | Flange Dimensions | | | | | | | S | MD | MW | MH | ML | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LR | LE | LG | LC | LA | LB | LZ | | | | | | |
| 02A□A2□ | 99.5 (140) | 69.5 (110) | 51.2 | 30 | 3 | 6 | 60 | 70 | $50^{0}_{-0.025}$ | 5.5 | $14^{0}_{-0.011}$ | 8.5 | 28.7 | 14.7 | 17.1 | 0.8 (1.4) |
| 04A□A2□ | 115.5 (156) | 85.5 (126) | 67.2 | 30 | 3 | 6 | 60 | 70 | $50^{0}_{-0.025}$ | 5.5 | $14^{0}_{-0.011}$ | 8.5 | 28.7 | 14.7 | 17.1 | 1.2 (1.8) |
| 06A□A2□ | 137.5 (191.5) | 107.5 (161.5) | 89.2 | 30 | 3 | 6 | 60 | 70 | $50^{0}_{-0.025}$ | 5.5 | $14^{0}_{-0.011}$ | 8.5 | 28.7 | 14.7 | 17.1 | 1.6 (2.2) |

* For models that have a batteryless absolute encoder, L and LL are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

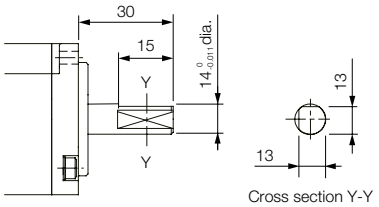
Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

### Straight with Key and Tap

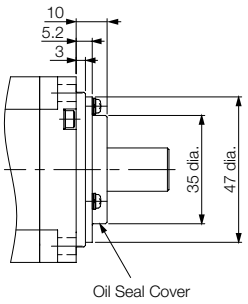



### With Two Flat Seats

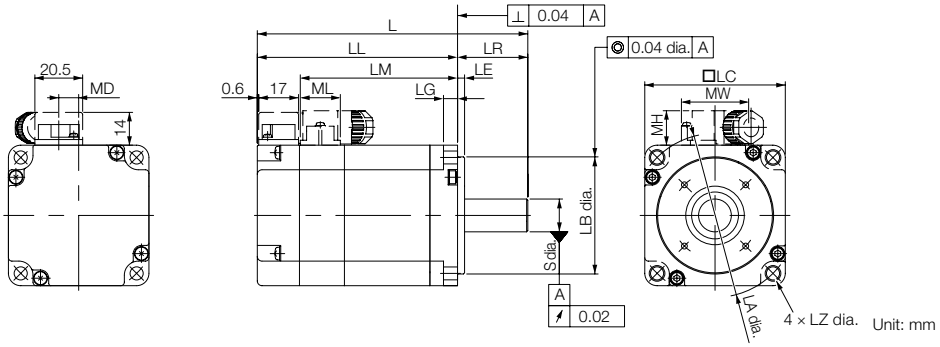



## Specification of Options

### Oil Seal



### SGM7A-08 and -10



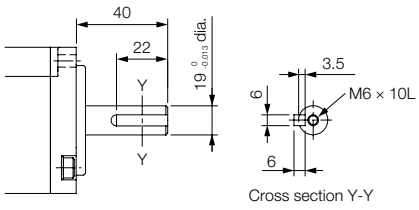

| Model SMG7A | L* | LL* | LM | Flange Dimensions | | | | | | | S | MD | MW | MH | ML | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LR | LE | LG | LC | LA | LB | LZ | | | | | | |
| 08A□A2□ | 137 (184) | 97 (144) | 78.5 | 40 | 3 | 8 | 80 | 90 | $70^{0}_{-0.030}$ | 7 | $19^{0}_{-0.013}$ | 13.6 | 38 | 14.7 | 19.3 | 2.3 (2.9) |
| 10A□A2□ | 162 (209) | 122 (169) | 103.5 | 40 | 3 | 8 | 80 | 90 | $70^{0}_{-0.030}$ | 7 | $19^{0}_{-0.013}$ | 13.6 | 38 | 14.7 | 19.3 | 3.1 (3.7) |

* For models that have a batteryless absolute encoder, L and LL are 8 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

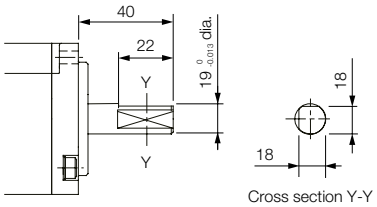
Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

### Straight with Key and Tap

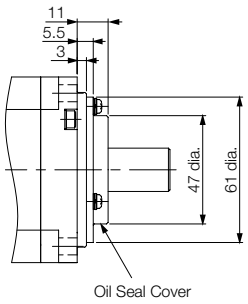



### With Two Flat Seats



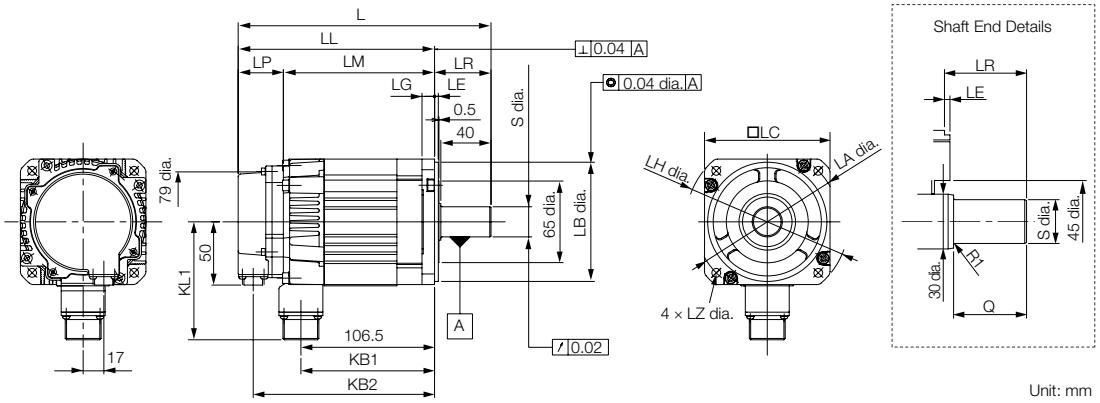

## Specification of Options

### Oil Seal



# Servomotors without Holding Brakes

## SGM7A-15, -20, and -25




Unit: mm

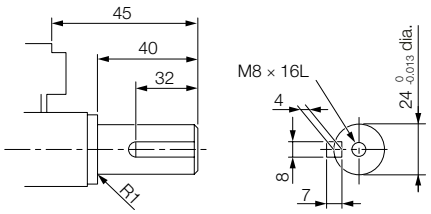
| Model SGM7A- | L* | LL* | LM | LP | LR | KB1 | KB2* | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass[kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | |
| 15A□A21 | 202 | 157 | 121 | 36 | 45 | 107 | 145 | 94 | 115 | $95^{0}_{-0.035}$ | 100 | 3 | 10 | 130 | 7 | $24^{0}_{-0.013}$ | 40 | 4.6 |
| 20A□A21 | 218 | 173 | 137 | 36 | 45 | 123 | 161 | 94 | 115 | $95^{0}_{-0.035}$ | 100 | 3 | 10 | 130 | 7 | $24^{0}_{-0.013}$ | 40 | 5.4 |
| 25A□A21 | 241 | 196 | 160 | 36 | 45 | 146 | 184 | 94 | 115 | $95^{0}_{-0.035}$ | 100 | 3 | 10 | 130 | 7 | $24^{0}_{-0.013}$ | 40 | 6.8 |

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

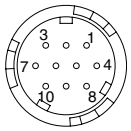
# Shaft End Specifications

## Straight with Key and Tap




# Connector Specifications

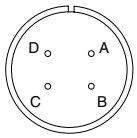
## Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

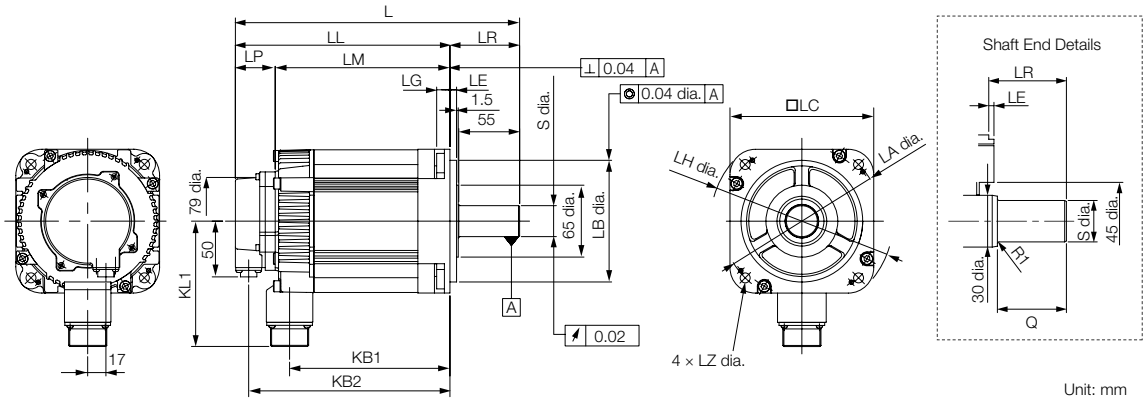
## Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

### SGM7A-30, -40, and -50




Unit: mm

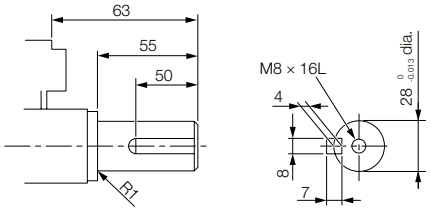
| Model SGM7A- | L* | LL* | LM | LP | LR | KB1 | KB2* | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass[kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | |
| 30A□A21 | 257 | 194 | 158 | 36 | 63 | 145 | 182 | 114 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $28^{0}_{-0.013}$ | 55 | 10.5 |
| 40A□A21 | 296 | 233 | 197 | 36 | 63 | 184 | 221 | 114 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $28^{0}_{-0.013}$ | 55 | 13.5 |
| 50A□A21 | 336 | 273 | 237 | 36 | 63 | 224 | 261 | 114 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $82^{0}_{-0.013}$ | 55 | 16.5 |

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

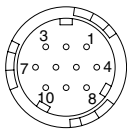
## Shaft End Specifications

### Straight with Key and Tap




## Connector Specifications

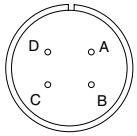
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

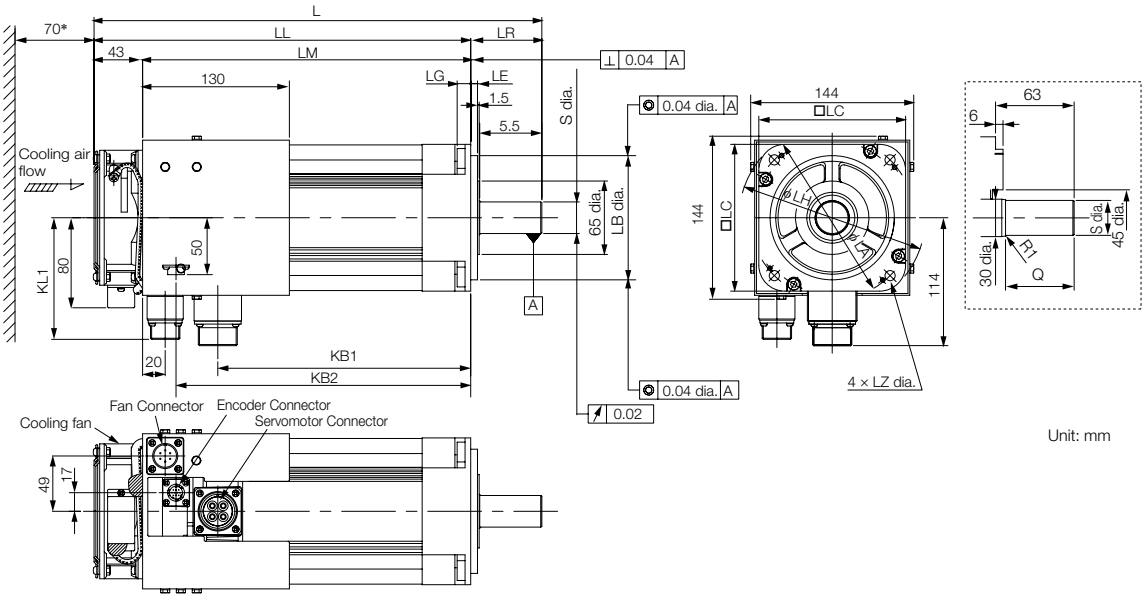
### Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

### SGM7A-70




Unit: mm

* Leave a minimum space of 70 mm around the Servomotor from walls and other equipment to allow for a sufficient amount of cooling air.

| Model SGM7A- | L | LL | LM | LR | KB1 | KB2* | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass[kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | |
| 70A□A21 | 397 | 334 | 291 | 63 | 224 | 261 | 108 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $28^{0}_{-0.013}$ | 55 | 18.5 |

* For models that have a batteryless absolute encoder, KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Cooling Fan Specifications

Single-phase, 200 V
50/60 Hz
17/15 W
0.11/0.09 A

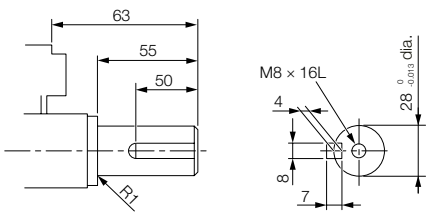
## Specifications of Fan Operation Error Detector

Contact Capacity
- Maximum allowable voltage: 350 V (AC/DC)
- Maximum allowable current: 120 mA (AC/ DC)
- Maximum controllable power: 360 mW

Alarm Contacts
- ON for normal fan rotation.
- OFF at 1,680 ± 100 min-1 max.
- OFF for 3 seconds at startup.

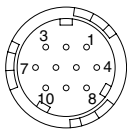
## Shaft End Specifications

### Straight with Key and Tap




## Connector Specifications

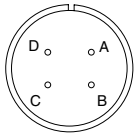
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

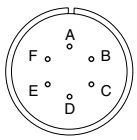
### Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

### Fan Connector

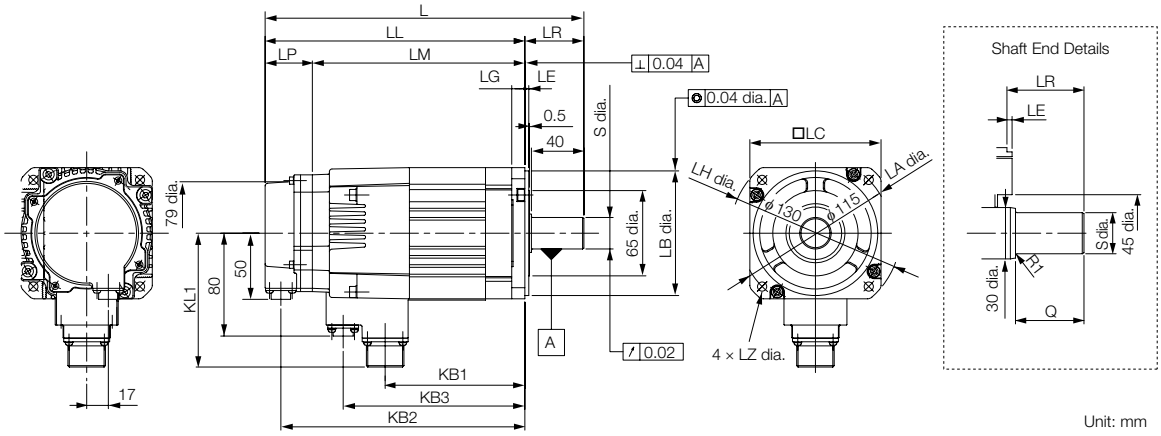



| | | | |
|---|---|---|---|
| A | Fan motor | D | Alarm pin |
| B | Fan motor | E | Alarm pin |
| C | – | F | FG (frame ground) |

Receptacle: MS3102A14S-6P
Applicable Plug (Available from Yaskawa Controls Co., Ltd.)
Plug: MS3108B14S-6S
Cable Clamp: MS3057-6A
Note: The Servomotor Connector (receptacle) is RoHS compliant.Contact the connector manufacturer for RoHS-compliant cable-side connectors (not provided by Yaskawa).

# Servomotors with Holding Brakes

## SGM7A-15, -20, and -25




Unit: mm

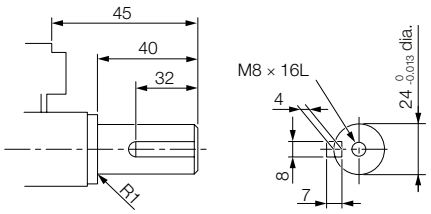
| Model SGM7A- | L* | LL* | LM | LP | LR | KB1 | KB2* | KB3 | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass[kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | |
| 15A□A2C | 243 | 198 | 162 | 36 | 45 | 107 | 186 | 139 | 102 | 115 | $95^{0}_{-0.035}$ | 100 | 3 | 10 | 130 | 7 | $24^{0}_{-0.013}$ | 40 | 6.0 |
| 20A□A2C | 259 | 214 | 178 | 36 | 45 | 123 | 202 | 155 | 102 | 115 | $95^{0}_{-0.035}$ | 100 | 3 | 10 | 130 | 7 | $24^{0}_{-0.013}$ | 40 | 6.8 |
| 25A□A2C | 292 | 247 | 211 | 36 | 45 | 156 | 235 | 188 | 102 | 115 | $95^{0}_{-0.035}$ | 100 | 3 | 10 | 130 | 7 | $24^{0}_{-0.013}$ | 40 | 8.7 |

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

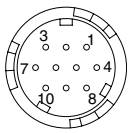
# Shaft End Specifications

## Straight with Key and Tap




# Connector Specifications

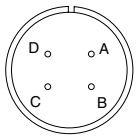
## Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

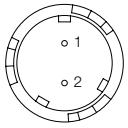
## Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

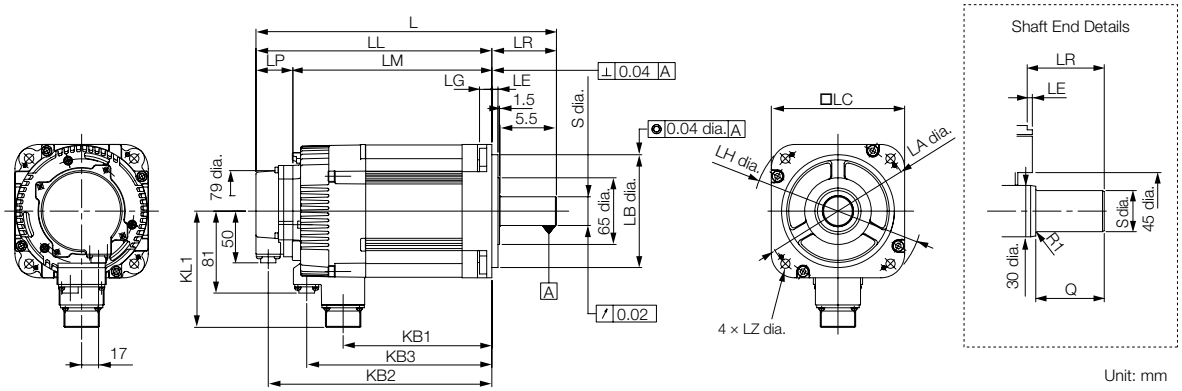
## Brake Connector




| | |
|---|---|
| 1 | Brake terminal |
| 2 | Brake terminal |

Note: There is no voltage polarity for the brake terminals.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP2S-□-D for Right-angle Plug
CM10-SP2S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

### SGM7A-30, -40, and -50




Unit: mm

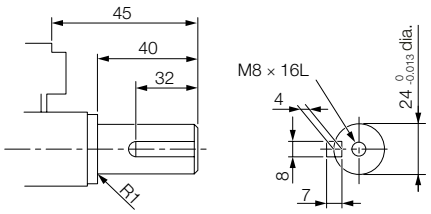
| Model SGM7A- | L* | LL* | LM | LP | LR | KB1 | KB2* | KB3 | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass[kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | |
| 30A□A2C | 293 | 232 | 196 | 36 | 63 | 145 | 220 | 181 | 119 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $28^{0}_{-0.013}$ | 55 | 13 |
| 40A□A2C | 332 | 269 | 233 | 36 | 63 | 184 | 257 | 220 | 119 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $28^{0}_{-0.013}$ | 55 | 16 |
| 50A□A2C | 372 | 309 | 273 | 36 | 63 | 224 | 297 | 260 | 119 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $28^{0}_{-0.013}$ | 55 | 19 |

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the Dimensions of Servomotors with Batteryless Absolute Encoders section for the values for individual models.

Notes:
1 The values in parentheses are for Servomotors with Holding Brakes.
2 The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

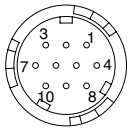
## Shaft End Specifications

### Straight with Key and Tap




## Connector Specifications

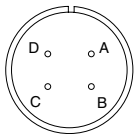
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

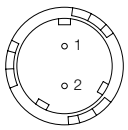
### Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

### Brake Connector




| | |
|---|---|
| 1 | Brake terminal |
| 2 | Brake terminal |

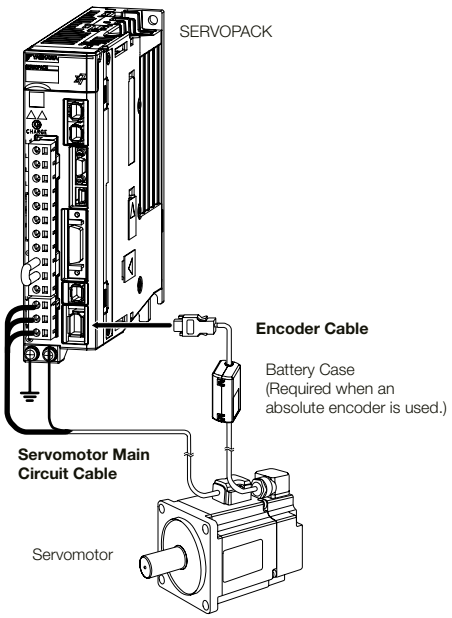
Note: There is no voltage polarity for the brake terminals.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP2S-□-D for Right-angle Plug
CM10-SP2S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

# Selecting Cables SGM7A

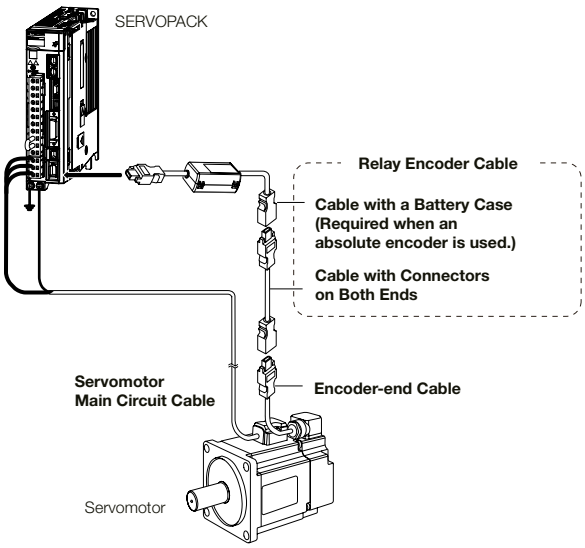
## Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

### Encoder Cable of 20 m or less




### Encoder Cable of 30 m to 50 m (Relay Cable)



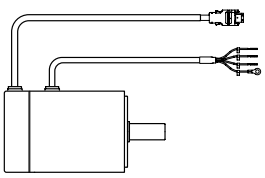

Note:
1. Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from YASKAWA for the SGM7A-15A to SGM7A-70A Servomotors. You must make such a cable yourself. Use the Connectors specified by YASKAWA for these Servomotors. (These Connectors are compliant with the standards.) YASKAWA does not specify what wiring materials to use.
2. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
3. If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
4. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

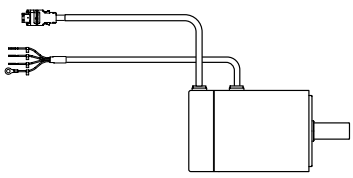
Important

For the SGM7A-A5 to -10, there are different order numbers for the Servomotor Motor Power Cables and Encoder Cables depending on the cable installation direction. Confirm the order numbers before you order.

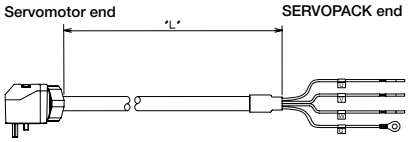
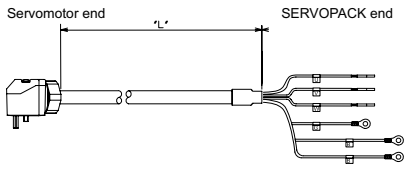
**Cable installed towards Load**



**Cable installed away from Load**

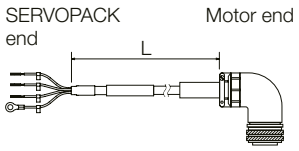
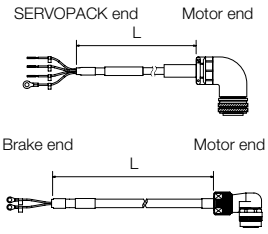
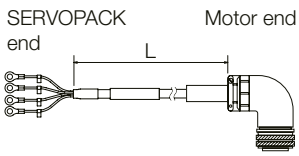
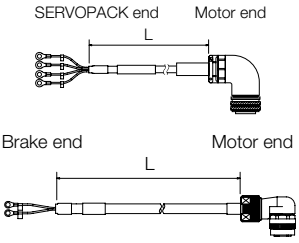


## Servomotor Motor Power Cables

| Servomotor Model | Description | Length | Order Number Flexible Cable* | Appearance |
|---|---|---|---|---|
| SGM7A-A5 to -C2 50 W to 150 W | For Servomotors without Holding Brakes<br>Cable installed toward load | 3 m | JZSP-CSM21-03-E-G# |  |
| | | 5 m | JZSP-CSM21-05-E-G# | |
| | | 10 m | JZSP-CSM21-10-E-G# | |
| | | 15 m | JZSP-CSM21-15-E-G# | |
| | | 20 m | JZSP-CSM21-20-E-G# | |
| SGM7A-02 to -06 200 W to 600 W | | 3 m | JZSP-CSM22-03-E-G# | |
| | | 5 m | JZSP-CSM22-05-E-G# | |
| | | 10 m | JZSP-CSM22-10-E-G# | |
| | | 15 m | JZSP-CSM22-15-E-G# | |
| | | 20 m | JZSP-CSM22-20-E-G# | |
| SGM7A-08 and -10 750 W, 1.0 kW | | 3 m | JZSP-CSM23-03-E-G# | |
| | | 5 m | JZSP-CSM23-05-E-G# | |
| | | 10 m | JZSP-CSM23-10-E-G# | |
| | | 15 m | JZSP-CSM23-15-E-G# | |
| | | 20 m | JZSP-CSM23-20-E-G# | |
| | | 30 m | JZSP-CSM23-30-E-G# | |
| SGM7A-A5 to -C2 50 W to 150 W | For Servomotors with Holding Brakes<br>Cable installed towards load | 3 m | JZSP-CSM31-03-E-G# |  |
| | | 5 m | JZSP-CSM31-05-E-G# | |
| | | 10 m | JZSP-CSM31-10-E-G# | |
| | | 15 m | JZSP-CSM31-15-E-G# | |
| | | 20 m | JZSP-CSM31-20-E-G# | |
| SGM7A-02 to -06 200 W to 600 W | | 3 m | JZSP-CSM32-03-E-G# | |
| | | 5 m | JZSP-CSM32-05-E-G# | |
| | | 10 m | JZSP-CSM32-10-E-G# | |
| | | 15 m | JZSP-CSM32-15-E-G# | |
| | | 20 m | JZSP-CSM32-20-E-G# | |
| SGM7A-08 and -10 750 W, 1.0 kW | | 3 m | JZSP-CSM33-03-G# | |
| | | 5 m | JZSP-CSM33-05-G# | |
| | | 10 m | JZSP-CSM33-10-G# | |
| | | 15 m | JZSP-CSM33-15-G# | |
| | | 20 m | JZSP-CSM33-20-G# | |

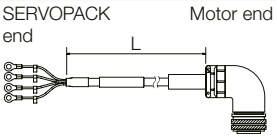
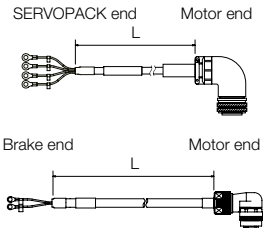
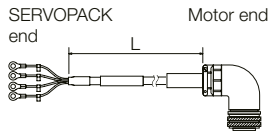
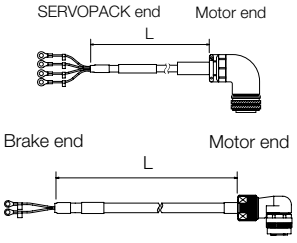
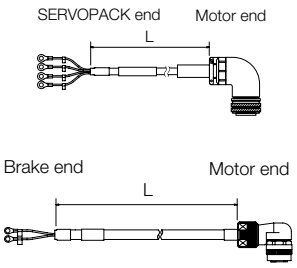
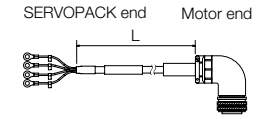
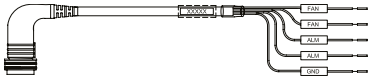
* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
Note: The digit # of the order number represents the design revision.

## Servomotor Motor Power Cables

| Servomotor Model | Description | Connector Specifications | Length | Order Number Flexible Cable*1 | Appearance |
|---|---|---|---|---|---|
| SGM7A-15 1.5 kW | For Servomotors without Holding Brakes | Right-angle | 3 m | JZSP-CVMCA12-03-E-G# |  |
| | | | 5 m | JZSP-CVMCA12-05-E-G# | |
| | | | 10 m | JZSP-CVMCA12-10-E-G# | |
| | | | 15 m | JZSP-CVMCA12-15-E-G# | |
| | | | 20 m | JZSP-CVMCA12-20-E-G# | |
| | For Servomotors with Holding Brakes (Set of Two Cables*2) | Right-angle | 3 m | JZSP-CVMCA12-03-E-G#<br>JZSP-CVB12Y-03-E-G# |  |
| | | | 5 m | JZSP-CVMCA12-05-E-G#<br>JZSP-CVB12Y-05-E-G# | |
| | | | 10 m | JZSP-CVMCA12-10-E-G#<br>JZSP-CVB12Y-10-E-G# | |
| | | | 15 m | JZSP-CVMCA12-15-E-G#<br>JZSP-CVB12Y-15-E-G# | |
| | | | 20 m | JZSP-CVMCA12-20-E-G#<br>JZSP-CVB12Y-20-E-G# | |
| SGM7A-20 2.0 kW | For Servomotors without Holding Brakes | Right-angle | 3 m | JZSP-CVMCA12-03-E-G# |  |
| | | | 5 m | JZSP-CVMCA12-05-E-G# | |
| | | | 10 m | JZSP-CVMCA12-10-E-G# | |
| | | | 15 m | JZSP-CVMCA12-15-E-G# | |
| | | | 20 m | JZSP-CVMCA12-20-E-G# | |
| | For Servomotors with Holding Brakes (Set of Two Cables*2) | Right-angle | 3 m | JZSP-CVMCA12-03-E-G#<br>JZSP-CVB12Y-03-E-G# |  |
| | | | 5 m | JZSP-CVMCA12-05-E-G#<br>JZSP-CVB12Y-05-E-G# | |
| | | | 10 m | JZSP-CVMCA12-10-E-G#<br>JZSP-CVB12Y-10-E-G# | |
| | | | 15 m | JZSP-CVMCA12-15-E-G#<br>JZSP-CVB12Y-15-E-G# | |
| | | | 20 m | JZSP-CVMCA12-20-E-G#<br>JZSP-CVB12Y-20-E-G# | |

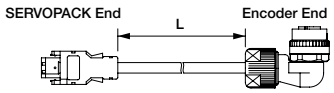
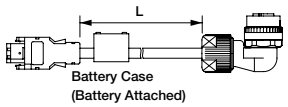
*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. This order number is for a set of two cables (Main Power Supply Cable and Holding Brake Cable). When you purchase them separately, the order numbers for Main Power Supply Cables are the same as for a Servomotor without a Holding Brake.
The following order numbers are for a Holding Brake Cable. These Standard Cables are Flexible Cables.
- Cable with Straight Plug: JZSP-U7B23-□□-E
- Cable with Right-angle Plug: JZSP-U7B24-□□-E

## Servomotor Main Circuit Cables

| Servomotor Model | Description | Connector Specifications | Length | Order Number Flexible Cable*1 | Appearance |
|---|---|---|---|---|---|
| SGM7A-25 2.5 kW | For Servomotors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA12-03-E-G# |  |
| | | | 5m | JZSP-CVMCA12-05-E-G# | |
| | | | 10m | JZSP-CVMCA12-10-E-G# | |
| | | | 15m | JZSP-CVMCA12-15-E-G# | |
| | | | 20m | JZSP-CVMCA12-20-E-G# | |
| | For Servomotors with Holding Brakes (Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA12-03-E-G# |  |
| | | | | JZSP-CVB12Y-03-E-G# | |
| | | | 5m | JZSP-CVMCA12-05-E-G# | |
| | | | | JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA12-10-E-G# | |
| | | | | JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA12-15-E-G# | |
| | | | | JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA12-20-E-G# | |
| | | | | JZSP-CVB12Y-20-E-G# | |
| SGM7A-30 3.0 kW | For Servomotors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA13-03-E-G# |  |
| | | | 5m | JZSP-CVMCA13-05-E-G# | |
| | | | 10m | JZSP-CVMCA13-10-E-G# | |
| | | | 15m | JZSP-CVMCA13-15-E-G# | |
| | | | 20m | JZSP-CVMCA13-20-E-G# | |
| | For Servomotors with Holding Brakes (Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA13-03-E-G# |  |
| | | | | JZSP-CVB12Y-03-E-G# | |
| | | | 5m | JZSP-CVMCA13-05-E-G# | |
| | | | | JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA13-10-E-G# | |
| | | | | JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA13-15-E-G# | |
| | | | | JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA13-20-E-G# | |
| | | | | JZSP-CVB12Y-20-E-G# | |
| SGM7A-40 to -50 4.0 kW & 5.0 kW | For Servomotors with Holding Brakes (Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA35-03-E-G# |  |
| | | | | JZSP-CVB12Y-03-E-G# | |
| | | | 5m | JZSP-CVMCA35-05-E-G# | |
| | | | | JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA35-10-E-G# | |
| | | | | JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA35-15-E-G# | |
| | | | | JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA35-20-E-G# | |
| | | | | JZSP-CVB12Y-20-E-G# | |
| SGM7A-70 7.0 kW | For Servomotors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA35-03-E-G# |  |
| | | | 5m | JZSP-CVMCA35-05-E-G# | |
| | | | 10m | JZSP-CVMCA35-10-E-G# | |
| | | | 15m | JZSP-CVMCA35-15-E-G# | |
| | | | 20m | JZSP-CVMCA35-20-E-G# | |
| | Fan Cable | Right-angle | 3m | BFEV-03(A)-E |  |
| | | | 5m | BFEV-05(A)-E | |
| | | | 10m | BFEV-10(A)-E | |
| | | | 15m | BFEV-15(A)-E | |
| | | | 20m | BFEV-20(A)-E | |

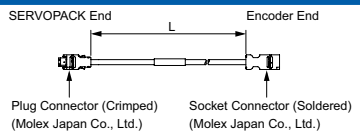
*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. This order number is for a set of two cables (Main Power Supply Cable and Holding Brake Cable). When you purchase them separately, the order numbers for Main Power Supply Cables are the same as for a Servomotor without a Holding Brake.
The following order numbers are for a Holding Brake Cable. These Standard Cables are Flexible Cables.
- Cable with Straight Plug: JZSP-U7B23-□□-E
- Cable with Right-angle Plug: JZSP-U7B24-□□-E

## Encoder Cables of 20 m or less

| Servomotor Model | Description | Length | Order Number | Appearance |
|---|---|---|---|---|
| SGM7A-A5 to -10 50 W - 1 kW | Cable direction to load side | 3 m | JZSP-C7PI2D-03-E-G# | |
| | | 5 m | JZSP-C7PI2D-05-E-G# | |
| | | 10 m | JZSP-C7PI2D-10-E-G# | |
| | | 15 m | JZSP-C7PI2D-15-E-G# | |
| | | 20 m | JZSP-C7PI2D-20-E-G# | |
| | Cable direction away from load | 3 m | JZSP-C7PI2E-03-E-G# | |
| | | 5 m | JZSP-C7PI2E-05-E-G# | |
| | | 10 m | JZSP-C7PI2E-10-E-G# | |
| | | 15 m | JZSP-C7PI2E-15-E-G# | |
| | | 20 m | JZSP-C7PI2E-20-E-G# | |
| | Cable with battery case, direction to load side | 3 m | JZSP-C7PA2D-03-E-G# | |
| | | 5 m | JZSP-C7PA2D-05-E-G# | |
| | | 10 m | JZSP-C7PA2D-10-E-G# | |
| | | 15 m | JZSP-C7PA2D-15-E-G# | |
| | | 20 m | JZSP-C7PA2D-20-E-G# | |
| | Cable with battery case, direction away from load side | 3 m | JZSP-C7PA2E-03-E-G# | |
| | | 5 m | JZSP-C7PA2E-05-E-G# | |
| | | 10 m | JZSP-C7PA2E-10-E-G# | |
| | | 15 m | JZSP-C7PA2E-15-E-G# | |
| | | 20 m | JZSP-C7PA2E-20-E-G# | |
| SGM7A-15 to -30 1.5 W - 3 kW | For incremental encoder | 3 m | JZSP-CVP12-03-E-G# |   |
| | | 5 m | JZSP-CVP12-05-E-G# | |
| | | 10 m | JZSP-CVP12-10-E-G# | |
| | | 15 m | JZSP-CVP12-15-E-G# | |
| | | 20 m | JZSP-CVP12-20-E-G# | |
| | For absolute ne-coder with battery case *1 | 3 m | JZSP-CVP27-03-E-G# |   |
| | | 5 m | JZSP-CVP27-05-E-G# | |
| | | 10 m | JZSP-CVP27-10-E-G# | |
| | | 15 m | JZSP-CVP27-15-E-G# | |
| | | 20 m | JZSP-CVP27-20-E-G# | |

*1. If a battery is connected to the host controller, the Battery Case is not required. If so, use a cable for incremental encoders.

## Encoder Extension Cables of 30 m or above

| Servomotor Model | Description | Length | Order Number | Appearance |
|---|---|---|---|---|
| All SGM7A models | Cable with Connectors (For incremental and absolute encoder) | 30 m | JZSP-UCMP00-30-E |   |
| | | 40 m | JZSP-UCMP00-40-E | |
| | | 50 m | JZSP-UCMP00-50-E | |

Note: Encoder Extension cables can only be used together with suitable Encoder Cables.

# Model Designations

SGM7J - 01 A 7 A 2 1

| SGM7J | - | 01 | A | 7 | A | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 series Servomotors: SGM7J | | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th | digit |

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| A5 | 50 W |
| 01 | 100 W |
| C2 | 150 W |
| 02 | 200 W |
| 04 | 400 W |
| 06 | 600 W |
| 08 | 750 W |

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 6 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight with key and tap |
| B | With two flat seats |

**7th digit - Options**

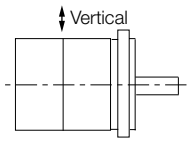
| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 VDC) |
| E | With oil seal and holding brake (24 VDC) |
| S | With oil seal |

# Specifications and Ratings

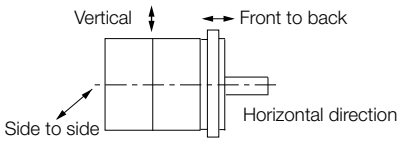
## Specifications

| Voltage | | 200 V | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model SGM7J- | | 05A | 01A | C2A | 02A | 04A | 06A | 08A |
| Time Rating | | Continuous | | | | | | |
| Thermal Class | | B | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MOhm min. | | | | | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | | | | | |
| Excitation | | Permanent magnet | | | | | | |
| Mounting | | Flange-mounted | | | | | | |
| Drive Method | | Direct drive | | | | | | |
| Rotation Direction | | Counterclockwise (CCW) for forward reference when viewed from the load side | | | | | | |
| Vibration Class*1 | | V15 | | | | | | |
| Environmental Conditions | Surrounding Air Temperature | 0 °C to 40 °C (With derating, usage is possible between 40 °C and 60 °C)*3 | | | | | | |
| | Surrounding Air Humidity | 20% to 80% relative humidity (with no condensation) | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*3<br>• Must be free of strong magnetic fields. | | | | | | |
| | Storage Environment | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20 °C to 60 °C (with no freezing)<br>Storage Humidity: 20% to 80% relative humidity (with no condensation) | | | | | | |
| Shock Resistance*2 | Impact Acceleration Rate at Flange | 490 m/s$^2$ | | | | | | |
| | Number of Impacts | 2 times | | | | | | |
| Vibration Resistance*2 | Vibration Acceleration Rate at Flange | 49 m/s$^2$ | | | | | | |
| Applicable SERVOPACKS | SGD7S- | R70A, R70F | R70A, R90F | 1R6A, 2R1F | | 2R8A, 2R8F | 5R5A | |
| | SGD7W-<br>SGD7C | 1R6A*4, 2R8A*4 | | 1R6A*4, 2R8A*4 | | 2R8A, 5R5A*4, 7R6A*4 | 5R5A, 7R6A | |

*1. A vibration class of V15 indicates a vibration amplitude of 15 mm maximum on the Servomotor without a load at the rated motor speed.
*2. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures. The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.




Shock Applied to the Servomotor




Vibration Applied to the Servomotor

*3. Refer to the following section for the derating rates.
*4. If you use a Servomotor together with a S-7W or S-7C SERVOPACK, the control gain may not increase as much as with a S-7S SERVOPACK and other performances may be lower than those achieved with a S-7S SERVOPACK.

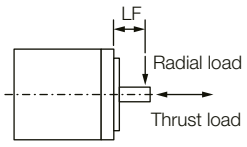
## Ratings

| Voltage | | | 200 V | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model SGM7J- | | | A5A | 01A | C2A | 02A | 04A | 06A | 08A |
| Rated Output *1 | | W | 50 | 100 | 150 | 200 | 400 | 600 | 750 |
| Rated Torque *1, *2 | | Nm | 0.159 | 0.318 | 0.477 | 0.637 | 1.27 | 1.91 | 2.39 |
| Instantaneous Maximum Torque *1 | | Nm | 0.557 | 1.11 | 1.67 | 2.23 | 4.46 | 6.69 | 8.36 |
| Rated Current *1 | | A | 0.55 | 0.85 | 1.6 | 1.6 | 2.5 | 4.2 | 4.4 |
| Instantaneous Maximum Current *1 | | A | 2.0 | 3.1 | 5.7 | 5.8 | 9.3 | 15.3 | 16.9 |
| Rated Motor Speed *1 | | min$^{-1}$ | 3,000 | | | | | | |
| Maximum Motor Speed *1 | | min$^{-1}$ | 6,000 | | | | | | |
| Torque Constant | | Nm/A | 0.316 | 0.413 | 0.321 | 0.444 | 0.544 | 0.493 | 0.584 |
| Motor Moment of Inertia | | ×10$^{-4}$ kg·m$^2$ | 0.0395 | 0.0659 | 0.0915 | 0.263 | 0.486 | 0.800 | 1.59 |
| | with holding brake | | 0.0475 | 0.0739 | 0.0995 | 0.333 | 0.556 | 0.870 | 1.77 |
| | with batteryless absolute encoder | | 0.0410 | 0.0674 | 0.0930 | 0.264 | 0.487 | 0.801 | 1.59 |
| Rated Power Rate *1 | | kW/s | 6.40 | 15.3 | 24.8 | 15.4 | 33.1 | 45.6 | 35.9 |
| | with holding brake | | 5.32 | 13.6 | 22.8 | 12.1 | 29.0 | 41.9 | 32.2 |
| Rated Angular Acceleration Rate *1 | | rad/s | 40,200 | 48,200 | 52,100 | 24,200 | 26,100 | 23,800 | 15,000 |
| | with holding brake | | 33,400 | 43,000 | 47,900 | 19,100 | 22,800 | 21,900 | 13,500 |
| Derating Rate for Servomotor with Oil Seal | | % | 80 | | 90 | | 95 | | |
| Heat Sink Size (Aluminium) *3 | | mm | 200 × 200 × 6 | | 250 × 250 × 6 | | | | |
| Protective Structure *4 | | | Totally enclosed, self-cooled, IP67 | | | | | | |
| Holding Brake Specifications*5 | Rated Voltage | V | 24 VDC ±10% | | | | | | |
| | Capacity | W | | 5.5 | | 6 | | 6.5 | |
| | Holding Torque | Nm | 0.159 | 0.318 | 0.477 | 0.637 | 1.27 | 1.91 | 2.39 |
| | Coil Resistance | Ω (at 20 °C) | | 104.8±10% | | 96±10% | | 88.6±10% | |
| | Rated Current | A (at 20 °C) | | 0.23 | | 0.25 | | 0.27 | |
| | Time Required to Release Brake | ms | | | 60 | | | 80 | |
| | Time Required to Brake | ms | | | | 100 | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) *6 | | | | 35 times | | 15 times | 10 times | 20 times | 12 times |
| | With External Regenerative Resistor and Dynamic Brake Resistor *7 | | | 35 times | | 25 times | | 20 times | 15 times |
| Allowable Shaft Load *3 | LF | mm | | 20 | | | 25 | | 35 |
| | Allowable Radial Load | N | | 78 | | | 245 | | 392 |
| | Allowable Thrust Load | N | | 54 | | | 74 | | 147 |

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.
*3. Refer to the following section for the relation between the heat sinks and derating rate.
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.
*7. To externally connect a dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect a dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

*8. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.

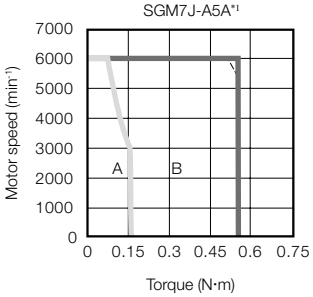


## Torque-motor Speed Characteristics

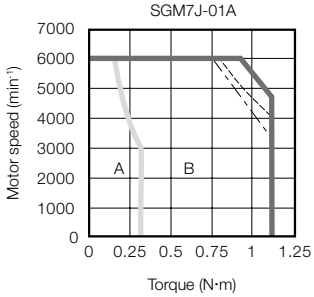
A : Continuous duty zone
B : Intermittent duty zone

——— (solid lines): With three-phase 200-V or single-phase 230-V input
- - - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input

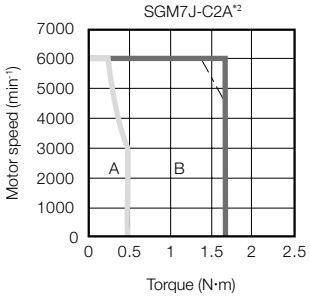
SGM7J-A5A*1



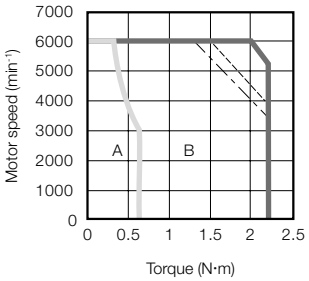

SGM7J-01A



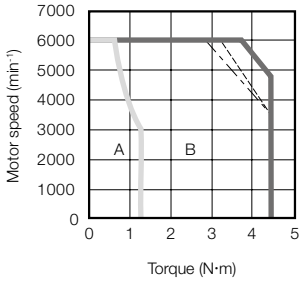

SGM7J-C2A*2



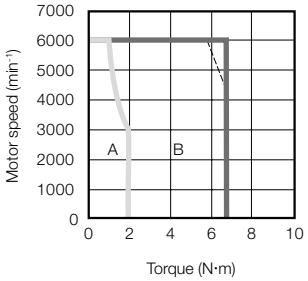

SGM7J-02A



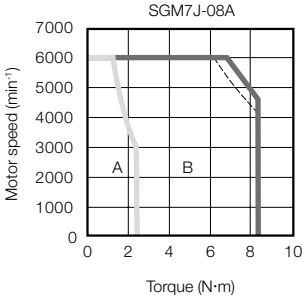

SGM7J-04A




SGM7J-06A




SGM7J-08A

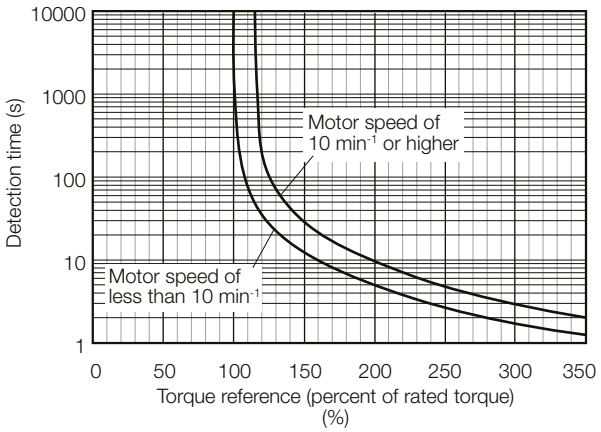



*1. The characteristics are the same for single-phase 200 V and single-phase 100 V input.
*2. The characteristics are the same for three-phase 200 V and single-phase 200 V input.

Notes:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

## Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Ratings of Servomotors. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.

Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.

### Exceeding the allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

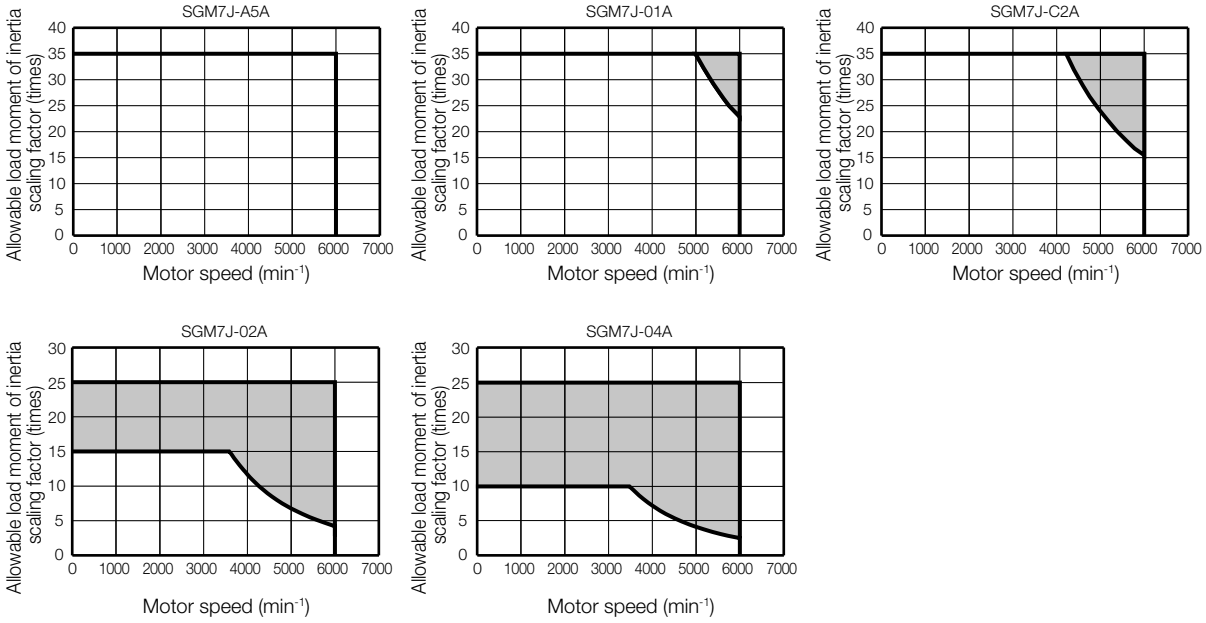
If the above steps is not possible, install an external regenerative resistor.

Information

An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to Built-In Regenerative Resistor for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

### SERVOPACKs without built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.



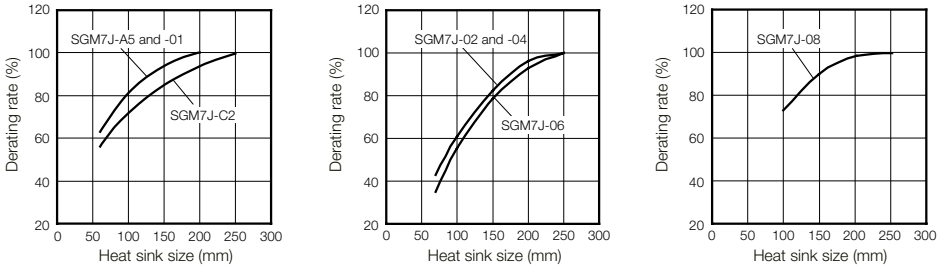

Note: Applicable SERVOPACK models: SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F

### When an External Regenerative Resistor is required

Install the External Regenerative Resistor. Refer to the following section for the recommended products.

## Servomotor Heat Dissipation Conditions

The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.

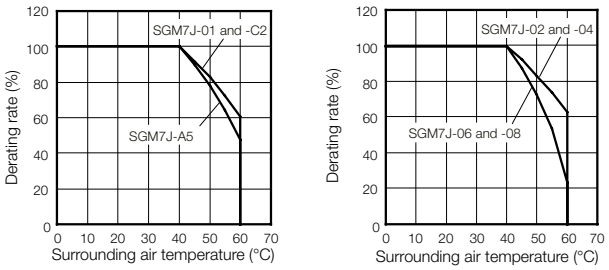



Important

The actual temperature rise depends on how the heat sink (i.e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.

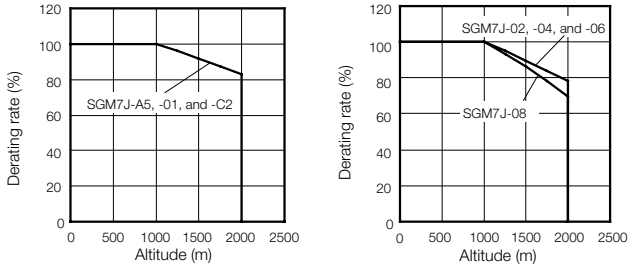
## Applications where the surrounding Air Temperature of the Servomotor exceeds 40 °C

The Servomotor ratings are the continuous allowable values at a surrounding air temperature of 40°C. If you use a Servomotor at a surrounding air temperature that exceeds 40°C (60°C max.), apply a suitable derating rate from the following graphs.




## Applications where the Altitude exceeds 1,000 m

The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.



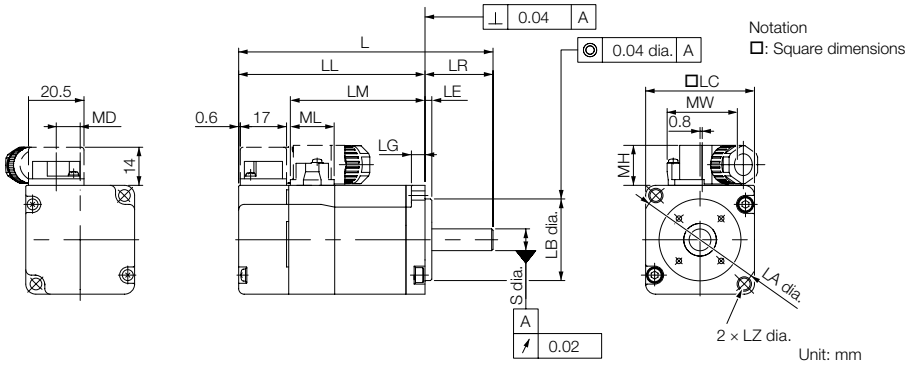

Information

When using Servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in Servomotor Overload Protection Characteristics.

Notes:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your YASKAWA representative.

# Dimensions

## SGM7J-A5, -01, and -C2

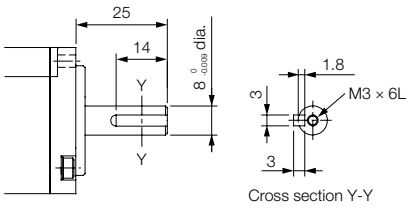



| Model SGM7J- | L* | LL* | LM | Flange Dimensions | | | | | | | S | MD | MW | MH | ML | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LR | LE | LG | LC | LA | LB | LZ | | | | | | |
| A5A□A2□ | 81.5 (122) | 56.5 (97) | 37.9 | 25 | 2.5 | 5 | 40 | 46 | $30^{0}_{-0.021}$ | 4.3 | $8^{0}_{-0.009}$ | 8.8 | 25.8 | 14.7 | 16.1 | 0.3 (0.6) |
| 01A□A2□ | 93.5 (134) | 68.5 (109) | 49.9 | 25 | 2.5 | 5 | 40 | 46 | $30^{0}_{-0.021}$ | 4.3 | $8^{0}_{-0.009}$ | 8.8 | 25.8 | 14.7 | 16.1 | 0.4 (0.7) |
| C2A□A2□ | 105.5 (153.5) | 80.5 (128.5) | 61.9 | 25 | 2.5 | 5 | 40 | 46 | $30^{0}_{-0.021}$ | 4.3 | $8^{0}_{-0.009}$ | 8.8 | 25.8 | 14.7 | 16.1 | 0.5 (0.8) |

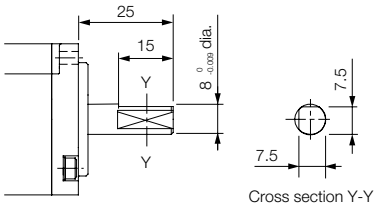
* For models that have a batteryless absolute encoder, L and LL are 8 mm greater than the given value. Refer to the following section for the values for individual models.
Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

# Shaft End Specifications

### Straight with Key and Tap

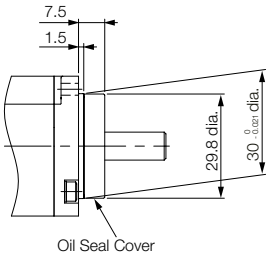



### with Two Flat Seats

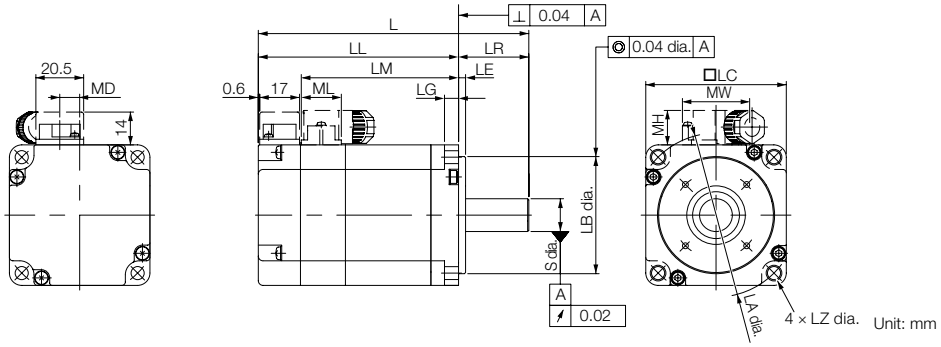



# Specifications of Options

### Oil Seal



### SGM7J-02, -04 and -06

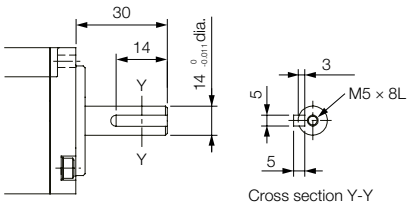



| Model SGM7J- | L* | LL* | LM | Flange Dimensions | | | | | | | S | MD | MW | MH | ML | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LR | LE | LG | LC | LA | LB | LZ | | | | | | |
| 02A□A2□ | 99.5 (140) | 69.5 (110) | 51.2 | 30 | 3 | 6 | 60 | 70 | $50^{0}_{-0.025}$ | 5.5 | $14^{0}_{-0.011}$ | 8.5 | 28.7 | 14.7 | 17.1 | 0.8 (1.4) |
| 04A□A2□ | 115.5 (156) | 85.5 (126) | 67.2 | 30 | 3 | 6 | 60 | 70 | $50^{0}_{-0.025}$ | 5.5 | $14^{0}_{-0.011}$ | 8.5 | 28.7 | 14.7 | 17.1 | 1.1 (1.7) |
| 06A□A2□ | 137.5 (191.5) | 107.5 (161.5) | 89.2 | 30 | 3 | 6 | 60 | 70 | $50^{0}_{-0.025}$ | 5.5 | $14^{0}_{-0.011}$ | 8.5 | 28.7 | 14.7 | 17.1 | 1.6 (2.2) |

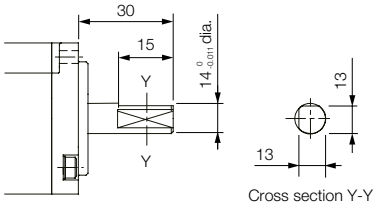
* For models that have a batteryless absolute encoder, L and LL are 8 mm greater than the given value. Refer to the following section for the values for individual models.
Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

### Straight with Key and Tap

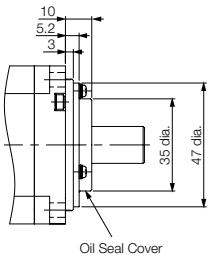



### with Two Flat Seats

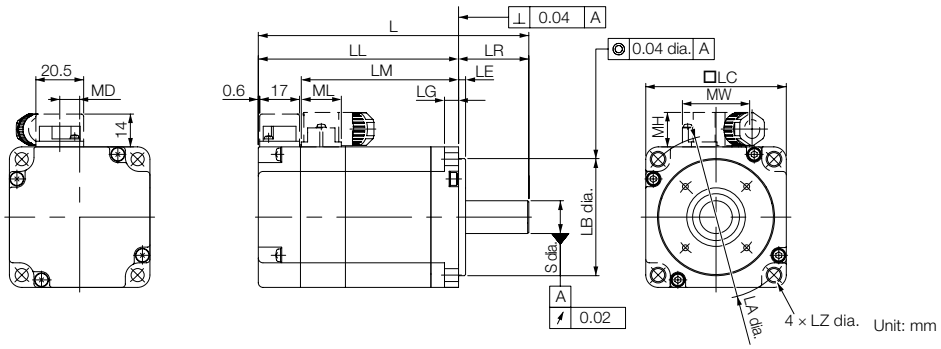



## Specifications of Options

### Oil Seal



### SGM7J-08

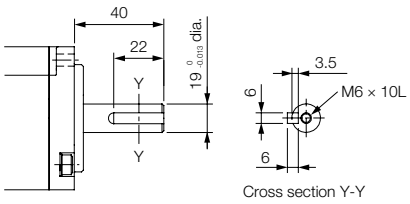



| Model SGM7J- | L* | LL* | LM | Flange Dimensions | | | | | | | S | MD | MW | MH | ML | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LR | LE | LG | LC | LA | LB | LZ | | | | | | |
| 08A□A2□ | 137 (184) | 97 (144) | 78.5 | 40 | 3 | 8 | 80 | 90 | $70^{0}_{-0.030}$ | 7 | $19^{0}_{-0.013}$ | 13.6 | 38 | 14.7 | 19.3 | 2.2 (2.8) |

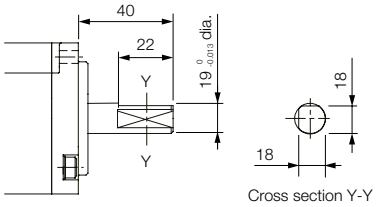
* For models that have a batteryless absolute encoder, L and LL are 8 mm greater and the approximate mass is 0.1 kg greater than the given value. Refer to the following section for the values for individual models.Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

### Straight with Key and Tap

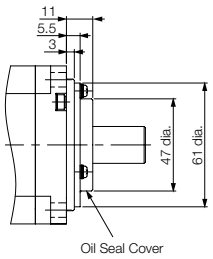



### with Two Flat Seats




## Specifications of Options

### Oil Seal



## Dimensions of Servomotors with batteryless Absolute Encoders

| Model SGM7J- | L | LL | Approx. Mass [kg] |
|---|---|---|---|
| A5A6A2☐ | 89.5<br>(130) | 64.5<br>(105) | 0.3<br>(0.6) |
| 01A6A2☐ | 101.5<br>(142) | 76.5<br>(117) | 0.4<br>(0.7) |
| C2A6A2☐ | 113.5<br>(161.5) | 88.5<br>(136.5) | 0.5<br>(0.8) |
| 02A6A2☐ | 107.5<br>(148) | 77.5<br>(118) | 0.8<br>(1.4) |
| 04A6A2☐ | 123.5<br>(164) | 93.5<br>(134) | 1.1<br>(1.7) |
| 06A6A2☐ | 145.5<br>(198.5) | 115.5<br>(169.5) | 1.6<br>(2.2) |
| 08A6A2☐ | 145<br>(192) | 105<br>(152) | 2.3<br>(2.9) |

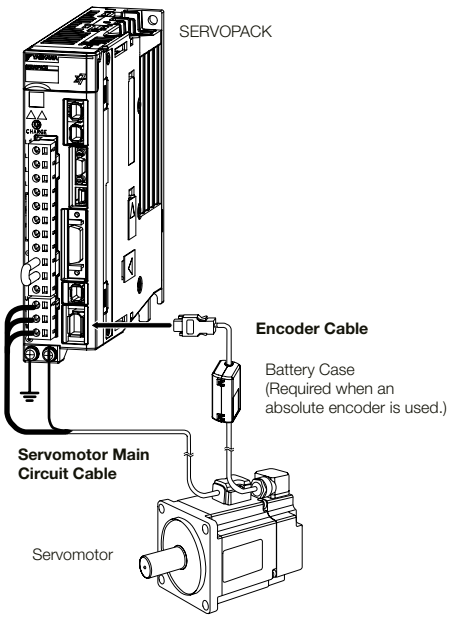
Note: The values in parentheses are for Servomotors with Holding Brakes.

# Selecting Cables SGM7J

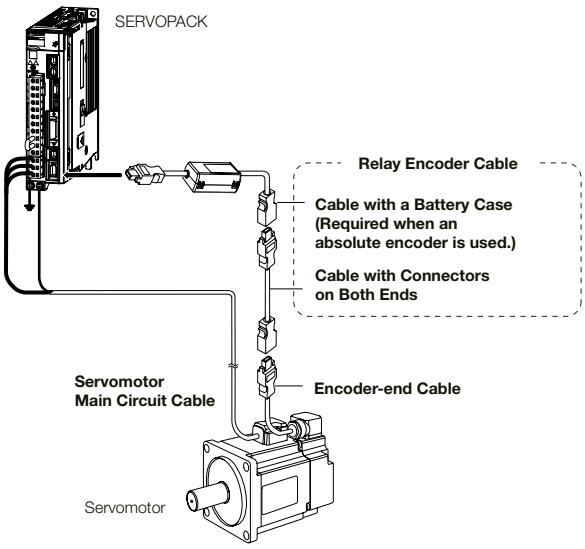
## Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

### Encoder Cable of 20 m or less




### Encoder Cable of 30 m to 50 m (Relay Cable)

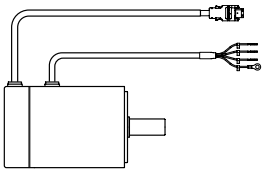



Note:
1. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
2. If you use a Servomotor Motor Power Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials: Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

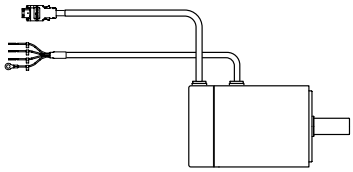
Important

There are different order numbers for the Servomotor Motor Power Cables and Encoder Cables depending on the cable installation direction. Confirm the order numbers before you order.

**Cable installed towards Load**



**Cable installed away from Load**

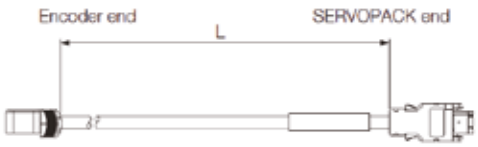


## Servomotor Motor Power Cables

| Servomotor Model | Description | Length | Order Number Flexible Cable* | Appearance |
|---|---|---|---|---|
| SGM7J-A5 to -C2 50 W to 150 W | For Servomotors without Holding Brakes<br>Cable installed towards load | 3 m | JZSP-CSM21-03-E-G# | |
| | | 5 m | JZSP-CSM21-05-E-G# | |
| | | 10 m | JZSP-CSM21-10-E-G# | |
| | | 15 m | JZSP-CSM21-15-E-G# | |
| | | 20 m | JZSP-CSM21-20-E-G# | |
| SGM7J-02 to -06 200 W to 600 W | | 3 m | JZSP-CSM22-03-E-G# | |
| | | 5 m | JZSP-CSM22-05-E-G# | Servomotor end "L" SERVOPACK end |
| | | 10 m | JZSP-CSM22-10-E-G# | |
| | | 15 m | JZSP-CSM22-15-E-G# | |
| | | 20 m | JZSP-CSM22-20-E-G# | |
| | | 30 m | JZSP-CSM22-30-E-G# | |
| SGM7J-08 750 W, 1.0 kW | | 3 m | JZSP-CSM23-03-E-G# | |
| | | 5 m | JZSP-CSM23-05-E-G# | |
| | | 10 m | JZSP-CSM23-10-E-G# | |
| | | 15 m | JZSP-CSM23-15-E-G# | |
| | | 20 m | JZSP-CSM23-20-E-G# | |
| | | 30 m | JZSP-CSM23-30-E-G# | |
| SGM7J-A5 to -C2 50 W to 150 W | For Servomotors with Holding Brakes<br>Cable installed towards load | 3 m | JZSP-CSM31-03-E-G# | |
| | | 5 m | JZSP-CSM31-05-E-G# | |
| | | 10 m | JZSP-CSM31-10-E-G# | |
| | | 15 m | JZSP-CSM31-15-E-G# | |
| | | 20 m | JZSP-CSM31-20-E-G# | |
| SGM7J-02 to -06 200 W to 600 W | | 3 m | JZSP-CSM32-03-E-G# | |
| | | 5 m | JZSP-CSM32-05-E-G# | Servomotor end "L" SERVOPACK end |
| | | 10 m | JZSP-CSM32-10-E-G# | |
| | | 15 m | JZSP-CSM32-15-E-G# | |
| | | 20 m | JZSP-CSM32-20-E-G# | |
| SGM7J-08 750 W, 1.0 kW | | 3 m | JZSP-CSM33-03-E-G# | |
| | | 5 m | JZSP-CSM33-05-E-G# | |
| | | 10 m | JZSP-CSM33-10-E-G# | |
| | | 15 m | JZSP-CSM33-15-E-G# | |
| | | 20 m | JZSP-CSM33-20-E-G# | |

* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
Note: The digit # of the order number represents the design revision number.

## Encoder Cables

| Servomotor Model | Description | Length | Order Number | Appearance |
|---|---|---|---|---|
| SGM7J-A5 to 08<br>50 W - 750 W | Cable direction to load side | 3 m | JZSP-C7PI2D-03-E-G# |  |
| | | 5 m | JZSP-C7PI2D-05-E-G# | |
| | | 10 m | JZSP-C7PI2D-10-E-G# | |
| | | 15 m | JZSP-C7PI2D-15-E-G# | |
| | | 20 m | JZSP-C7PI2D-20-E-G# | |
| | | 25 m | JZSP-C7PI2D-25-E-G# | |
| | | 30 m | JZSP-C7PI2D-30-E-G# | |
| | | 35 m | JZSP-C7PI2D-35-E-G# | |
| | | 40 m | JZSP-C7PI2D-40-E-G# | |
| | Cable direction away from load | 3 m | JZSP-C7PI2E-03-E-G# | |
| | | 5 m | JZSP-C7PI2E-05-E-G# | |
| | | 10 m | JZSP-C7PI2E-10-E-G# | |
| | | 15 m | JZSP-C7PI2E-15-E-G# | |
| | | 20 m | JZSP-C7PI2E-20-E-G# | |
| | | 25 m | JZSP-C7PI2E-25-E-G# | |
| | | 30 m | JZSP-C7PI2E-30-E-G# | |
| | | 35 m | JZSP-C7PI2E-35-E-G# | |
| | | 40 m | JZSP-C7PI2E-40-E-G# | |
| | Cable with battery case, direction to load side | 3 m | JZSP-C7PA2D-03-E-G# | |
| | | 5 m | JZSP-C7PA2D-05-E-G# | |
| | | 10 m | JZSP-C7PA2D-10-E-G# | |
| | | 15 m | JZSP-C7PA2D-15-E-G# | |
| | | 20 m | JZSP-C7PA2D-20-E-G# | |
| | | 25 m | JZSP-C7PA2D-25-E-G# | |
| | | 30 m | JZSP-C7PA2D-30-E-G# | |
| | | 35 m | JZSP-C7PA2D-35-E-G# | |
| | | 40 m | JZSP-C7PA2D-40-E-G# | |
| | Cable with battery case, direction away from load side | 3 m | JZSP-C7PA2E-03-E-G# | |
| | | 5 m | JZSP-C7PA2E-05-E-G# | |
| | | 10 m | JZSP-C7PA2E-10-E-G# | |
| | | 15 m | JZSP-C7PA2E-15-E-G# | |
| | | 20 m | JZSP-C7PA2E-20-E-G# | |
| | | 25 m | JZSP-C7PA2E-25-E-G# | |
| | | 30 m | JZSP-C7PA2E-30-E-G# | |
| | | 35 m | JZSP-C7PA2E-35-E-G# | |
| | | 40 m | JZSP-C7PA2E-40-E-G# | |

# Model Designations

| SGM7G | - | 03 | A | 7 | A | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 series Servomotors: SGM7G | | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th | digit |

**1st + 2nd digit - Rated output**

| Code | Specification |
|---|---|
| 03 | 300 W |
| 05 | 450 W |
| 09 | 850 W |
| 13 | 1.3 kW |
| 20 | 1.8 kW |
| 30 | 2.9 kW* |
| 44 | 4.4 kW |
| 55 | 5.5 kW |
| 75 | 7.5 kW |
| 1A | 11.0 kW |
| 1E | 15.0 kW |

**3rd digit - Power supply voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**4th digit - Serial encoder**

| Code | Specification |
|---|---|
| 6 | 24-bit batteryless absolute |
| 7 | 24-bit absolute |
| F | 24-bit incremental |

**5th digit - Design revision order**

| Code | Specification |
|---|---|
| A | Standard model |

**6th digit - Shaft end**

| Code | Specification |
|---|---|
| 2 | Straight without key |
| 6 | Straight shaft with key and tap |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| C | With holding brake (24 VDC) |
| E | With oil seal and holding brake (24 VDC) |
| S | With oil seal |

Note: Readily available up to 1.5 kW. Others available on request.

* The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.

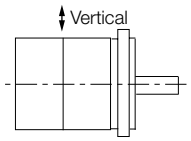
# Specifications and Ratings

## Specifications

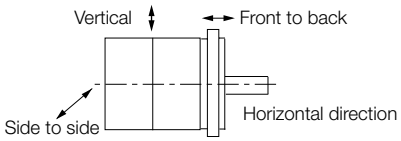
| Voltage | | 200 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SGM7G- | | 03A | 05A | 09A | 13A | 20A | 30A | 44A | 55A | 75A | 1AA | 1EA |
| Time Rating | | Continuous | | | | | | | | | | |
| Thermal Class | | UL:F, CE:F | | | | | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | | | | | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | | | | | | | | | |
| Excitation | | Permanent magnet | | | | | | | | | | |
| Mounting | | Flange-mounted | | | | | | | | | | |
| Drive Method | | Direct drive | | | | | | | | | | |
| Rotation Direction | | Counterclockwise (CCW) for forward reference when viewed from the load side | | | | | | | | | | |
| Vibration Class*1 | | V15 | | | | | | | | | | |
| Environmental Conditions | Surrounding Air Temperature | 0 °C to 40 °C (With derating, usage is possible between 40 °C and 60 °C)*3 | | | | | | | | | | |
| | Surrounding Air Humidity | 20% to 80% relative humidity (with no condensation) | | | | | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less. (With derating, usage is possible between 1,000 m and 2,000 m.)*3<br>• Must be free of strong magnetic fields. | | | | | | | | | | |
| | Storage Environment | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20 °C to 60 °C (with no freezing)<br>Storage Humidity: 20% to 80% relative humidity (with no condensation) | | | | | | | | | | |
| Shock Resistance*2 | Impact Acceleration Rate at Flange | 490 m/s$^2$ | | | | | | | | | | |
| | Number of Impacts | 2 times | | | | | | | | | | |
| Vibration Resistance*2 | Vibration Acceleration Rate at Flange | 49 m/s$^2$ (24.5 m/s$^2$ front to back) | | | | | | | 24.5 m/s$^2$ | | | |
| Applicable SERVOPACKs | SGD7S- | 3R8A | | 7R6A | 120A | 180A | 330A | | 470A | 550A | 590A | 780A |
| | SGD7W-<br>SGD7C- | 5R5A*4, 7R6A*4 | | 7A6A | – | | | | | | | |

Note: Readily available up to 1.5 kW. Others available on request.

*1. A vibration class of V15 indicates a vibration amplitude of 15 mm maximum on the Servomotor without a load at the rated motor speed.
*2. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures.
The strength of the vibration that the Servomotor can withstand depends on the application. Always check the vibration acceleration rate that is applied to the Servomotor with the actual equipment.




Shock Applied to the Servomotor




Vibration Applied to the Servomotor

*3. Refer to the following section for the derating rates.
*4. If you use a Servomotor together with a S-7W or S-7C SERVOPACK, the control gain may not increase as much as with a S-7S SERVOPACK and other performances may be lower than those achieved with a S-7S SERVOPACK.

## Servomotor Ratings

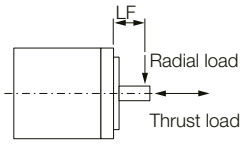
| Voltage | | | 200 V | | | | |
|---|---|---|---|---|---|---|---|
| Model SGM7G- | | | 03A | 05A | 09A | 13A | 20A |
| Rated Output *1 | | kW | 0.3 | 0.45 | 0.85 | 1.3 | 1.8 |
| Rated Torque *1, *2 | | Nm | 1.96 | 2.86 | 5.39 | 8.34 | 11.5 |
| Instantaneous Maximum Torque *1 | | Nm | 5.88 | 8.92 | 14.2 | 23.3 | 28.7 |
| Rated Current *1 | | A | 2.8 | 3.8 | 6.9 | 10.7 | 16.7 |
| Instantaneous Maximum Current *1 | | A | 8.0 | 11 | 17 | 28 | 42 |
| Rated Motor Speed *1 | | $min^{-1}$ | 1,500 | | | | |
| Maximum Motor Speed *1 | | $min^{-1}$ | 3,000 | | | | |
| Torque Constant | | Nm/A | 0.776 | 0.854 | 0.859 | 0.891 | 0.748 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg·$m^2$ | 2.48 (2.73) | 3.33 (3.58) | 13.9 (16.0) | 19.9 (22.0) | 26.0 (28.1) |
| Rated Power Rate *1 | | kW/s | 15.5 (14.1) | 24.6 (22.8) | 20.9 (18.2) | 35.0 (31.6) | 50.9 (47.1) |
| Rated Angular Acceleration Rate *1 | | $rad/s^2$ | 7,900 (7,180) | 8,590 (7,990) | 3,880 (3,370) | 4,190 (3,790) | 4,420 (4,090) |
| Heat Sink Size*3 | | mm | 250 × 250 × 6 (aluminium) | | | 400 × 400 × 20 (steel) | |
| Protective Structure *4 | | | Totally enclosed, self-cooled, IP67 | | | | |
| Holding Brake Specifications *5 | Rated Voltage | V | 24 VDC $^{+10\%}_{0}$ | | | | |
| | Capacity | W | 10 | | | | |
| | Holding Torque | Nm | 4.5 | | 12.7 | 19.6 | |
| | Coil Resistance | Ω (at 20 °C) | 56 | | 59 | | |
| | Rated Current | A (at 20 °C) | 0.43 | | 0.41 | | |
| | Time Required to Release Brake | ms | 100 | | | | |
| | Time Required to Brake | ms | 80 | | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | | 15 times | 15 times | 5 times | | |
| | With External Regenerative Resistor and Dynamic Brake Resistor | | | | 10 times | | |
| Allowable Shaft Load *7 | LF | mm | 40 | | 58 | | |
| | Allowable Radial Load | N | 490 | | | 686 | 980 |
| | Allowable Thrust Load | N | 98 | | | 343 | 392 |

Note: Readily available up to 1.5 kW. Others available on request.

Note: The values in parentheses are for Servomotors with Holding Brakes.

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.
*3. Refer to the following section for the relation between the heat sinks and derating rate.
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.
*7. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.

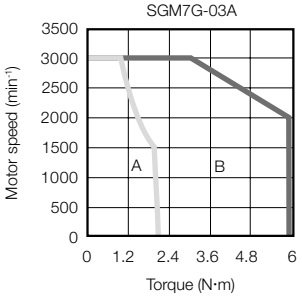


# Torque-motor Speed Characteristics

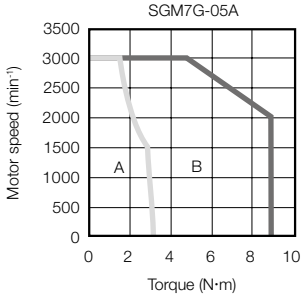
A : Continuous duty zone
B : Intermittent duty zone

——— (solid lines): With three-phase 200-V or single-phase 230-V input
- - - - - - - - (dotted lines): With single-phase 200-V input

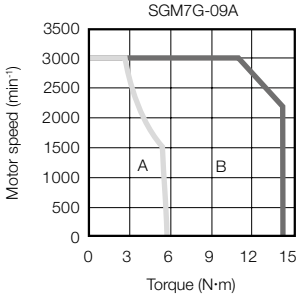
SGM7G-03A



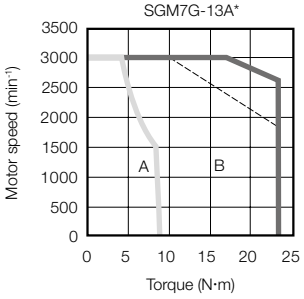

SGM7G-05A



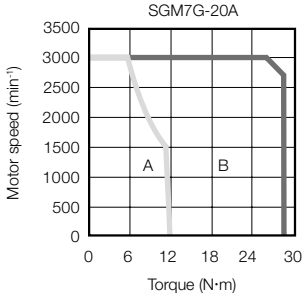

SGM7G-09A




SGM7G-13A*




SGM7G-20A




* A single-phase power input can be used in combination with the SGD7S-120A□□A008.

Notes:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

# Servomotor Ratings

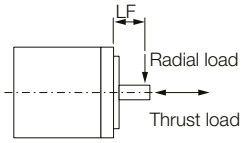
| Model SGM7G- | | | 30A | 30A*6 | 44A | 55A | 75A | 1AA | 1EA |
|---|---|---|---|---|---|---|---|---|---|
| Rated Output *1 | | kW | 2.9 | 2.4 | 4.4 | 5.5 | 7.5 | 11 | 15 |
| Rated Torque *1, *2 | | Nm | 18.6 | 15.1 | 28.4 | 35.0 | 48.0 | 70.0 | 95.4 |
| Instantaneous Maximum Torque *1 | | Nm | 54.0 | 45.1 | 71.6 | 102 | 119 | 175 | 224 |
| Rated Current *1 | | A | 23.8 | 19.6 | 32.8 | 37.2 | 54.7 | 58.6 | 78.0 |
| Instantaneous Maximum Current *1 | | A | 70 | 56 | 84 | 110 | 130 | 140 | 170 |
| Rated Motor Speed *1 | | $min^{-1}$ | 1,500 | | | | | | |
| Maximum Motor Speed *1 | | $min^{-1}$ | 3,000 | | | | | 2,000 | |
| Torque Constant | | Nm/A | 0.848 | 0.848 | 0.934 | 1.00 | 0.957 | 1.38 | 1.44 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg·$m^2$ | 46.0 (53.9) | 46.0 (53.9) | 67.5 (75.4) | 89.0 (96.9) | 125 (133) | 242 (261) | 303 (341) |
| Rated Power Rate *1 | | kW/s | 75.2 (64.2) | 49.5 (42.2) | 119 (107) | 138 (126) | 184 (173) | 202 (188) | 300 (267) |
| Rated Angular Acceleration Rate *1 | | $rad/s^2$ | 4,040 (3,450) | 3,280 (2,800) | 4,210 (3,370) | 3,930 (3,610) | 3,840 (3,610) | 2,890 (2,680) | 3,150 (2,800) |
| Heat Sink Size*3 | | mm | 500 × 500 × 30 (steel) | | | | | 650 × 650 × 35 (steel) | |
| Protective Structure *4 | | | Totally enclosed, self-cooled, IP67 | | | | | | |
| Holding Brake Specifications *5 | Rated Voltage | V | 24 VDC +10% 0 | | | | | | |
| | Capacity | W | 18.5 | | | 25 | | 32 | 35 |
| | Holding Torque | Nm | 43.1 | | | 72.6 | | 84.3 | 114.6 |
| | Coil Resistance | Ω (at 20 °C) | 31 | | | 23 | | 18 | 17 |
| | Rated Current | A (at 20 °C) | 0.77 | | | 1.05 | | 1.33 | 1.46 |
| | Time Required to Release Brake | ms | 170 | | | | | | 250 |
| | Time Required to Brake | ms | 100 | | | 80 | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) *6 | | | 5 times | 3 times | 5 times | | | | |
| | With External Regenerative Resistor and Dynamic Brake Resistor | | 10 times | 7 times | 10 times | | | | |
| Allowable Shaft Load *7 | LF | mm | 79 | | | 113 | | 116 | |
| | Allowable Radial Load | N | 1,470 | | | 1,764 | | | 4,998 |
| | Allowable Thrust Load | N | 490 | | | 588 | | | 2,156 |

Note: Readily available up to 1.5 kW. Others available on request.

Notes: The values in parentheses are for Servomotors with Holding Brakes.

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values with an aluminum or steel heat sink of the dimensions given in the table.
*3. Refer to the following section for the relation between the heat sinks and derating rate.
*4. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*5. Observe the following precautions if you use a Servomotor with a Holding Brake.
- The holding brake cannot be used to stop the Servomotor.
- The time required to release the brake and the time required to brake depend on which discharge circuit is used. Confirm that the operation delay time is appropriate for the actual equipment.
- The 24-VDC power supply is not provided by YASKAWA.

*6. The motor moment of inertia scaling factor is the value for a standard Servomotor without a Holding Brake.
*7. Design the mechanical system so that the thrust and radial loads applied to the Servomotor shaft end during operation do not exceed the values given in the table.

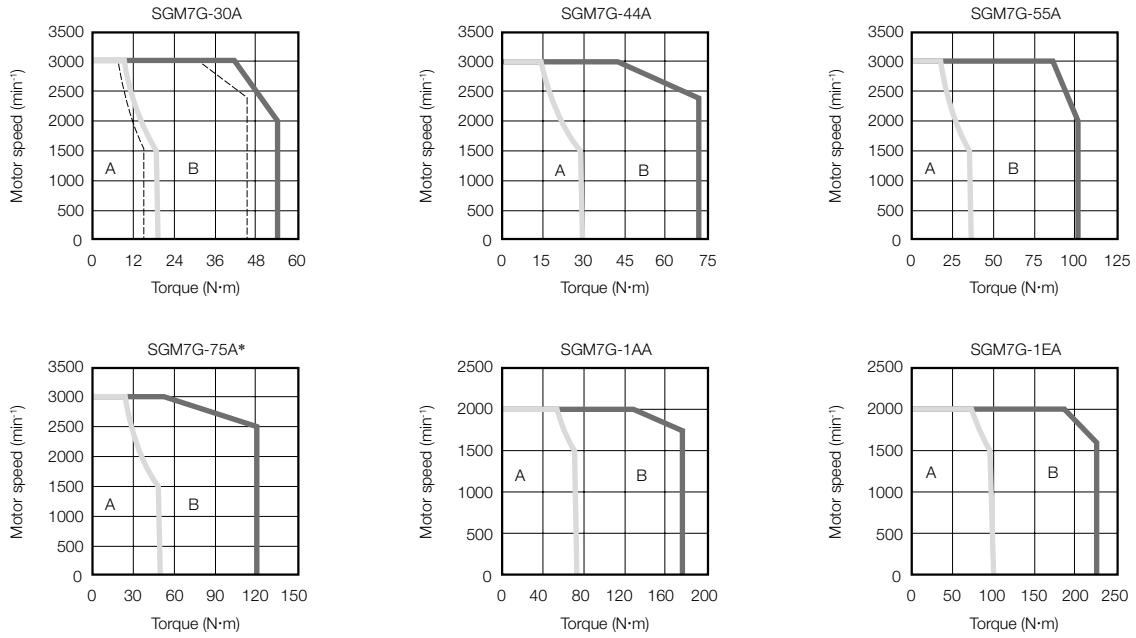



*8. This is the value if you combine the SGM7G-30A with the SGD7S-200A.

# Torque-motor Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone

(solid lines): With three-phase 200-V input
(dotted lines): When combined with the SGD7S-200A



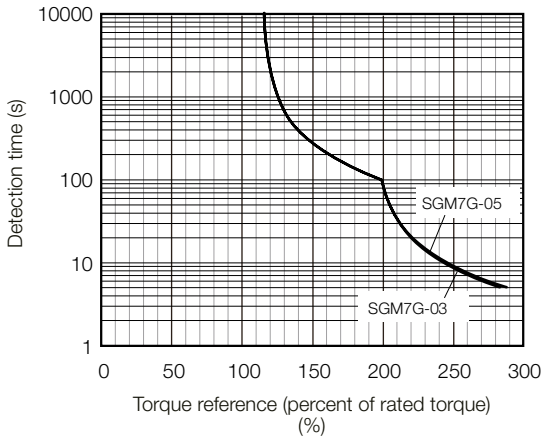

* Use an SGM7G-75A Servomotor with a Holding Brake with an output torque of 14.4 Nm (30% of the rated torque) or lower when using the Servomotor in continuous operation at the maximum motor speed of 3,000 $min^{-1}$.

Note:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

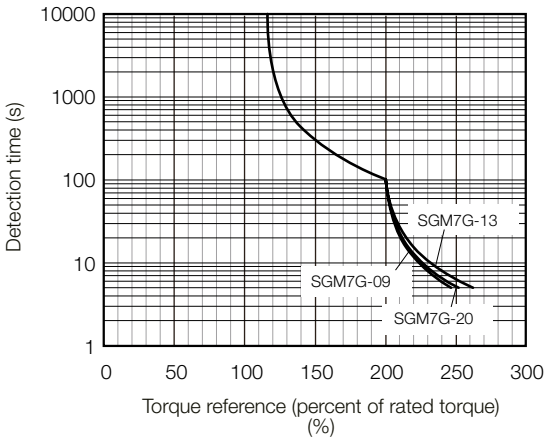
# Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor surrounding air temperature of 40 °C.

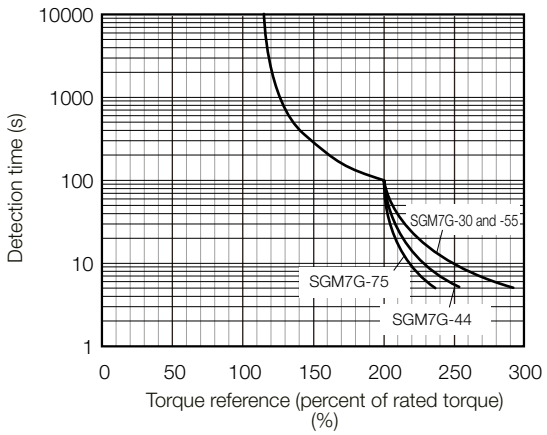
SGM7G-03 and -05



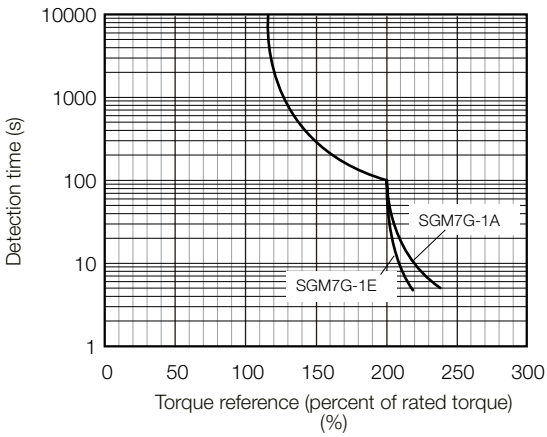

SGM7G-09, -13, and -20




SGM7G-30, -44, -55, and -75




SGM7G-1A and -1E




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Servomotor Ratings. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.
Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.

### Exceeding the allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information

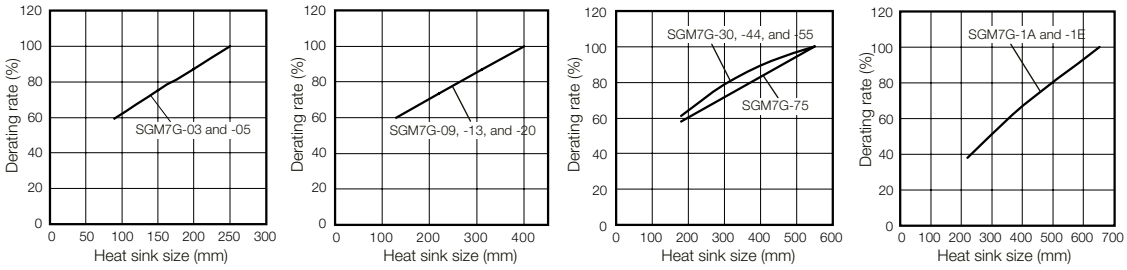
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to Built-In Regenerative Resistor for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

### When an External Regenerative Resistor is required

Install the External Regenerative Resistor. Refer to the following section for the recommended products.

## Servomotor Heat Dissipation Conditions

The Servomotor ratings are the continuous allowable values when a heat sink is installed on the Servomotor. If the Servomotor is mounted on a small device component, the Servomotor temperature may rise considerably because the surface for heat dissipation becomes smaller. Refer to the following graphs for the relation between the heat sink size and derating rate.

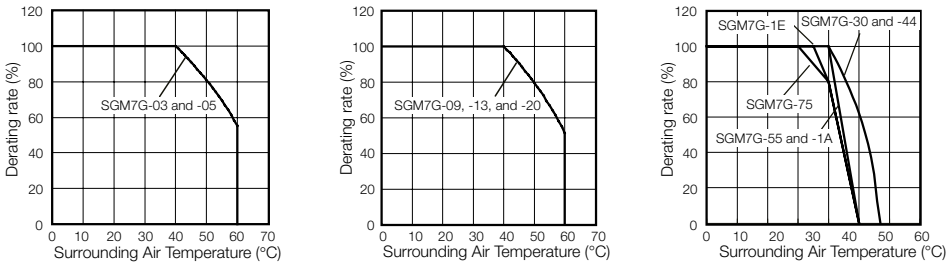



Important

The actual temperature rise depends on how the heat sink (i.e., the Servomotor mounting section) is attached to the installation surface, what material is used for the Servomotor mounting section, and the motor speed. Always check the Servomotor temperature with the actual equipment.

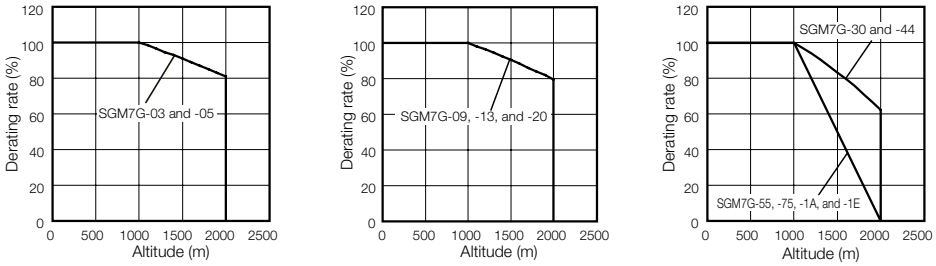
## Servomotor Derating Rates for surrounding Air Temperatures

Apply a suitable derating rate from the following graphs according to the surrounding air temperature of the Servomotor (60°C max.).




## Applications where the Altitude exceeds 1,000 m

The Servomotor ratings are the continuous allowable values at an altitude of 1,000 m or less. If you use a Servomotor at an altitude that exceeds 1,000 m (2,000 m max.), the heat dissipation effect of the air is reduced. Apply the appropriate derating rate from the following graphs.




Information

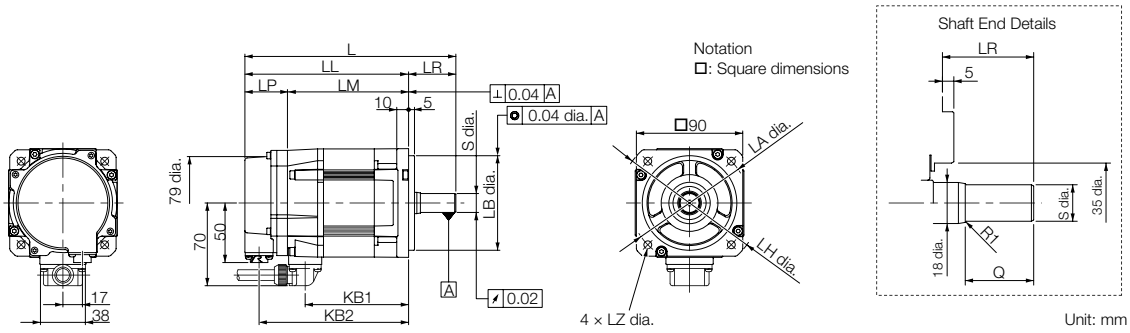
When using Servomotors with derating, change the detection timing of overload warning and overload alarm based on the overload detection level of the motor given in Servomotor Overload Protection Characteristics.

Notes:
1. Use the combination of the SERVOPACK and Servomotor so that the derating conditions are satisfied for both the SERVOPACK and Servomotor.
2. The derating rates are applicable only when the average motor speed is less than or equal to the rated motor speed. If the average motor speed exceeds the rated motor speed, consult with your YASKAWA representative.

# External Dimensions

## Servomotors without Holding Brakes

### SGM7G-03 and -05



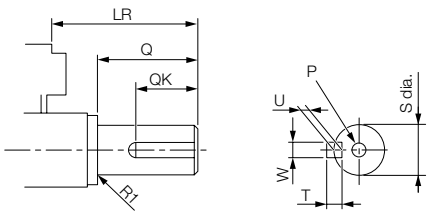

| Model SGM7G- | L*1 | LL*1 | LM | LP*1 | LR | KB1 | KB2*1 | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | |
| 03A□A21 | 166*2 | 126 | 90 | 36 | 40*2 | 75 | 114 | 70 | 100 | $80^{0}_{-0.030}$ | 90 | 5 | 10 | 120 | 6.6 | $16^{0}_{-0.011\ *2}$ | 30*2 | 2.6 |
| 05A□A21 | 179 | 139 | 103 | 36 | 40 | 88 | 127 | 70 | 100 | $80^{0}_{-0.030}$ | 90 | 5 | 10 | 120 | 6.6 | $16^{0}_{-0.013}$ | 30 | 3.2 |

*1. For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
*2. The L, LR, S, and Q dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

### Straight with Key and Tap

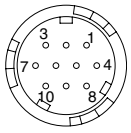



| Model SGM7G- | LR | Q | QK | S | W | T | U | P |
|---|---|---|---|---|---|---|---|---|
| 03A□A61 | 40* | 30* | 20* | $16^{0}_{-0.011\ *}$ | 5 | 5 | 3 | M5 x 2L |
| 05A□A61 | 40 | 30 | 20 | $16^{0}_{-0.013}$ | 5 | 5 | 3 | |

* The shaft end dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

## Connector Specifications

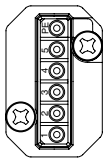
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

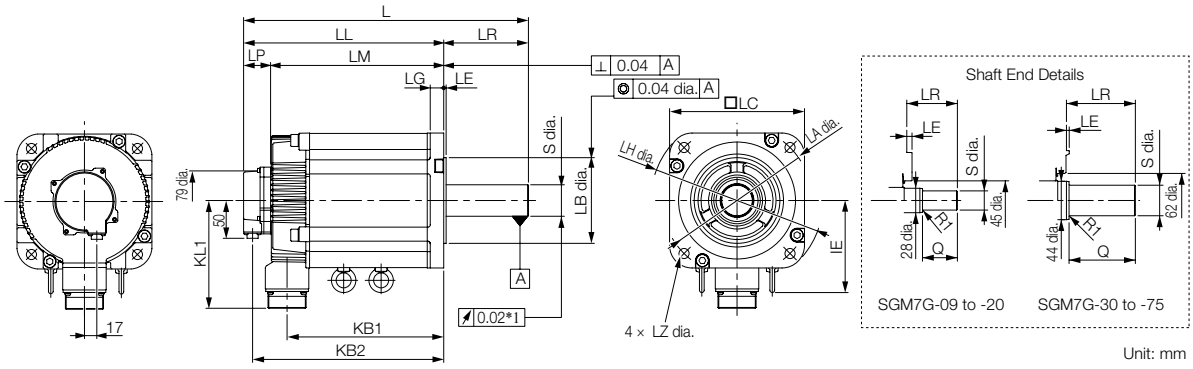
### Servomotor Connector



| | | | |
|---|---|---|---|
| PE | FG (frame ground) | 3 | Phase U |
| 5 | – | 2 | Phase V |
| 4 | – | 1 | Phase W |

Manufacturer: Japan Aviation Electronics Industry, Ltd.

### SGM7G-09 to -75




Unit: mm

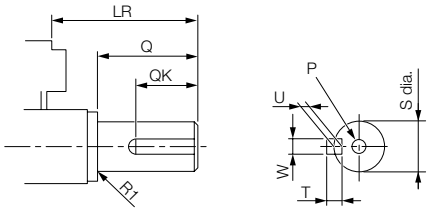
| Model SGM7G- | L*2 | LL*2 | LM | LP*2 | LR | KB1 | KB2*2 | IE | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | [kg] |
| 09A□A21 | 195 | 137 | 101 | 36 | 58 | 83 | 125 | – | 104 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $24^{0}_{-0.013}$ *3 | 40 | 5.5 |
| 13A□A21 | 211 | 153 | 117 | 36 | 58 | 99 | 141 | – | 104 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $24^{0}_{-0.013}$ *3 | 40 | 7.1 |
| 20A□A21 | 229 | 171 | 135 | 36 | 58 | 117 | 159 | – | 104 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $24^{0}_{-0.013}$ *3 | 40 | 8.6 |
| 30A□A21 | 239 | 160 | 124 | 36 | 79 | 108 | 148 | – | 134 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $35^{+0.01}_{0}$ | 76 | 13.5 |
| 44A□A21 | 263 | 184 | 148 | 36 | 79 | 132 | 172 | – | 134 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $35^{+0.01}_{0}$ | 76 | 17.5 |
| 55A□A21 | 334 | 221 | 185 | 36 | 113 | 163 | 209 | 123 | 144 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $42^{0}_{-0.016}$ | 110 | 21.5 |
| 75A□A21 | 380 | 267 | 231 | 36 | 113 | 209 | 255 | 123 | 144 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $42^{0}_{-0.016}$ | 110 | 29.5 |

*1. This is 0.04 for the SGM7G-55 or SGM7G-75.
*2. For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
*3. The S dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

### Straight with Key and Tap

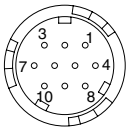



| Model SGM7G- | LR | Q | QK | S | W | T | U | P |
|---|---|---|---|---|---|---|---|---|
| 09A□A61 | 58 | 40 | 25 | $24^{0}_{-0.013}$ * | 8* | 7* | 4* | M5x12L |
| 13A□A61 | 58 | 40 | 25 | $24^{0}_{-0.013}$ * | 8* | 7* | 4* | |
| 20A□A61 | 58 | 40 | 25 | $24^{0}_{-0.013}$ * | 8 | 7 | 4 | |
| 30A□A61 | 79 | 76 | 60 | $35^{+0.01}_{0}$ | 10 | 8 | 5 | M12×25L |
| 44A□A61 | 79 | 76 | 60 | $35^{+0.01}_{0}$ | 10 | 8 | 5 | |
| 55A□A61 | 113 | 110 | 90 | $42^{0}_{-0.016}$ | 12 | 8 | 5 | M16×32L |
| 75A□A61 | 113 | 110 | 90 | $42^{0}_{-0.016}$ | 12 | 8 | 5 | |

* The shaft end dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

## Connector Specifications

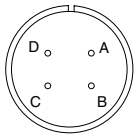
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

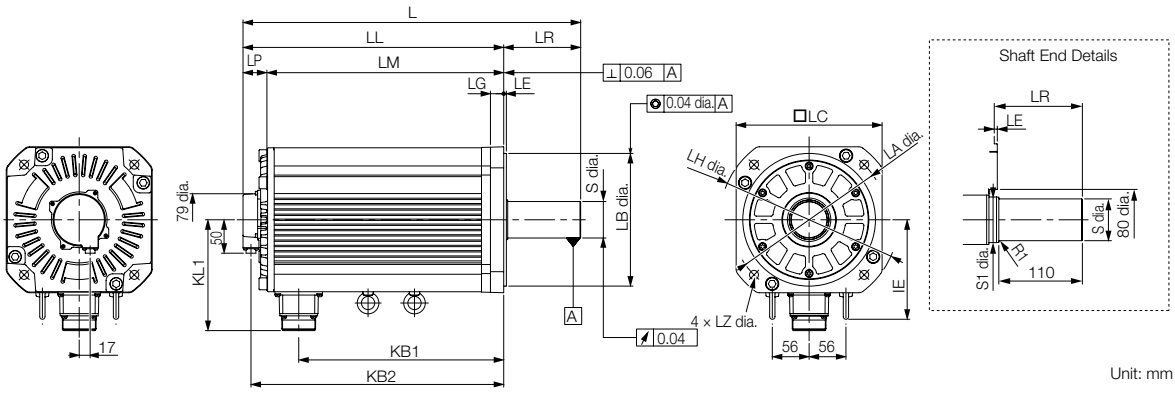
### Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

### SGM7G-1A and -1E




Unit: mm

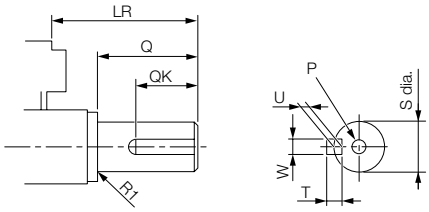
| Model SGM7G- | L* | LL* | LM | LP* | LR | KB1 | KB2* | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | S1 | |
| 1AA□A21 | 447 | 331 | 295 | 36 | 116 | 247 | 319 | 150 | 235 | $200^{0}_{-0.046}$ | 220 | 4 | 20 | 270 | 13.5 | $42^{0}_{-0.016}$ | 50 | 57 |
| 1EA□A21 | 509 | 393 | 357 | 36 | 116 | 309 | 381 | 150 | 235 | $200^{0}_{-0.046}$ | 220 | 4 | 20 | 270 | 13.5 | $55^{+0.030}_{+0.011}$ | 60 | 67 |

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.

Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

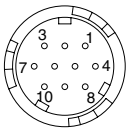
### Straight with Key and Tap




| Model SGM7G- | LR | Q | QK | S | W | T | U | P |
|---|---|---|---|---|---|---|---|---|
| 1AA□A61 | 116 | 110 | 90 | $42^{0}_{-0.016}$ | 12 | 8 | 5 | M16x32L |
| 1EA□A61 | 116 | 110 | 90 | $55^{+0.030}_{+0.011}$ | 16 | 10 | 6 | M20x40L |

## Connector Specifications

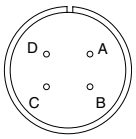
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by YASKAWA.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

### Servomotor Connector

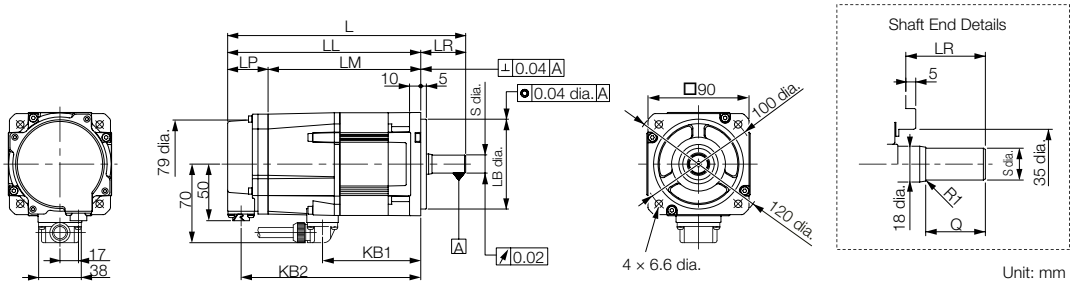



| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

# Servomotors with Holding Brakes

## SGM7G-03 and -05



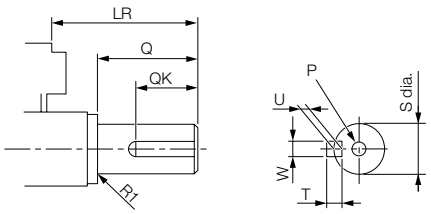

| Model SGM7G- | L*1 | LL*1 | LM | LP*1 | LR | KB1 | KB2*1 | KL1 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | |
| 03A□A2C | 199*2 | 159 | 123 | 36 | 40*2 | 75 | 147 | 70 | 100 | $80^{0}_{-0.030}$ | 90 | 5 | 10 | 120 | 6.6 | $16^{0}_{-0.011\ *2}$ | 30*2 | 3.6 |
| 05A□A2C | 212 | 172 | 136 | 36 | 40 | 88 | 160 | 70 | 100 | $80^{0}_{-0.030}$ | 90 | 5 | 10 | 120 | 6.6 | $16^{0}_{-0.013}$ | 30 | 4.2 |

*1. For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
*2. The L, LR, S, and Q dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

# Shaft End Specifications

## Straight with Key and Tap

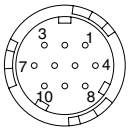



| Model SGM7G- | LR | Q | QK | S | W | T | U | P |
|---|---|---|---|---|---|---|---|---|
| 03A□A6C | 40* | 30* | 20* | $16^{0}_{-0.011\ *}$ | 5 | 5 | 3 | M5x12L |
| 05A□A6C | 40 | 30 | 20 | $16^{0}_{-0.013}$ | 5 | 5 | 3 | |

* The shaft end dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

# Connector Specifications

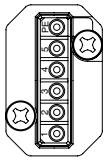
## Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

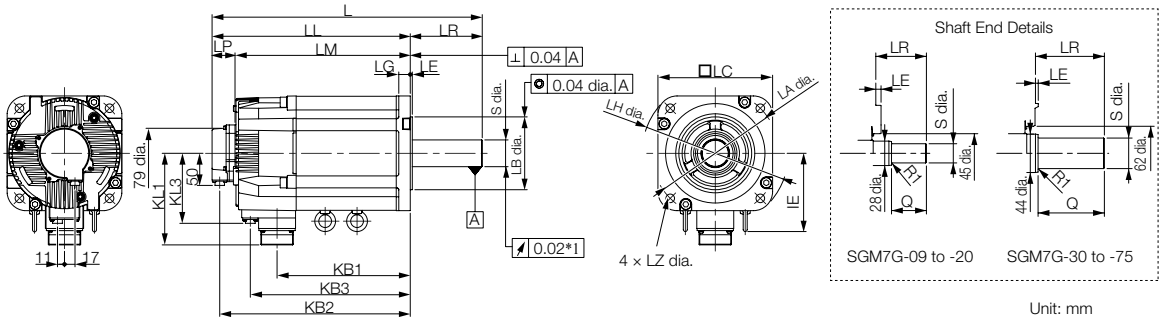
## Servomotor Connector



| | | | |
|---|---|---|---|
| PE | FG (frame ground) | 3 | Phase U |
| 5 | – | 2 | Phase V |
| 4 | – | 1 | Phase W |

Manufacturer: Japan Aviation Electronics Industry, Ltd.

## SGM7G-09 to -75




Unit: mm

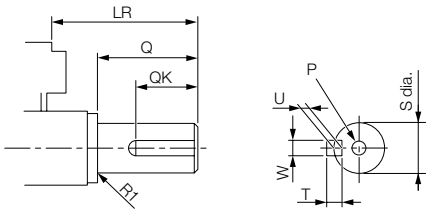
| Model SGM7G- | L*2 | LL*2 | LM | LP*2 | LR | KB1 | KB2*2 | KB3 | IE | KL1 | KL3 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | Q | [kg] |
| 09A□A2C | 231 | 173 | 137 | 36 | 58 | 83 | 161 | 115 | – | 104 | 80 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $24^{0}_{-0.013}$ *3 | 40 | 7.5 |
| 13A□A2C | 247 | 189 | 153 | 36 | 58 | 99 | 177 | 131 | – | 104 | 80 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $24^{0}_{-0.013}$ *3 | 40 | 9.0 |
| 20A□A2C | 265 | 207 | 171 | 36 | 58 | 117 | 195 | 149 | – | 104 | 80 | 145 | $110^{0}_{-0.035}$ | 130 | 6 | 12 | 165 | 9 | $24^{0}_{-0.013}$ *3 | 40 | 11.0 |
| 30A□A2C | 287 | 208 | 172 | 36 | 79 | 108 | 196 | 148 | – | 134 | 110 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $35^{+0.01}_{0}$ | 76 | 19.5 |
| 44A□A2C | 311 | 232 | 196 | 36 | 79 | 132 | 220 | 172 | – | 134 | 110 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $35^{+0.01}_{0}$ | 76 | 23.5 |
| 55A□A2C | 378 | 265 | 229 | 36 | 113 | 163 | 253 | 205 | 123 | 144 | 110 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $42^{0}_{-0.016}$ | 110 | 27.5 |
| 75A□A2C | 424 | 311 | 275 | 36 | 113 | 209 | 299 | 251 | 123 | 144 | 110 | 200 | $114.3^{0}_{-0.025}$ | 180 | 3.2 | 18 | 230 | 13.5 | $42^{0}_{-0.016}$ | 110 | 35.0 |

*1. This is 0.04 for the SGM7G-55 or SGM7G-75.
*2. For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.
*3. The S dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

# Shaft End Specifications

### Straight with Key and Tap

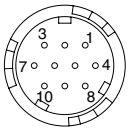



| Model SGM7G- | LR | Q | QK | S | W | T | U | P |
|---|---|---|---|---|---|---|---|---|
| 09A□A6C | 58 | 40 | 25 | $24^{0}_{-0.013}$ * | 8* | 7* | 4* | M5x12L |
| 13A□A6C | 58 | 40 | 25 | $24^{0}_{-0.013}$ * | 8* | 7* | 4* | |
| 20A□A6C | 58 | 40 | 25 | $24^{0}_{-0.013}$ * | 8 | 7 | 4 | |
| 30A□A6C | 79 | 76 | 60 | $35^{+0.01}_{0}$ | 10 | 8 | 5 | M12×25L |
| 44A□A6C | 79 | 76 | 60 | $35^{+0.01}_{0}$ | 10 | 8 | 5 | |
| 55A□A6C | 113 | 110 | 90 | $42^{0}_{-0.016}$ | 12 | 8 | 5 | M16×32L |
| 75A□A6C | 113 | 110 | 90 | $42^{0}_{-0.016}$ | 12 | 8 | 5 | |

* The shaft end dimensions of these Servomotors are different from those of the S-V-series SGMGV Servomotors.
Models that have the same installation dimensions as the SGMGV Servomotors are also available. Contact your YASKAWA representative for details.

# Connector Specifications

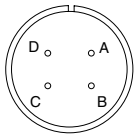
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

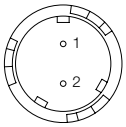
### Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

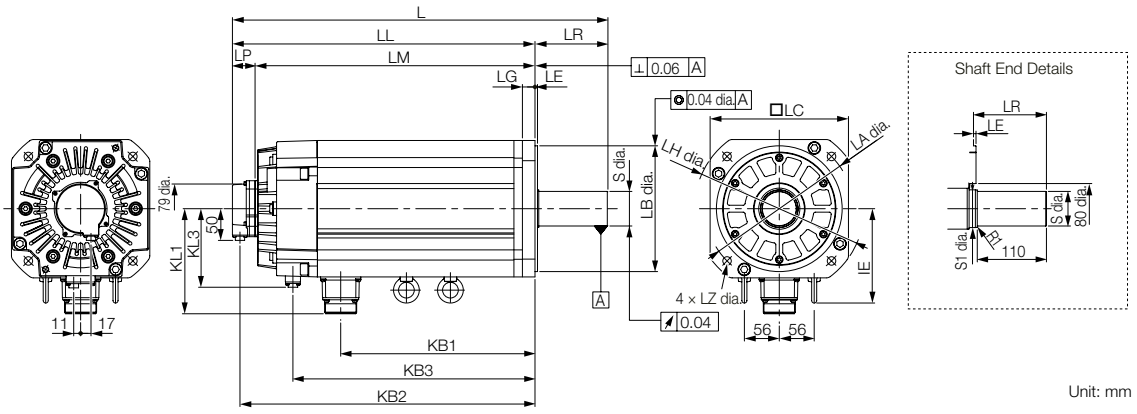
### Brake Connector




| | |
|---|---|
| 1 | Brake terminal |
| 2 | Brake terminal |

Note: There is no voltage polarity for the brake terminals.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by Yaskawa.
Plug: CM10-AP2S-□-D for Right-angle Plug
CM10-SP2S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

### SGM7G-1A and -1E




Unit: mm

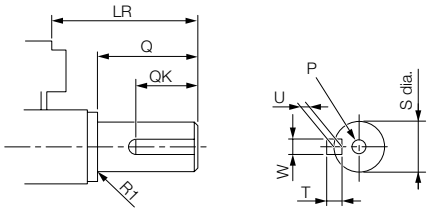
| Model SGM7G- | L* | LL* | LM | LP* | LR | KB1 | KB2* | KB3 | IE | KL1 | KL3 | Flange Dimensions | | | | | | | Shaft End Dimensions | | Approx. Mass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | LA | LB | LC | LE | LG | LH | LZ | S | S1 | [kg] |
| 1AA□A2C | 498 | 382 | 346 | 36 | 116 | 247 | 370 | 315 | 150 | 168 | 125 | 235 | $200^{0}_{-0.046}$ | 220 | 4 | 20 | 270 | 13.5 | $42^{0}_{-0.016}$ | 50 | 65 |
| 1EA□A2C | 598 | 482 | 446 | 36 | 116 | 309 | 470 | 385 | 150 | 168 | 125 | 235 | $200^{0}_{-0.046}$ | 220 | 4 | 20 | 270 | 13.5 | $55^{+0.030}_{+0.011}$ | 60 | 85 |

* For models that have a batteryless absolute encoder, L, LL, LP, and KB2 are 8 mm greater than the given value. Refer to the following section for the values for individual models.

Notes:
1. The values in parentheses are for Servomotors with Holding Brakes.
2. The values for a straight, without key specification are given. Refer to the information given below for other shaft end specifications and option specifications.

## Shaft End Specifications

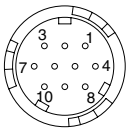
### Straight with Key and Tap




| Model SGM7G- | LR | Q | QK | S | W | T | U | P |
|---|---|---|---|---|---|---|---|---|
| 1AA□A6C | 116 | 110 | 90 | $42^{0}_{-0.016}$ | 12 | 8 | 5 | M16x32L |
| 1EA□A6C | 116 | 110 | 90 | $55^{+0.030}_{+0.011}$ | 16 | 10 | 6 | M20x40L |

## Connector Specifications

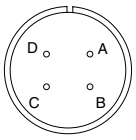
### Encoder Connector (24-bit Encoder)




| | | | |
|---|---|---|---|
| 1 | PS | 6* | BAT(+) |
| 2 | /PS | 7 | – |
| 3 | – | 8 | – |
| 4 | PG5V | 9 | PG0V |
| 5* | BAT(-) | 10 | FG (frame ground) |

* A battery is required only for an absolute encoder.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by YASKAWA.
Plug: CM10-AP10S-□-D for Right-angle Plug
CM10-SP10S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

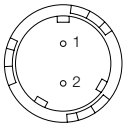
### Servomotor Connector




| | | | |
|---|---|---|---|
| A | Phase U | C | Phase W |
| B | Phase V | D | FG (frame ground) |

Manufacturer: DDK Ltd.

### Brake Connector




| | |
|---|---|
| 1 | Brake terminal |
| 2 | Brake terminal |

Note: There is no voltage polarity for the brake terminals.
Receptacle: CM10-R10P-D
Applicable plug: Not provided by YASKAWA.
Plug: CM10-AP2S-□-D for Right-angle Plug
CM10-SP2S-□-D for Straight Plug
(□ depends on the applicable cable size.)
Manufacturer: DDK Ltd.

# Dimensions of Servomotors with batteryless Absolute Encoders

## Servomotors without Holding Brakes

| Model SGM7G- | L | LL | LP | KB2 | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 03A6A21 | 174 | 134 | 44 | 122 | 2.6 |
| 05A6A21 | 187 | 147 | 44 | 135 | 3.2 |
| 09A6A21 | 203 | 145 | 44 | 133 | 5.5 |
| 13A6A21 | 219 | 161 | 44 | 149 | 7.1 |
| 20A6A21 | 237 | 179 | 44 | 167 | 8.6 |
| 30A6A21 | 247 | 168 | 44 | 156 | 13.5 |
| 44A6A21 | 271 | 192 | 44 | 180 | 17.5 |
| 55A6A21 | 342 | 229 | 44 | 217 | 21.5 |
| 75A6A21 | 388 | 275 | 44 | 263 | 29.5 |
| 1AA6A21 | 455 | 339 | 44 | 327 | 57 |
| 1EA6A21 | 514 | 401 | 44 | 389 | 67 |

## Servomotors with Holding Brakes

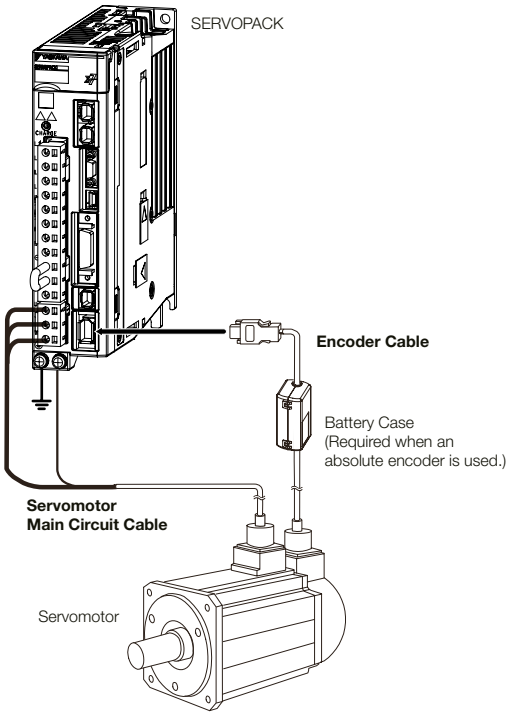
| Model SGM7G- | L | LL | LP | KB2 | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 03A6A2C | 207 | 167 | 44 | 155 | 3.6 |
| 05A6A2C | 220 | 180 | 44 | 168 | 4.2 |
| 09A6A2C | 239 | 181 | 44 | 169 | 7.5 |
| 13A6A2C | 255 | 197 | 44 | 185 | 9.0 |
| 20A6A2C | 273 | 215 | 44 | 203 | 11 |
| 30A6A2C | 295 | 216 | 44 | 204 | 19.5 |
| 44A6A2C | 319 | 240 | 44 | 228 | 23.5 |
| 55A6A2C | 386 | 273 | 44 | 261 | 27.5 |
| 75A6A2C | 432 | 319 | 44 | 307 | 35.0 |
| 1AA6A2C | 506 | 390 | 44 | 378 | 65 |
| 1EA6A2C | 606 | 490 | 44 | 478 | 85 |

# Selecting Cables SGM7G

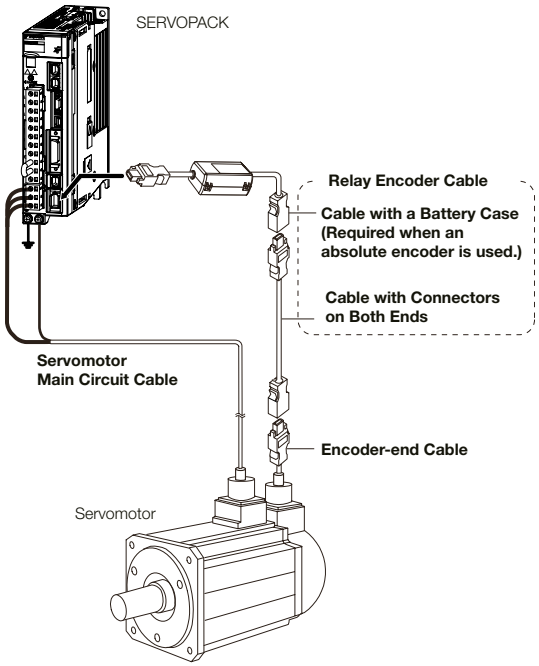
## Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

### Encoder Cable of 20 m or less




### Encoder Cable of 30 m to 50 m (Relay Cable)

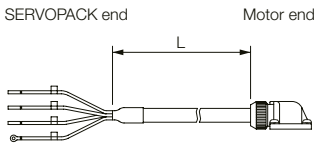
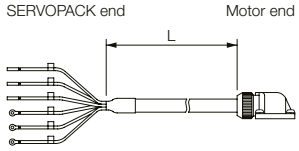



Note:

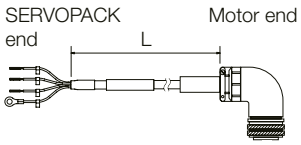
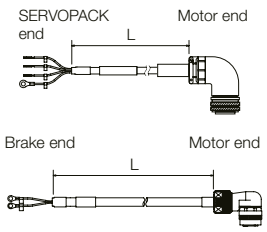
1. Cables with connectors on both ends that are compliant with an IP67 protective structure and European Safety Standards are not available from YASKAWA for the SGM7G Servomotors. You must make such a cable yourself. Use the Connectors specified by YASKAWA for these Servomotors. (These Connectors are compliant with the standards.) YASKAWA does not specify what wiring materials to use.
2. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
3. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
4. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials

   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

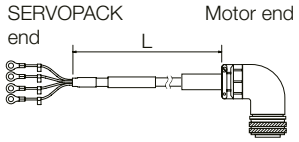
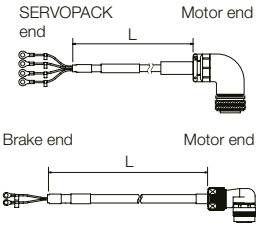
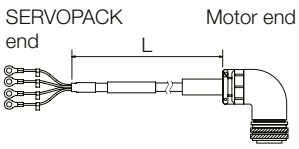
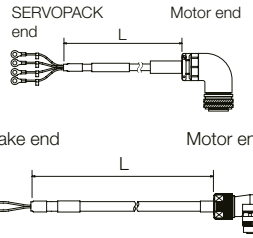
## Servomotor Main Circuit Cables

| Servomotor Model | Description | Length | Order Number* | Appearance |
|---|---|---|---|---|
| SGM7G-03 and -05<br>300 W, 450 W | For Servomotors without Holding Brakes | 3m | JZSP-CVM21-03-E-G# |  |
| | | 5m | JZSP-CVM21-05-E-G# | |
| | | 10m | JZSP-CVM21-10-E-G# | |
| | | 15m | JZSP-CVM21-15-E-G# | |
| | | 20m | JZSP-CVM21-20-E-G# | |
| | | 30m | JZSP-CVM21-30-E-G# | |
| | For Servomotors with Holding Brakes | 3m | JZSP-CVM41-03-E-G# |  |
| | | 5m | JZSP-CVM41-05-E-G# | |
| | | 10m | JZSP-CVM41-10-E-G# | |
| | | 15m | JZSP-CVM41-15-E-G# | |
| | | 20m | JZSP-CVM41-20-E-G# | |

* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.

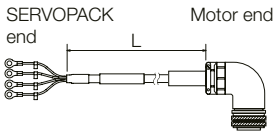
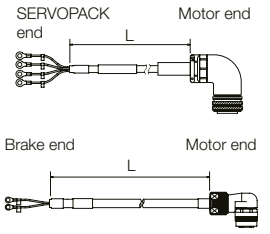
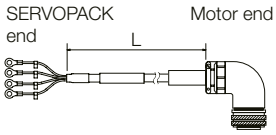
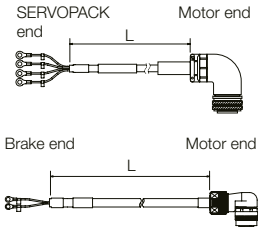
| Servomotor Model | Description | Connector Specifications | Length | Order Number<br>Flexible Cable*1 | Appearance |
|---|---|---|---|---|---|
| SGM7G-09 to -20<br>850 W, 1.8 kW | For Servomotors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA12-03-E-G# |  |
| | | | 5m | JZSP-CVMCA12-05-E-G# | |
| | | | 10m | JZSP-CVMCA12-10-E-G# | |
| | | | 15m | JZSP-CVMCA12-15-E-G# | |
| | | | 20m | JZSP-CVMCA12-20-E-G# | |
| | For Servomotors with Holding Brakes (Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA12-03-E-G# |  |
| | | | | JZSP-CVB12Y-03-E-G# | |
| | | | 5m | JZSP-CVMCA12-05-E-G# | |
| | | | | JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA12-10-E-G# | |
| | | | | JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA12-15-E-G# | |
| | | | | JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA12-20-E-G# | |
| | | | | JZSP-CVB12Y-20-E-G# | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. This order number is for a set of two cables (Main Power Supply Cable and Holding Brake Cable).
When you purchase them separately, the order numbers for Main Power Supply Cables are the same as for a Servomotor without a Holding Brake.
The following order numbers are for a Holding Brake Cable. These Standard Cables are Flexible Cables.
- Cable with Straight Plug: JZSP-U7B23-□□-E
- Cable with Right-angle Plug: JZSP-U7B24-□□-E

| Servomotor Model | Description | Connector Specifications | Length | Order Number Flexible Cable*1 | Appearance |
|---|---|---|---|---|---|
| SGM7G-30 and -44<br>2.9 kW, 4.4 kW | For Servomotors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA13-03-E-G# |  |
| | | | 5m | JZSP-CVMCA13-05-E-G# | |
| | | | 10m | JZSP-CVMCA13-10-E-G# | |
| | | | 15m | JZSP-CVMCA13-15-E-G# | |
| | | | 20m | JZSP-CVMCA13-20-E-G# | |
| | For Servomotors with Holding Brakes<br>(Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA13-03-E-G# |  |
| | | | | JZSP-CVB12Y-03-E-G# | |
| | | | 5m | JZSP-CVMCA13-05-E-G# | |
| | | | | JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA13-10-E-G# | |
| | | | | JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA13-15-E-G# | |
| | | | | JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA13-20-E-G# | |
| | | | | JZSP-CVB12Y-20-E-G# | |
| SGM7G-55<br>5.5 kW | For Servomotors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA14-03-E-G# |  |
| | | | 5m | JZSP-CVMCA14-05-E-G# | |
| | | | 10m | JZSP-CVMCA14-10-E-G# | |
| | | | 15m | JZSP-CVMCA14-15-E-G# | |
| | | | 20m | JZSP-CVMCA14-20-E-G# | |
| | For Servomotors with Holding Brakes<br>(Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA14-03-E-G# |  |
| | | | | JZSP-CVB12Y-03-E-G# | |
| | | | 5m | JZSP-CVMCA14-05-E-G# | |
| | | | | JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA14-10-E-G# | |
| | | | | JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA14-15-E-G# | |
| | | | | JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA14-20-E-G# | |
| | | | | JZSP-CVB12Y-20-E-G# | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. This order number is for a set of two cables (Main Power Supply Cable and Holding Brake Cable). When you purchase them separately, the order numbers for Main Power Supply Cables are the same as for a Servomotor without a Holding Brake.
The following order numbers are for a Holding Brake Cable. These Standard Cables are Flexible Cables.
- Cable with Straight Plug: JZSP-U7B23-□□-E
- Cable with Right-angle Plug: JZSP-U7B24-□□-E

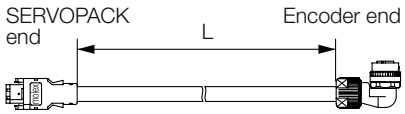
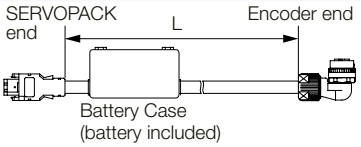
Note: If you need a Cable with a length of 20 m to 50 m, consider the operating conditions and specify a suitable length.

| Servomotor Model | Description | Connector Specifications | Length | Flexible Cable*1 | Appearance |
|---|---|---|---|---|---|
| SGM7G- 75 and -1A<br><br>7.5kW, 11kW | For Servo-motors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA15-03-E-G# |  |
| | | | 5m | JZSP-CVMCA15-05-E-G# | |
| | | | 10m | JZSP-CVMCA15-10-E-G# | |
| | | | 15m | JZSP-CVMCA15-15-E-G# | |
| | | | 20m | JZSP-CVMCA15-20-E-G# | |
| | For Servo-motors with Holding Brakes<br><br>(Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA15-03-E-G#<br>JZSP-CVB12Y-03-E-G# |  |
| | | | 5m | JZSP-CVMCA15-05-E-G#<br>JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA15-10-E-G#<br>JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA15-15-E-G#<br>JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA15-20-E-G#<br>JZSP-CVB12Y-20-E-G# | |
| SGM7G- 1E<br><br>15kW | For Servo-motors without Holding Brakes | Right-angle | 3m | JZSP-CVMCA16-03-E-G# |  |
| | | | 5m | JZSP-CVMCA16-05-E-G# | |
| | | | 10m | JZSP-CVMCA16-10-E-G# | |
| | | | 15m | JZSP-CVMCA16-15-E-G# | |
| | | | 20m | JZSP-CVMCA16-20-E-G# | |
| | For Servo-motors with Holding Brakes<br><br>(Set of Two Cables*2) | Right-angle | 3m | JZSP-CVMCA16-03-E-G#<br>JZSP-CVB12Y-03-E-G# |  |
| | | | 5m | JZSP-CVMCA16-05-E-G#<br>JZSP-CVB12Y-05-E-G# | |
| | | | 10m | JZSP-CVMCA16-10-E-G#<br>JZSP-CVB12Y-10-E-G# | |
| | | | 15m | JZSP-CVMCA16-15-E-G#<br>JZSP-CVB12Y-15-E-G# | |
| | | | 20m | JZSP-CVMCA16-20-E-G#<br>JZSP-CVB12Y-20-E-G# | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90mm or larger.
*2. This order number is for a set of two cables (Main Power Supply Cable and Holding Brake Cable). When you purchase them separately, the order numbers for Main Power Supply Cables are the same as for a Servomotor without a Holding Brake.
The following order numbers are for a Holding Brake Cable. These Standard Cables are Flexible Cables.
- Cable with Straight Plug: JZSP-U7B23-□□-E
- Cable with Right-angle Plug: JZSP-U7B24-□□-E

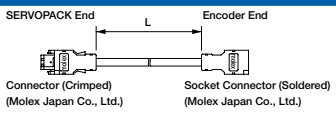
Note: If you need a Cable with a length of 20m to 50m, consider the operating conditions and specify a suitable length.

## Encoder Cables of 20 m or less

| Servomotor Model | Description | Length | Flexible Cable*1 | Appearance |
|---|---|---|---|---|
| All SGM7G Models | For incremental encoder, or battery-less absolute encoder | 3 m | JZSP-CVP12-03-E-G# |   |
| | | 5 m | JZSP-CVP12-05-E-G# | |
| | | 10 m | JZSP-CVP12-10-E-G# | |
| | | 15 m | JZSP-CVP12-15-E-G# | |
| | | 20 m | JZSP-CVP12-20-E-G# | |
| | For absolute encoder: With Battery Case*2 | 3 m | JZSP-CVP27-03-E-G# |   |
| | | 5 m | JZSP-CVP27-05-E-G# | |
| | | 10 m | JZSP-CVP27-10-E-G# | |
| | | 15 m | JZSP-CVP27-15-E-G# | |
| | | 20 m | JZSP-CVP27-20-E-G# | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. If a battery is connected to the host controller, the Battery Case is not required. If so, use a cable for incremental encoders.

## Encoder Extension Cables of 30 m or above

| Servomotor Model | Description | Length | Order Number | Appearance |
|---|---|---|---|---|
| All SGM7G models | Cable with Connectors (For incremental and absolute encoder) | 30 m | JZSP-UCMP00-30-E |   |
| | | 40 m | JZSP-UCMP00-40-E | |
| | | 50 m | JZSP-UCMP00-50-E | |

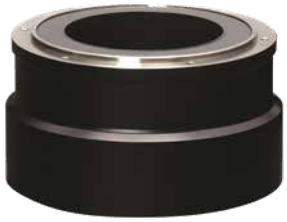
Note: Encoder Extension cables can only be used together with suitable Encoder Cables.

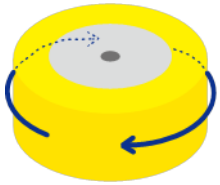
# Direct Drive Servomotors

SGM7D (Outer Rotor, with Core) 106
SGM7E (Inner Rotor, Coreless) 133
SGM7F (Inner Rotor, with Core) 148
SGMCS 170
SGMCV 191

# Product Overview

## SGM7D



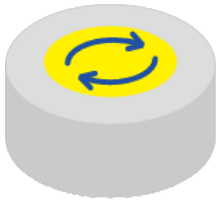


*Outer Rotor with Core*

Ideal for applications that require high torque, high precision and high rigidity.

- High inertia
- Built-in high-resolution (24-bit) encoder
- A high allowable load moment of inertia ratio enables application to large loads
- Large center aperture provides more space for wiring connections

## SGM7F

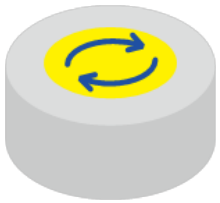


*Inner Rotor with Core*

Ideal for applications that require downsizing and a shorter takt time.

- Medium inertia
- Built-in high-resolution (24-bit) encoder
- Compact size with small rotor diameter
- Greater speed and torque stability enable high-speed, high-frequency positioning

## SGM7E



*Coreless, Inner Rotor*

Ideal for applications that require smooth movement withput speed fluctuations.

- Low inertia
- Built-in high-resolution (24-bit) encoder
- Smooth operation without speed fluctuations achieved through coreless structure with low cogging

## Combination of Direct Drive Servomotors and SERVOPACKs

| Direct Drive Servomotor Model | | Rated torque [Nm] | Instantaneous Max. Torque [Nm] | SERVOPACK Model | |
|---|---|---|---|---|---|
| | | | | SGD7S-□□□□ | SGD7W-□□□□<br>SGD7C-□□□□ |
| SGM7D<br>(With core, outer rotor) | SGM7D-30F | 30 | 50 | 120A*1 | – |
| | SGM7D-58F | 58 | 100 | | |
| | SGM7D-90F | 90 | 150 | | |
| | SGM7D-1AF | 110 | 200 | | |
| | SGM7D-01G | 1.3 | 4 | 2R8A*1, 2R8F*1 | |
| | SGM7D-05G | 5 | 6 | | |
| | SGM7D-08G | 8 | 15 | 120A*1 | |
| | SGM7D-18G | 18 | 30 | | |
| | SGM7D-24G | 24 | 45 | | |
| | SGM7D-34G | 34 | 60 | | |
| | SGM7D-45G | 45 | 75 | | |
| | SGM7D-03H | 3 | 4 | 2R8A*1, 2R8F*1 | |
| | SGM7D-28I | 28 | 50 | 120A*1 | |
| | SGM7D-70I | 70 | 100 | | |
| | SGM7D-1ZI | 100 | 150 | | |
| | SGM7D-1CI | 130 | 200 | | |
| | SGM7D-2BI | 220 | 300 | | |
| | SGM7D-2DI | 240 | 400 | | |
| | SGM7D-06J | 6 | 8 | | |
| | SGM7D-09J | 9 | 15 | | |
| | SGM7D-18J | 18 | 30 | | |
| | SGM7D-20J | 20 | 45 | | |
| | SGM7D-38J | 38 | 60 | | |
| | SGM7D-02K | 2.06 | 5 | 2R8A*1, 2R8F*1 | |
| | SGM7D-06K | 6 | 10 | | |
| | SGM7D-08K | 8 | 15 | | |
| | SGM7D-06L | 6 | 10 | | |
| | SGM7D-12L | 12 | 20 | | |
| | SGM7D-30L | 30 | 40 | 120A*1 | |
| SGM7E<br>(Coreless, inner rotor) | SGM7E-02B | 2 | 6 | 2R8A, 2R1F | 2R8A |
| | SGM7E-05B | 5 | 15 | | |
| | SGM7E-07B | 7 | 21 | | |
| | SGM7E-04C | 4 | 12 | 2R8A, 2R8F | |
| | SGM7E-10C | 10 | 30 | | |
| | SGM7E-14C | 14 | 42 | | |
| | SGM7E-08D | 8 | 24 | | |
| | SGM7E-17D | 17 | 51 | | |
| | SGM7E-25D | 25 | 75 | | |
| | SGM7E-16E | 16 | 48 | 5R5A | |
| | SGM7E-35E | 35 | 105 | | |
| SGM7F<br>(With core, inner rotor) | SGM7F-02A | 2 | 6 | 2R8A, 2R1F | 2R8A |
| | SGM7F-05A | 5 | 15 | | |
| | SGM7F-07A | 7 | 21 | | |
| | SGM7F-04B | 4 | 12 | 2R8A, 2R8F | |
| | SGM7F-10B | 10 | 30 | | |
| | SGM7F-14B | 14 | 42 | 5R5A | |
| | SGM7F-08C | 8 | 24 | 2R8A, 2R8F | 2R8A |
| | SGM7F-17C | 17 | 51 | 5R5A | |
| | SGM7F-25C | 25 | 75 | 7R6A | |
| | SGM7F-16D | 16 | 48 | 5R5A | |
| | SGM7F-35D | 35 | 105 | 7R6A*2, 120A | 7R6A*2 |
| | SGM7F-45M | 45 | 135 | 7R6A | |
| | SGM7F-80M | 80 | 240 | 120A | – |
| | SGM7F-1AM | 110 | 330 | 180A | |
| | SGM7F-80N | 80 | 240 | 120A | |
| | SGM7F-1EN | 150 | 450 | 200A | |
| | SGM7F-2ZN | 200 | 600 | | |

*1: An SGM7D Servomotor is used together with an FT-specification SERVOPACK. The following SERVOPACK models can be used.
- SGD7S-□□□□□□A□□□F82□
- SGD7S-□□□□00A□□□F83□
- SGD7S-□□□□20A□□□F84□

*2: Use the derated values given in the table below for the rated output and rated motor speed of this combination.

# SGM7D (Outer Rotor, with Core)

## Model Designations

SGM7D - 30 F 7 C 4 1

| Direct Drive Servomotors | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit |
|---|---|---|---|---|---|---|

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| 01 | 1.30 Nm |
| 02 | 2.06 Nm |
| 03 | 3.00 Nm |
| 05 | 5.00 Nm |
| 06 | 6.00 Nm |
| 08 | 8.00 Nm |
| 09 | 9.00 Nm |
| 12 | 12.0 Nm |
| 18 | 18.0 Nm |
| 20 | 20.0 Nm |
| 24 | 24.0 Nm |
| 28 | 28.0 Nm |
| 30 | 30.0 Nm |
| 34 | 34.0 Nm |
| 38 | 38.0 Nm |
| 45 | 45.0 Nm |
| 58 | 58.0 Nm |
| 70 | 70.0 Nm |
| 90 | 90.0 Nm |
| 1Z | 100 Nm |
| 1A | 110 Nm |
| 1C | 130 Nm |
| 2B | 220 Nm |
| 2D | 240 Nm |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| F | 264 mm dia. |
| G | 160 mm dia. |
| H | 116 mm dia. |
| I | 264 mm dia. |
| J | 150 mm dia. |
| K | 107 mm dia. |
| L | 224 mm x 224 mm |

Note:
1. Direct Drive Servomotors are not available with holding brakes
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.
3. The SGM7D-01G, -05G, and -03H are available only with high mechanical precision.

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 7* | 24-bit multiturn absolute encoder |
| F* | 24-bit incremental encoder |

* Both multiturn absolute encoder and incremental encoder can be used as a single-turn absolute encoder by setting parameters.

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| C | Standard Version |

**6th digit - Flange**

| Code | Mounting | Servomotor Outer Diameter Code (3rd digit) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | F | G | H | I | J | K | L |
| 4 | Non-load side with cable on side | ✓ | ✓ | ✓ | — | — | — | ✓ |
| 5 | Non-load side with cable on bottom | ✓ | ✓* | — | ✓ | ✓ | ✓ | — |

✓ : Applicable models
* SGM7D-01G and -05G are not available with a cable extending from the bottom.

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Standard mechanical precision |
| 2 | High mechanical precision*3 |

* The SGM7D-01G, -05G, and -03H are available only with high mechanical precision.

## Manufactured Models

| Rated Torque [Nm] | Servomotor Outer Diameter | | | | | | |
|---|---|---|---|---|---|---|---|
| | F (264 mm dia.) | G (160 mm dia.) | H (116 mm dia.) | I (264 mm dia.) | J (150 mm dia.) | K (107 mm dia.) | L (224 mm x 224 mm) |
| 1.30 Nm | — | SGM7D-01G | — | — | — | — | — |
| 2.06 Nm | — | — | — | — | — | SGM7D-02K | — |
| 3.00 Nm | — | — | SGM7D-03H | — | — | — | — |
| 5.00 Nm | — | SGM7D-05G | — | — | — | — | — |
| 6.00 Nm | — | — | — | — | SGM7D-06J | SGM7D-06K | SGM7D-06L |
| 8.00 Nm | — | SGM7D-08G | — | — | — | SGM7D-08K | — |
| 9.00 Nm | — | — | — | — | SGM7D-09J | — | — |
| 12.0 Nm | — | — | — | — | — | — | SGM7D-12L |
| 18.0 Nm | — | SGM7D-18G | — | — | SGM7D-18J | — | — |
| 20.0 Nm | — | — | — | — | SGM7D-20J | — | — |
| 24.0 Nm | — | SGM7D-24G | — | — | — | — | — |
| 28.0 Nm | — | — | — | SGM7D-28I | — | — | — |
| 30.0 Nm | SGM7D-30F | — | — | — | — | — | SGM7D-30L |
| 34.0 Nm | — | SGM7D-34G | — | — | — | — | — |
| 38.0 Nm | — | — | — | — | SGM7D-38J | — | — |
| 45.0 Nm | — | SGM7D-45G | — | — | — | — | — |
| 58.0 Nm | SGM7D-58F | — | — | — | — | — | — |
| 70.0 Nm | — | — | — | SGM7D-70I | — | — | — |
| 90.0 Nm | SGM7D-90F | — | — | — | — | — | — |
| 100 Nm | — | — | — | SGM7D-1ZI | — | — | — |
| 110 Nm | SGM7D-1AF | — | — | — | — | — | — |
| 130 Nm | — | — | — | SGM7D-1CI | — | — | — |
| 220 Nm | — | — | — | SGM7D-2BI | — | — | — |
| 240 Nm | — | — | — | SGM7D-2DI | — | — | — |

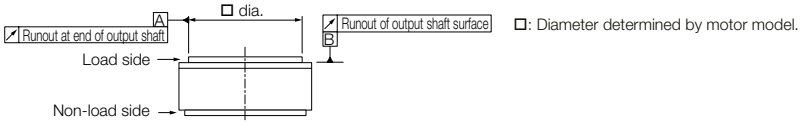
Note: The above table shows combinations of the rated torque and outer diameter. The fourth through seventh digits have been omitted.

# Specifications

## SGM7D-□□F, -□□G and -□□H

| Model SGM7D- | | | | 30F | 58F | 90F | 1AF | 01G | 05G | 08G | 18G | 24G | 34G | 45G | 03H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time Rating | | | | Continuous | | | | | | | | | | | |
| Thermal Class | | | | F | | | | | | | | | | | |
| Insulation Resistance | | | | 500 VDC, 10 MΩ min. | | | | | | | | | | | |
| Withstand Voltage | | | | 1,500 VAC for 1 minute | | | | | | | | | | | |
| Excitation | | | | Three-phase | | | | | | | | | | | |
| Mounting | | | | Flange-mounted | | | | | | | | | | | |
| Drive Method | | | | Direct drive | | | | | | | | | | | |
| Rotation Direction | | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | | | | | | | |
| Absolute Accuracy | | | | ±15 s | | | | | | | | | | | |
| Repeatability | | | | ±1.3 s | | | | | | | | | | | |
| Protective Structure*1 | | | | Totally enclosed, self-cooled, IP20 | | | | Totally enclosed, self-cooled, IP30 | | Totally enclosed, self-cooled, IP20 | | | | | Totally enclosed, self-cooled, IP30 |
| Environmental Conditions | Ambient Air Temperature | | | 0°C to 40°C (without freezing) | | | | | | | | | | | |
| | Ambient Air Humidity | | | 20% to 80% relative humidity (without condensation) | | | | | | | | | | | |
| | Installation Site | | | · Must be indoors and free of corrosive and explosive gases.<br>· Must be well-ventilated and free of dust and moisture.<br>· Must facilitate inspection and cleaning.<br>· Must have an altitude of 1,000 m or less.<br>· Must be free of strong magnetic fields. | | | | | | | | | | | |
| | Storage Environment | | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | | | | | | | |
| Mechanical Tolerances*2 | Runout of Output Shaft Surface | Standard Mechanical Precision | mm | 0.1 | | | | – | | 0.1 | | | 0.1 | – | |
| | Runout at End of Output Shaft | High Mechanical Precision | mm | 0.005 | | | | 0.01 | | 0.005 | | | 0.01 | | |
| Applicable SERVOPACKs | | | SGD7S- | 120A*3 | | | | 2R8A*3, 2R8F*3 | | 120A*3 | | | | 2R8A*3, 2R8F*3 | |
| | | | SGD7W-<br>SGD7C- | – | | | | | | | | | | | |

*1. The hollow hole section, motor mounting surface, and gap around the rotating part on non-load side are excluded. Protective structure specifications apply only when the special cable is used.
*2. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.



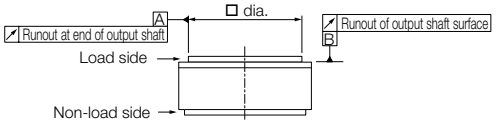

*3. An SGM7D Servomotor is used together with an FT-specification SERVOPACK. The following SERVOPACK models can be used.
- SGD7S-□□□□□□A□□□F82□
- SGD7S-□□□□00A□□□F83□

## SGM7D-□□I and -□□J

| Model SGM7D- | | | | 28I | 70I | 1ZI | 1CI | 2BI | 2DI | 06J | 09J | 18J | 20J | 38J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time Rating | | | | Continuous | | | | | | | | | | |
| Thermal Class | | | | F | | | | | | | | | | |
| Insulation Resistance | | | | 500 VDC, 10 MΩ min. | | | | | | | | | | |
| Withstand Voltage | | | | 1,500 VAC for 1 minute | | | | | | | | | | |
| Excitation | | | | Three-phase | | | | | | | | | | |
| Mounting | | | | Flange-mounted | | | | | | | | | | |
| Drive Method | | | | Direct drive | | | | | | | | | | |
| Rotation Direction | | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | | | | | | |
| Absolute Accuracy | | | | ±15 s | | | | | | | | | | |
| Repeatability | | | | ±1.3 s | | | | | | | | | | |
| Protective Structure*1 | | | | Totally enclosed, self-cooled, IP30 | | | | | | | | | | |
| Environmental Conditions | Ambient Air Temperature | | | 0°C to 40°C (without freezing) | | | | | | | | | | |
| | Ambient Air Humidity | | | 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| | Installation Site | | | · Must be indoors and free of corrosive and explosive gases.<br>· Must be well-ventilated and free of dust and moisture.<br>· Must facilitate inspection and cleaning.<br>· Must have an altitude of 1,000 m or less.<br>· Must be free of strong magnetic fields. | | | | | | | | | |
| | Storage Environment | | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| Mechanical Tolerances*2 | Runout of Output Shaft Surface | Standard Mechanical Precision | mm | 0.1 | | | | | | | | | | |
| | Runout at End of Output Shaft | High Mechanical Precision | mm | 0.005 | | | 0.02 | | | 0.005 | | | | 0.01 |
| Applicable SERVOPACKs | | | SGD7S- | 120A*3 | | | | | | | | | | |
| | | | SGD7W-<br>SGD7C- | – | | | | | | | | | | |

*1. The hollow hole section, motor mounting surface, and gap around the rotating part on non-load side are excluded. Protective structure specifications apply only when the special cable is used.

*2. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.



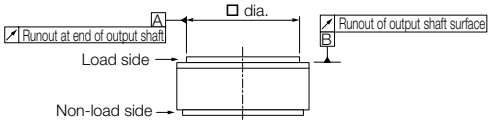

□: Diameter determined by motor model.

*3. An SGM7D Servomotor is used together with an FT-specification SERVOPACK. The following SERVOPACK models can be used.
- SGD7S-□□□□□□A□□□F82□
- SGD7S-□□□□00A□□□F83□

## SGM7D-□□K and -□□L

| Model SGM7D- | | | | 02K | 06K | 08K | 06L | 12L | 30L |
|---|---|---|---|---|---|---|---|---|---|
| Time Rating | | | | Continuous | | | | | |
| Thermal Class | | | | F | | | | | |
| Insulation Resistance | | | | 500 VDC, 10 MΩ min. | | | | | |
| Withstand Voltage | | | | 1,500 VAC for 1 minute | | | | | |
| Excitation | | | | Three-phase | | | | | |
| Mounting | | | | Flange-mounted | | | | | |
| Drive Method | | | | Direct drive | | | | | |
| Rotation Direction | | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | |
| Absolute Accuracy | | | | ±15 s | | | | | |
| Repeatability | | | | ±1.3 s | | | | | |
| Protective Structure*1 | | | | Totally enclosed, self-cooled, IP30 | | | | | |
| Environmental Conditions | Ambient Air Temperature | | | 0°C to 40°C (without freezing) | | | | | |
| | Ambient Air Humidity | | | 20% to 80% relative humidity (without condensation) | | | | | |
| | Installation Site | | | · Must be indoors and free of corrosive and explosive gases.<br>· Must be well-ventilated and free of dust and moisture.<br>· Must facilitate inspection and cleaning.<br>· Must have an altitude of 1,000 m or less.<br>· Must be free of strong magnetic fields. | | | | | |
| | Storage Environment | | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | |
| Mechanical Tolerances*2 | Runout of Output Shaft Surface | Standard Mechanical Precision | mm | 0.1 | | | 0.05 | | |
| | Runout at End of Output Shaft | High Mechanical Precision | mm | 0.01 | | | 0.005 | | |
| Applicable SERVOPACKs | | | SGD7S- | 2R8A*3, 2R8F*3 | | | | | 120A*3 |
| | | | SGD7W-<br>SGD7C- | – | | | | | |

*1. The hollow hole section, motor mounting surface, and gap around the rotating part on non-load side are excluded.
Protective structure specifications apply only when the special cable is used.
*2. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.




□: Diameter determined by motor model.

*3. An SGM7D Servomotor is used together with an FT-specification SERVOPACK. The following SERVOPACK models can be used.
- SGD7S-□□□□□□A□□□F82□
- SGD7S-□□□□00A□□□F83□

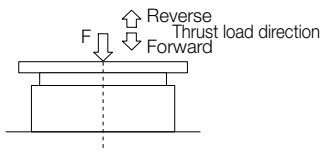
# Ratings

## SGM7D-□□F, -□□G and -□□H

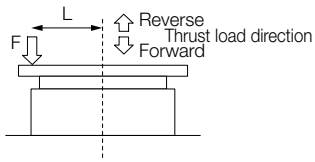
| Model SGM7D- | | | | 30F | 58F | 90F | 1AF | 01G | 05G | 08G | 18G | 24G | 34G | 45G | 03H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated Output | | | W | 188 | 364 | 565 | 691 | 16 | 63 | 101 | 226 | 302 | 320 | 565 | 38 |
| Rated Torque *1 | | | Nm | 30 | 58 | 90 | 110 | 1.30 | 5 | 8 | 18 | 24 | 34 | 45 | 3 |
| Rated Intermittent Torque *2 | | | Nm | – | – | – | – | – | – | – | – | 27 | 40 | 52 | – |
| Instantaneous Maximum Torque | | | Nm | 50 | 100 | 150 | 200 | 4 | 6 | 15 | 30 | 45 | 60 | 75 | 4 |
| Stall Torque | | | Nm | 30 | 58 | 90 | 110 | 1.3 | 5 | 8 | 18 | 24 | 34 | 45 | 3 |
| Rated Current | | | A | 5.7 | 6.4 | 5.9 | 5 | 1.7 | 1.6 | 3.4 | 3.4 | 3.1 | 3.3 | 4.8 | 1.1 |
| Instantaneous Maximum Current | | | A | 14.1 | | | | 4.2 | 3.5 | | | 10.6 | | | 3.5 |
| Rated Motor Speed | | | $min^{-1}$ | 60 | | | | | | 120 | | | 90 | | 120 |
| Maximum Motor Speed | | | $min^{-1}$ | 72 | | | | 150 | | | | 144 | | | 150 |
| Torque Constant | | | Nm/A | 6.25 | 12.5 | 17.8 | 24.5 | 1.09 | 3.84 | 2.82 | 5.76 | 8.57 | 11.2 | 10.2 | 3.01 |
| Motor Moment of Inertia | | | $\times 10^{-4}$ kg·m$^2$ | 960 | 1190 | 1420 | 1670 | 55 | 75 | 120 | 150 | 190 | 230 | 270 | 25 |
| Rated Power Rate | | | kW/s | 9.38 | 28.3 | 57 | 72.5 | 0.307 | 3.33 | 5.33 | 21.6 | 30.3 | 50.3 | 75 | 3.6 |
| Rated Angular Acceleration Rate | | | rad/s$^2$ | 313 | 487 | 634 | 659 | 236 | 667 | | 1200 | 1260 | 1480 | 1670 | 1200 |
| Heat Sink Size | | | mm | 550 x 550 x 30 (aluminium) | | | | | | | | | | | 350 x 350 x 20 (steel) |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | | times | 200 500*4 | 150 400*4 | 150 300*4 | 130 300*4 | 130 | 300 | 400 1000*4 | 350 900*4 | 300 750*4 | 250 650*4 | 200 450*4 | 600 |
| | With External Regenerative Resistor and External Dynamic Brake Resistor *3 | | times | 2,500 | 3,500 | 4,000 | 5,000 | 130 | 300 | 2,000 | 3,000 | 4,000 | | | 600 |
| Allowable Loads*5 | Allowable Thrust Load | Forward | N | 4 x $10^4$ | | | | 50 | 200 | 3 x $10^4$ | | | | | 50 |
| | | Reverse | N | 2 x $10^4$ | | | | 50 | 200 | 1 x $10^4$ | | | | | 50 |
| | Allowable Moment Load | | Nm | 400 | | | | – | 50 | 200 | | | | | – |
| Rigidities | Thrust Displacement Rigidity | Forward | mm/N | 2 x $10^{-6}$ | | | | – | | 2.5 x $10^{-6}$ | | | | | – |
| | | Reverse | mm/N | 3 x $10^{-6}$ | | | | – | | 3 x $10^{-6}$ | | | | | – |
| | Moment Displacement Rigidity | | rad/Nm | 4 x $10^{-7}$ | | | | – | | 1 x $10^{-6}$ | | | | | – |

*1. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum or steel heat sink of the dimensions given in the table.
*2. The rated intermittent torque is the value for 60% ED.
*3. To externally connect dynamic brake resistance, select hardware option specification 020 for the SERVOPACK.
However, you cannot externally connect dynamic brake resistance if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-2R8□□□A020F82□
- SGD7S-2R8□00A020F83□

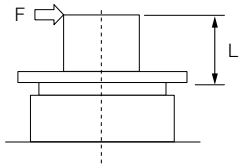
*4. If you use an SGD7S-120A008 SERVOPACK and SGM7D Servomotor together, use the ratios given on the bottom line.
*5. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns.
Design the machine so that the thrust loads or moment loads will not exceed the values given in the table. The allowable load is for a static load in one direction.
When designing the system, multiply the allowable load by the following safety coefficient depending on the type of load.
- Smooth load with no shock: 1/3
- Light repetitive load: 1/5
- Shock load: 1/10




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L



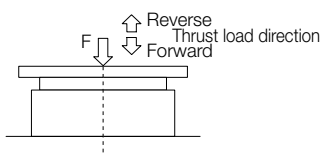

Where F is the external force,
Thrust load = Load mass
Moment load = F × L

Note:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

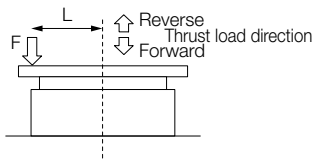
## SGM7D-□□I and -□□J

| Model SGM7D- | | | | 28I | 70I | 1ZI | 1CI | 2BI | 2DI | 06J | 09J | 18J | 20J | 38J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated Output | | | W | 264 | 440 | 628 | 817 | 691 | 754 | 75 | 113 | 226 | 251 | 358 |
| Rated Torque *1 | | | Nm | 28 | 70 | 100 | 130 | 220 | 240 | 6 | 9 | 18 | 20 | 38 |
| Instantaneous Maximum Torque | | | Nm | 50 | 100 | 150 | 200 | 300 | 400 | 8 | 15 | 30 | 45 | 60 |
| Stall Torque | | | Nm | 28 | 70 | 100 | 130 | 220 | 240 | 6 | 9 | 18 | 20 | 38 |
| Rated Current | | | A | 5.2 | 5.6 | 5.5 | 5 | 5.6 | 4.8 | 4 | 3.4 | 3 | 2.2 | 3.1 |
| Instantaneous Maximum Current | | | A | 14.1 | | | | | | 10.6 | | | | |
| Rated Motor Speed | | | $min^{-1}$ | 90 | 60 | | | 30 | | 120 | | | | 90 |
| Maximum Motor Speed | | | $min^{-1}$ | 108 | 72 | | | 60 | 48 | 144 | | | | |
| Torque Constant | | | Nm/A | 6.9 | 13.9 | 20.8 | 27.8 | 41.5 | 54.4 | 1.71 | 3.29 | 6.62 | 9.88 | 13.3 |
| Motor Moment of Inertia | | | $\times10^{-4}$ kg·$m^2$ | 1,800 | 2,000 | 2,300 | 2,850 | 3,400 | 4,000 | 150 | 210 | 240 | 260 | 330 |
| Rated Power Rate | | | kW/s | 4.36 | 24.5 | 43.5 | 59.3 | 142 | 144 | 2.4 | 3.86 | 13.5 | 15.4 | 43.8 |
| Rated Angular Acceleration Rate | | | $rad/s^2$ | 156 | 350 | 435 | 456 | 647 | 600 | 400 | 429 | 750 | 769 | 1,150 |
| Heat Sink Size | | | mm | 550 x 550 x 30 | | | | | | | | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | | times | 50<br>125*2 | 100<br>250*2 | 90<br>230*2 | 80<br>200*2 | 100 | 150 | 350<br>700*2 | 250<br>600*2 | 240<br>550*2 | 220<br>550*2 | 180<br>450*2 |
| | With External Regenerative Resistor and External Dynamic Brake Resistor *3 | | times | 800 | 2,000 | 2,500 | 3,000 | 100 | 150 | 700 | 900 | 2,500 | 2,000 | |
| Allowable Loads*5 | Allowable Thrust Load | Forward | N | 4 x $10^4$ | | | | | | 3 x $10^4$ | | | | |
| | | Reverse | N | 2 x $10^4$ | | | | | | 1 x $10^4$ | | | | |
| | Allowable Moment Load | | Nm | 400 | | | | | | 200 | | | | |
| Rigidities | Thrust Displacement Rigidity | Forward | mm/N | 2 x $10^{-6}$ | | | | | | 3 x $10^{-6}$ | | | | |
| | | Reverse | mm/N | 3 x $10^{-6}$ | | | | | | 4 x $10^{-6}$ | | | | |
| | Moment Displacement Rigidity | | rad/Nm | 4 x $10^{-7}$ | | | | | | 2 x $10^{-6}$ | | | | |

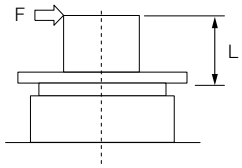
*1. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the table.
*2. If you use an SGD7S-120A008 SERVOPACK and SGM7D Servomotor together, use the ratios given on the bottom line.
*3. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns.
Design the machine so that the thrust loads or moment loads will not exceed the values given in the table.
The allowable load is for a static load in one direction.
When designing the system, multiply the allowable load by the following safety coefficient depending on the type of load.
- Smooth load with no shock: 1/3
- Light repetitive load: 1/5
- Shock load: 1/10




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L




Where F is the external force,
Thrust load = Load mass
Moment load = F × L

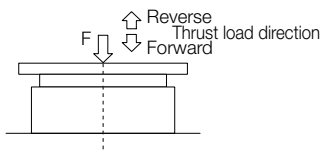
Note:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

## SGM7D-□□K and -□□L

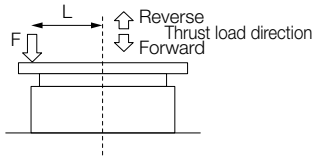
| Model SGM7D- | | | | 02K | 06K | 08K | 06L | 12L | 30L |
|---|---|---|---|---|---|---|---|---|---|
| Rated Output | | | W | 52 | 151 | 201 | 113 | 226 | 565 |
| Rated Torque *1 | | | Nm | 2.06 | 6 | 8 | 6 | 12 | 30 |
| Repetitive Rated Torque *2 | | | Nm | – | 6.9 | – | – | – | – |
| Instantaneous Maximum Torque | | | Nm | 5 | 10 | 15 | 10 | 20 | 40 |
| Stall Torque | | | Nm | 2.06 | 6 | 8 | 6 | 12 | 30 |
| Rated Current | | | A | 1.6 | 1.8 | 1.6 | 1.7 | 2.1 | 8.1 |
| Instantaneous Maximum Current | | | A | | | 4.2 | | | 14.1 |
| Rated Motor Speed | | | $min^{-1}$ | | 240 | | | 180 | |
| Maximum Motor Speed | | | $min^{-1}$ | | 360 | | | 216 | |
| Torque Constant | | | Nm/A | 1.83 | 3.67 | 5.5 | 4.13 | 6.59 | 3.95 |
| Motor Moment of Inertia | | | $\times 10^{-4}$ kg·$m^2$ | 60 | 70 | 80 | 220 | | 370 |
| Rated Power Rate | | | kW/s | 0.707 | 5.14 | 8 | 1.64 | 6.55 | 24.3 |
| Rated Angular Acceleration Rate | | | rad/$s^2$ | 343 | 857 | 1,000 | 273 | 545 | 811 |
| Heat Sink Size | | | mm | 550 x 550 x 30 | | | 650 x 650 x 30 | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | | times | 200 | 350 | 25 | 450 | 20 | 60<br>130*4 |
| | With External Regenerative Resistor and External Dynamic Brake Resistor *3 | | times | 200 | 350 | 25 | 450 | 20 | 3,500 |
| Allowable Loads*5 | Allowable Thrust Load | Forward | N | 5 x $10^3$ | | | 2,000 | | |
| | | Reverse | N | 3 x $10^3$ | | | 1,000 | | |
| | Allowable Moment Load | | Nm | 20 | | | 100 | | |
| Rigidities | Thrust Displacement Rigidity | Forward | mm/N | 4 x $10^{-6}$ | | | – | | |
| | | Reverse | mm/N | 8 x $10^{-6}$ | | | – | | |
| | Moment Displacement Rigidity | | rad/Nm | 8 x $10^{-6}$ | | | – | | |

*1. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with an aluminum or steel heat sink of the dimensions given in the table.
*2. The rated intermittent torque is the value for 60% ED.
*3. To externally connect dynamic brake resistance, select hardware option specification 020 for the SERVOPACK.
However, you cannot externally connect dynamic brake resistance if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-2R8□□□A020F82□
- SGD7S-2R8□00A020F83□

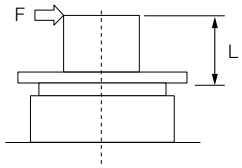
*4. If you use an SGD7S-120A008 SERVOPACK and SGM7D Servomotor together, use the ratios given on the bottom line.
*5. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns.
Design the machine so that the thrust loads or moment loads will not exceed the values given in the table. The allowable load is for a static load in one direction.
When designing the system, multiply the allowable load by the following safety coefficient depending on the type of load.
- Smooth load with no shock: 1/3
- Light repetitive load: 1/5
- Shock load: 1/10




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L



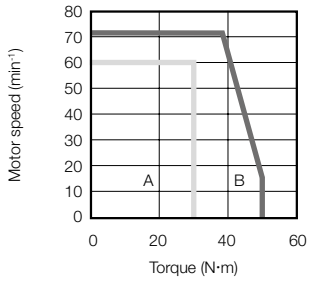

Where F is the external force,
Thrust load = Load mass
Moment load = F × L

Note:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

# Torque-Motor Speed Characteristics

A : Continuous duty zone ..... (dotted lines): With 60%ED 10 min. duty factor
B : Intermittent duty zone* ——— (solid lines): With three-phase 200-V, single-phase 230-V, and single-phase 200-V input

SGM7D-30F

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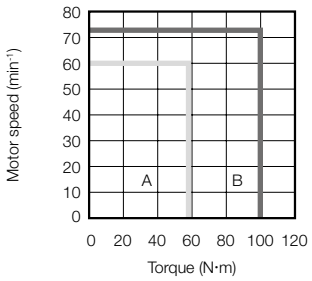


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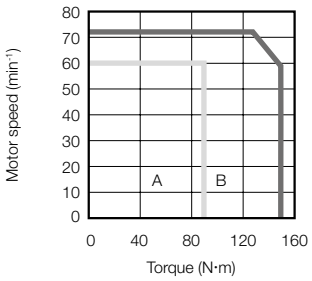


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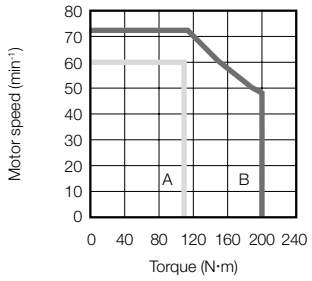


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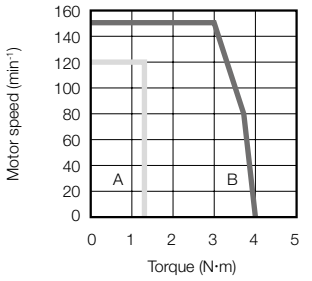


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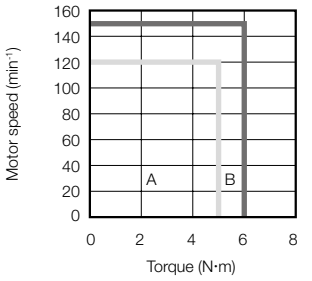


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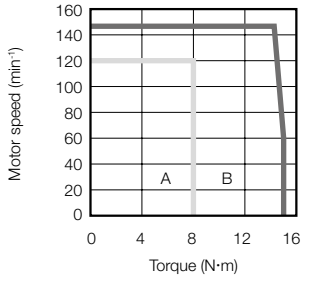


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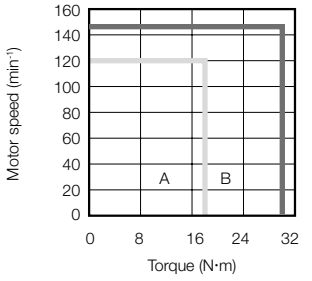


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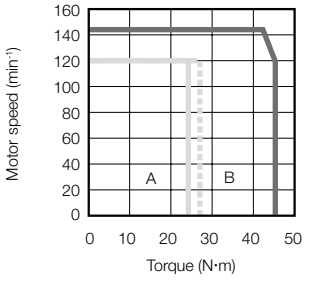


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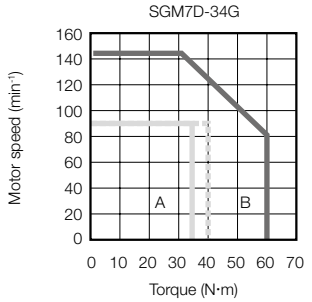


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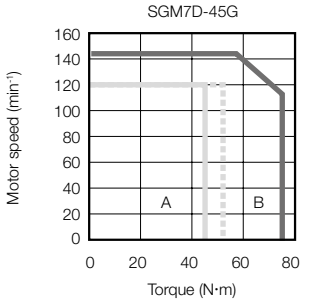


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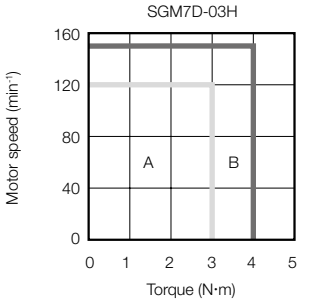


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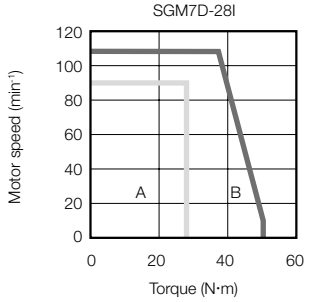


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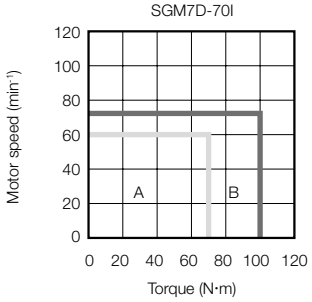


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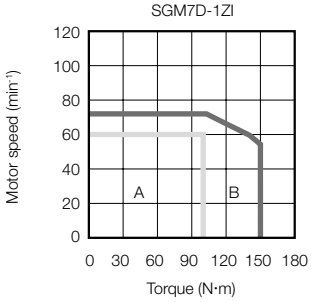

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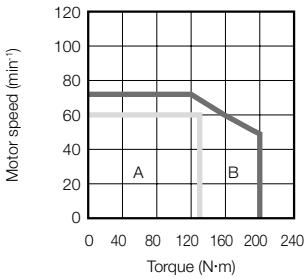


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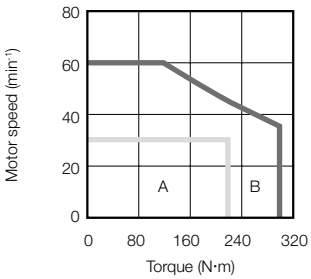


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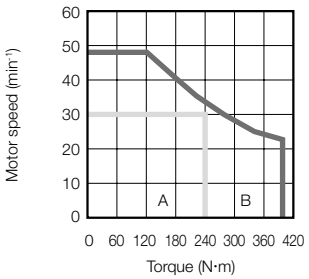


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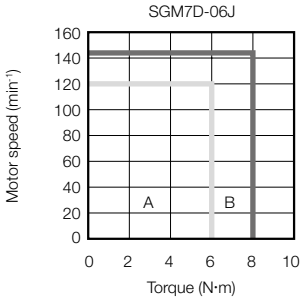


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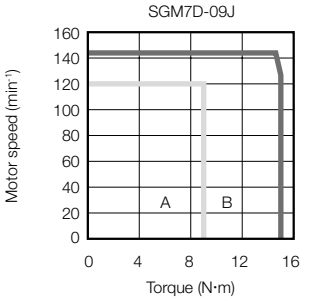


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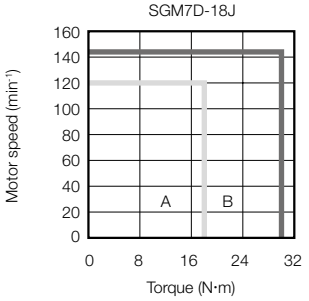


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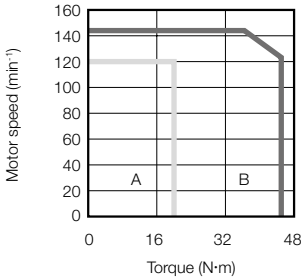


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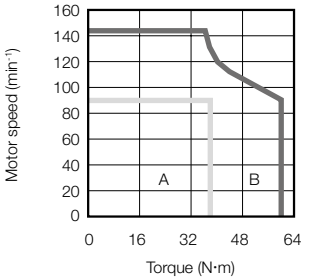


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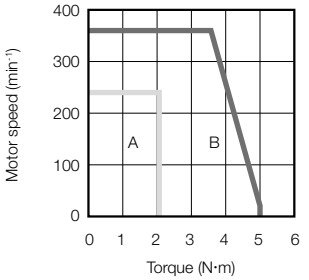


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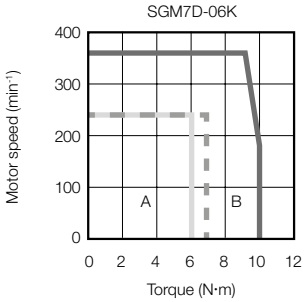


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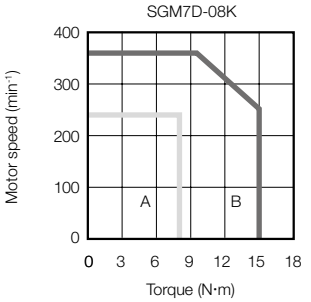


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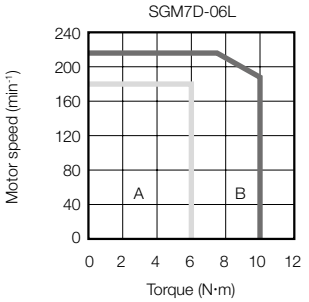


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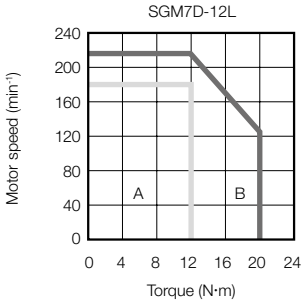


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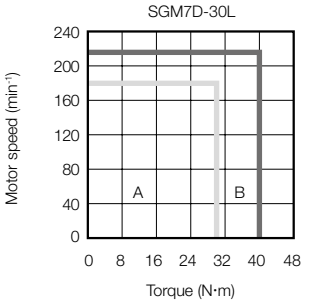


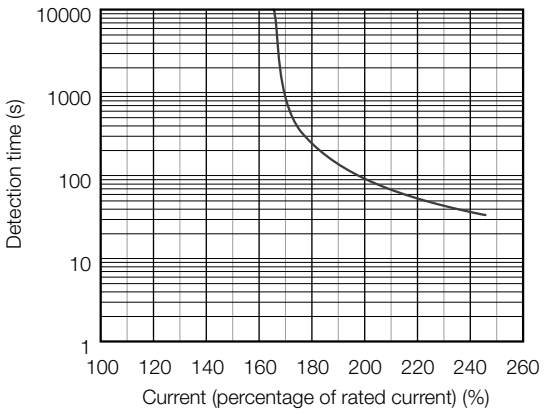

The characteristics are the same for three-phase 200 V and single-phase 200 V input.
Contact your YASKAWA representative for information on the characteristics for single-phase 100 V input.

Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

# Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions witg a Servomotor surrounding air temperature of 40ºC.

SGM7D-30F

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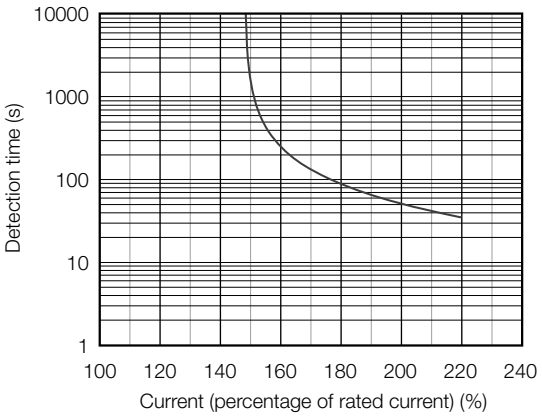


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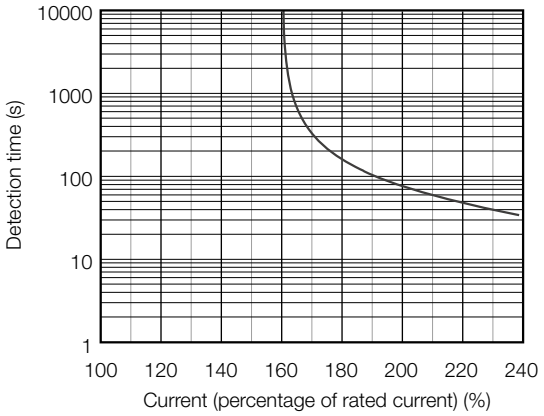


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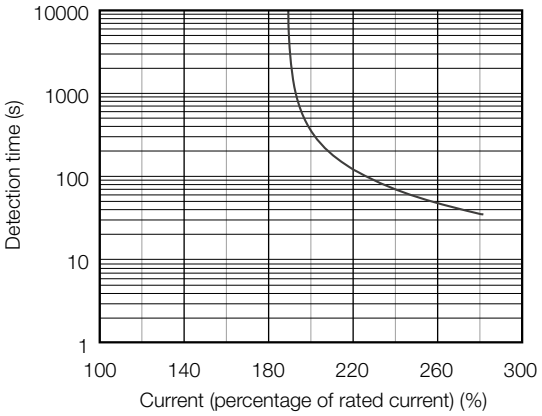


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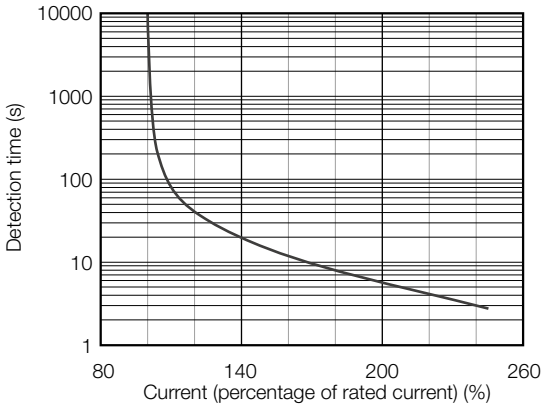


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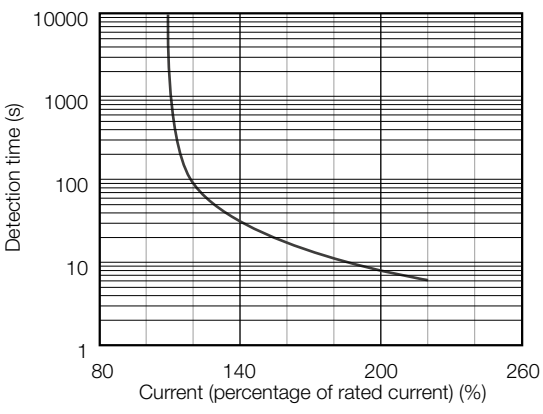

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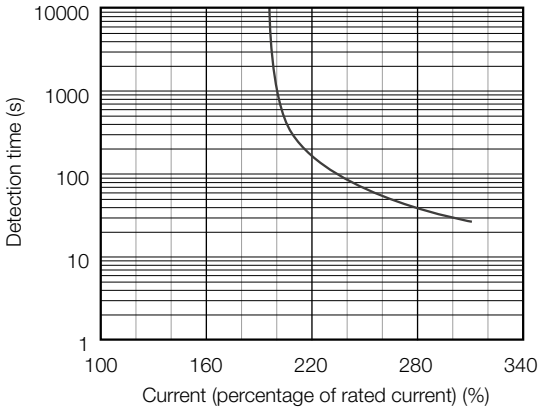


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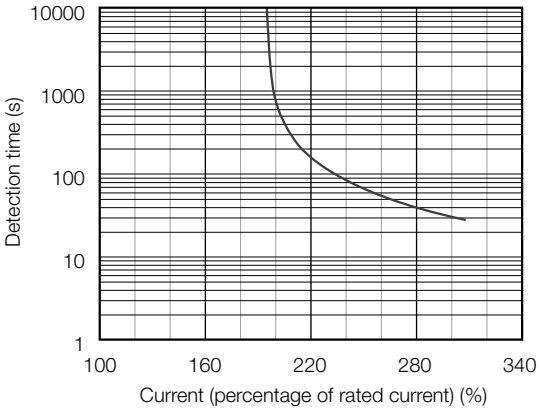


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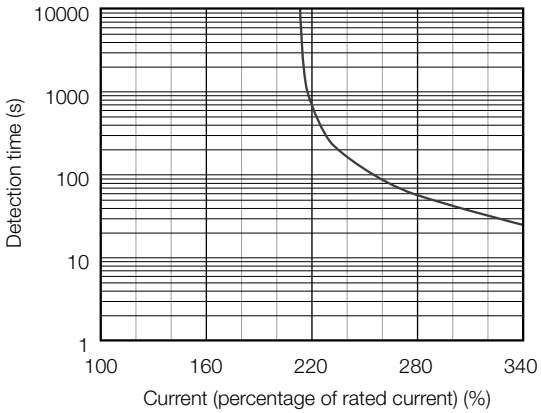


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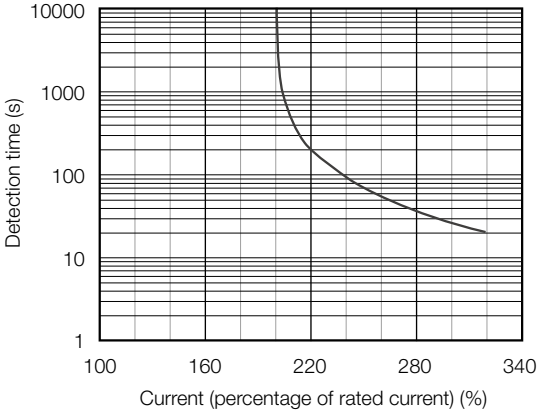


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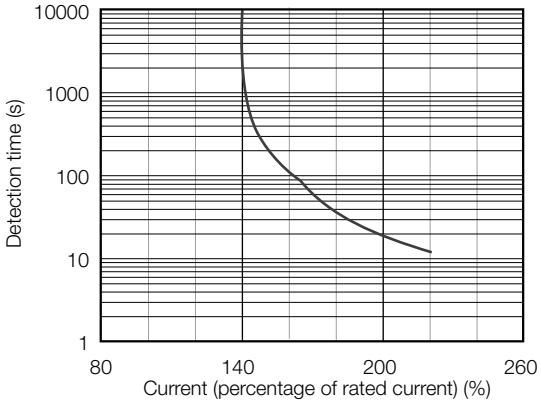


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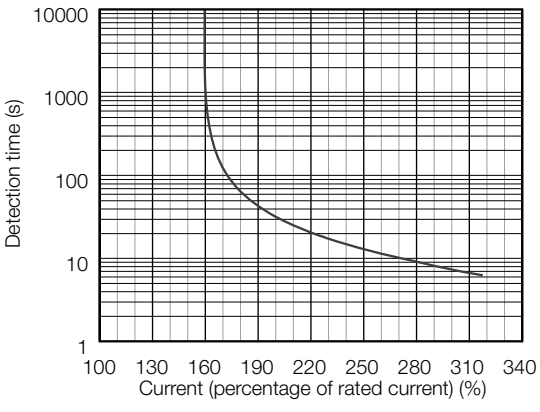

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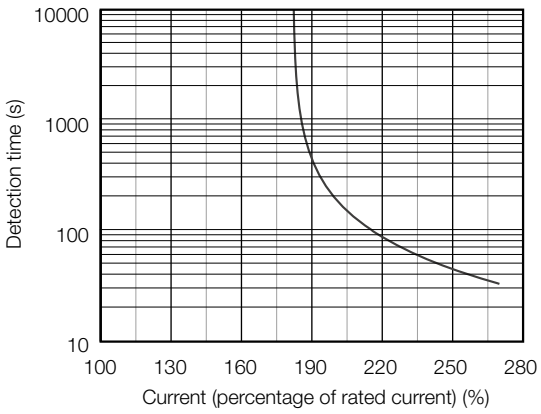


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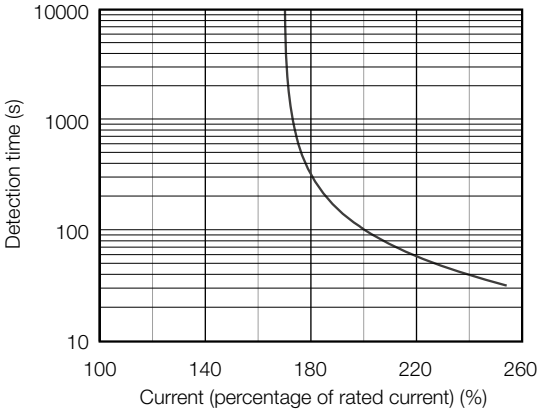


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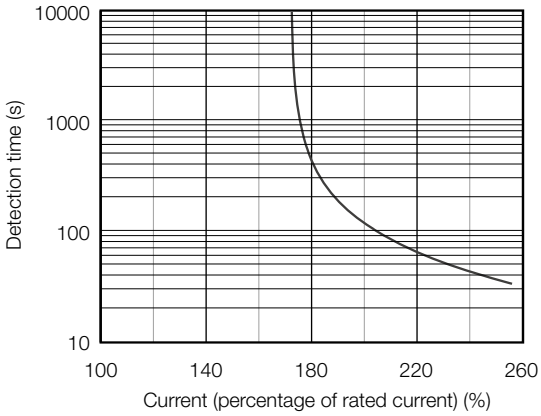


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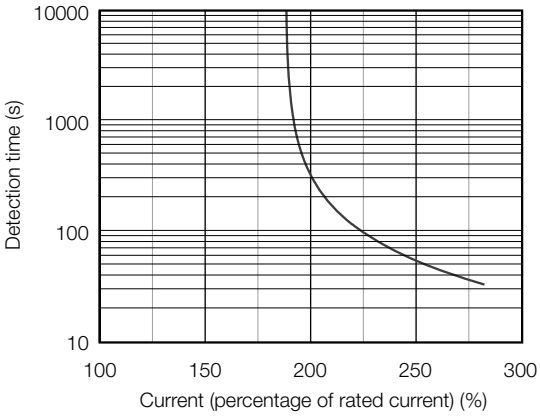


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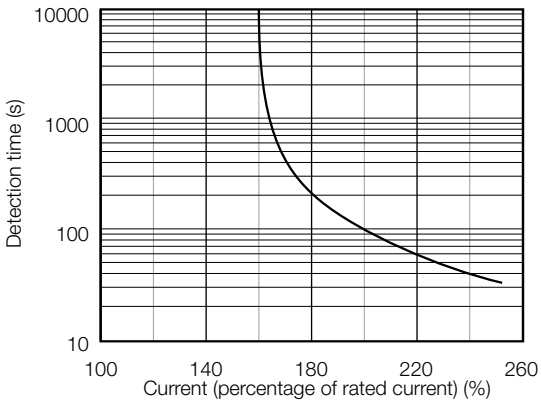


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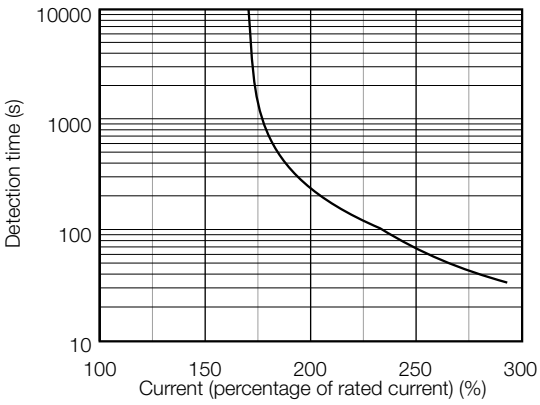

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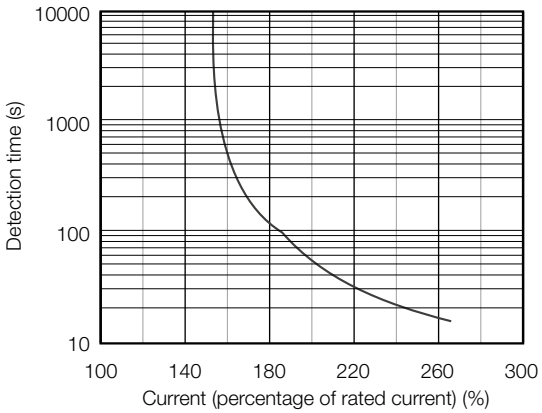


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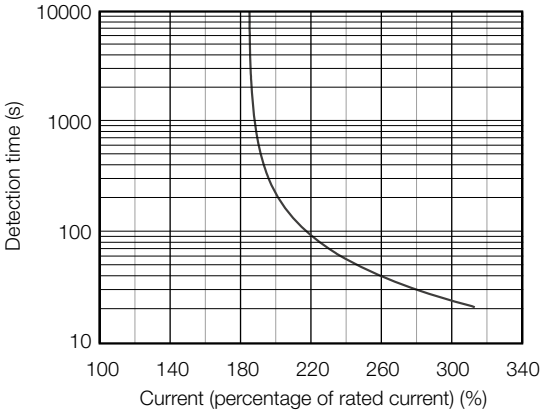


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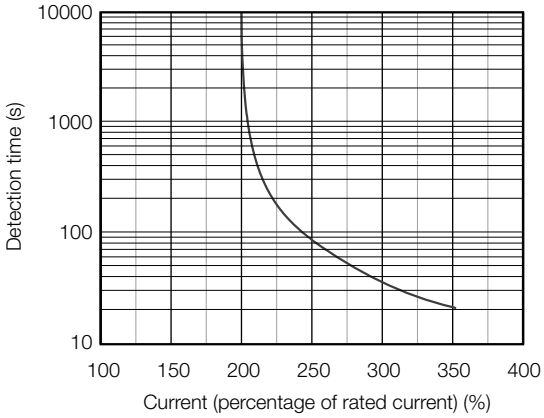


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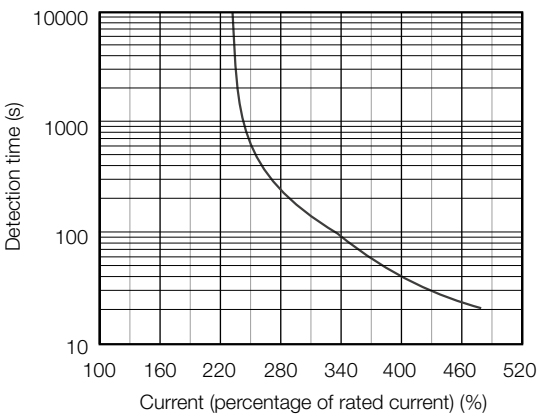
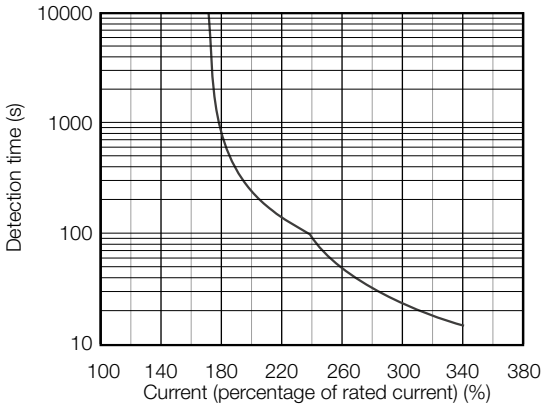
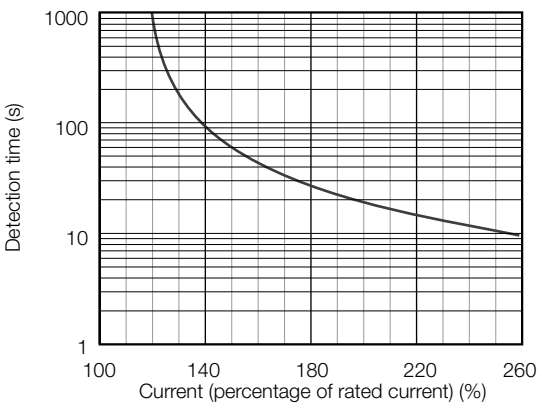


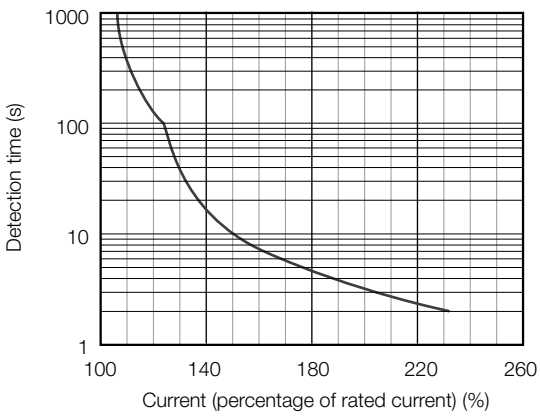

SGM7D-38J



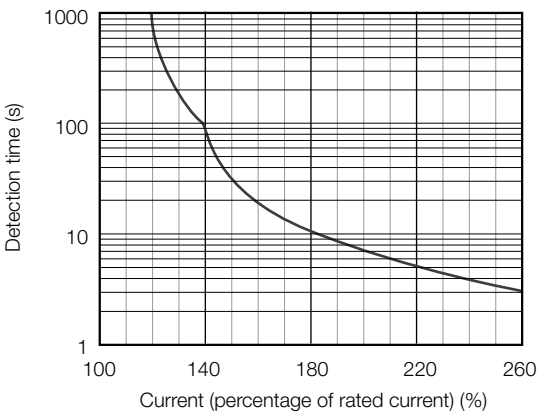

SGM7D-02K



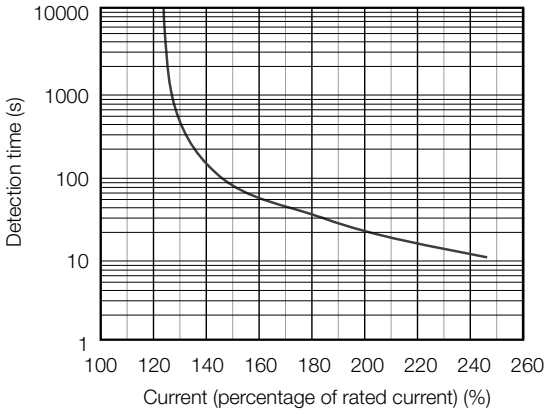
SGM7D-06K



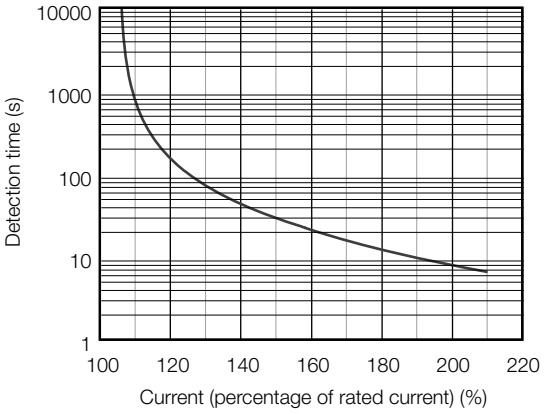

SGM7D-08K



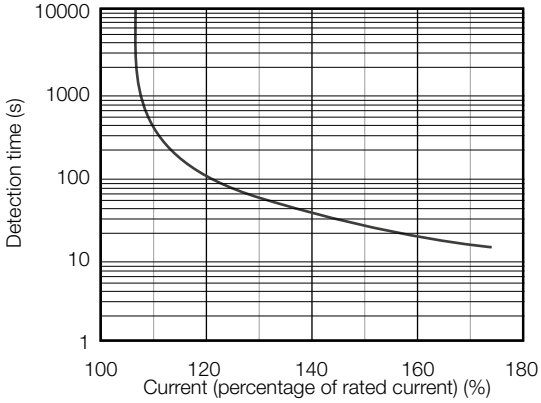

SGM7D-06L




SGM7D-12L




SGM7D-30L




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone. Refer to the section „Torque-Motor Speed Characteristics „for details on the effective torque.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Ratings section. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.
Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.

## Exceeding the allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to “Built-In Regenerative Resistor” for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

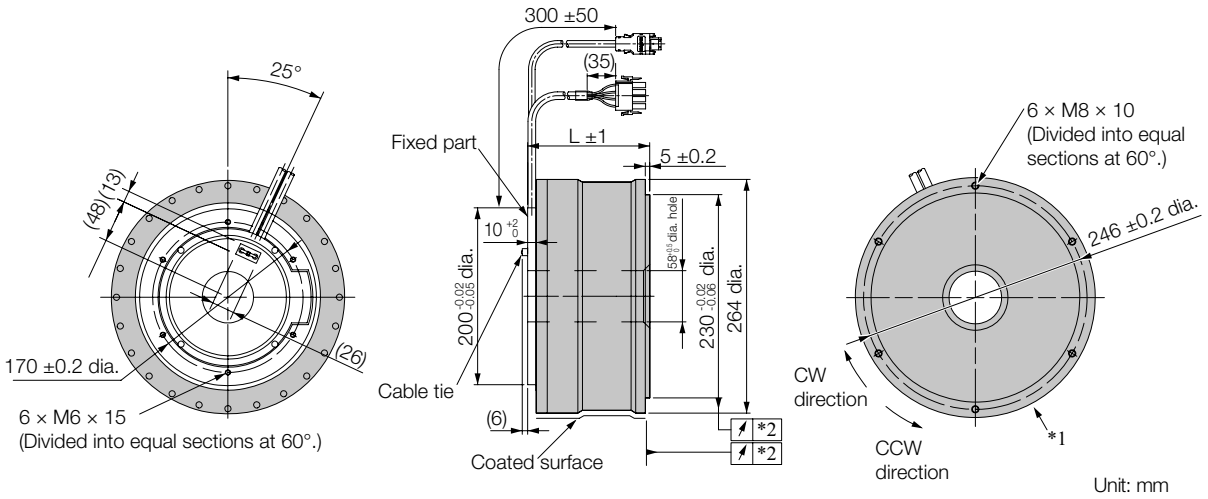
## When an external Regenerative Resistor is required

Install the External Regenerative Resistor. Refer to the „External Regenerative Resistors“ section for the recommended products.

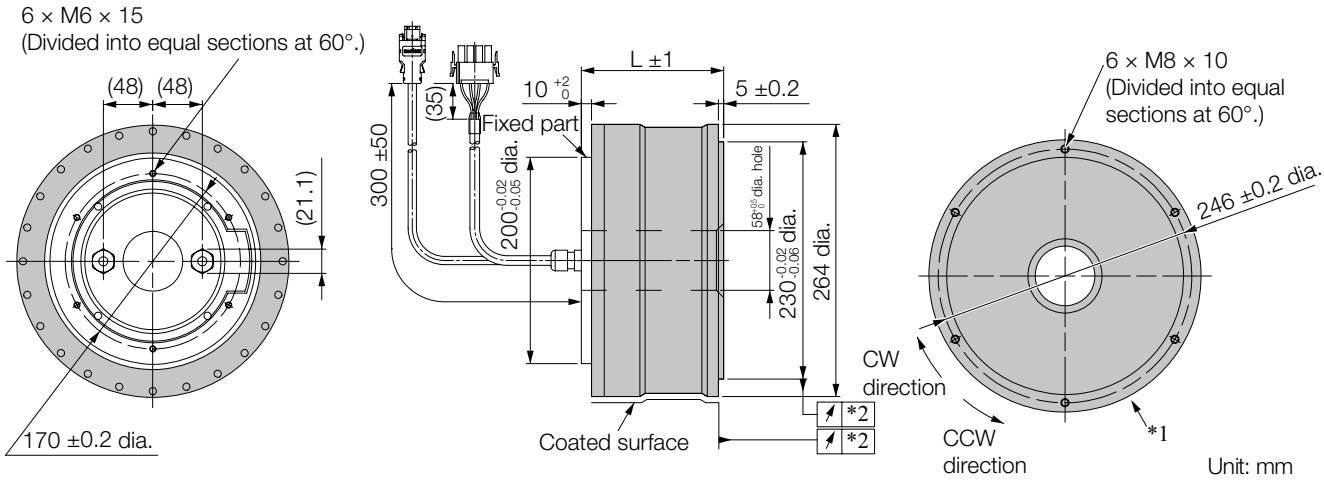
# External Dimensions

## SGM7D-□□F

### Servomotors with the Cable on the Side




### Servomotors with the Cable on the Bottom



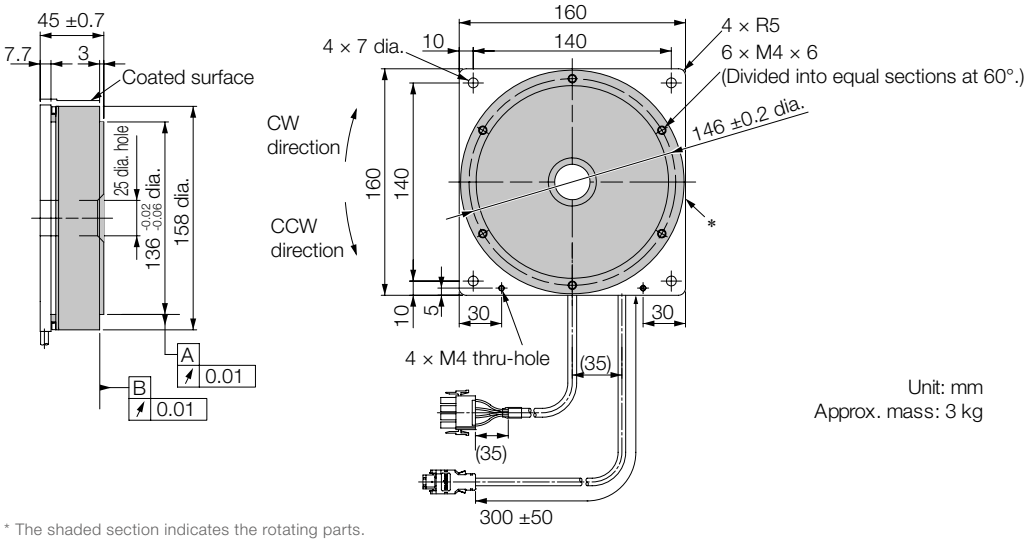

*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification. Refer to the Specifications section for details.

Note: Values in parentheses are reference dimensions.

| Model SGM7D- | L | Approx. Mass [kg] |
|---|---|---|
| 30F□C□□ | 113±1 | 14.5 |
| 58F□C□□ | 138±1 | 19 |
| 90F□C□□ | 163±1 | 24 |
| 1AF□C□□ | 188±1 | 29 |

## SGM7D-01G

### Servomotors with the Cable on the Side



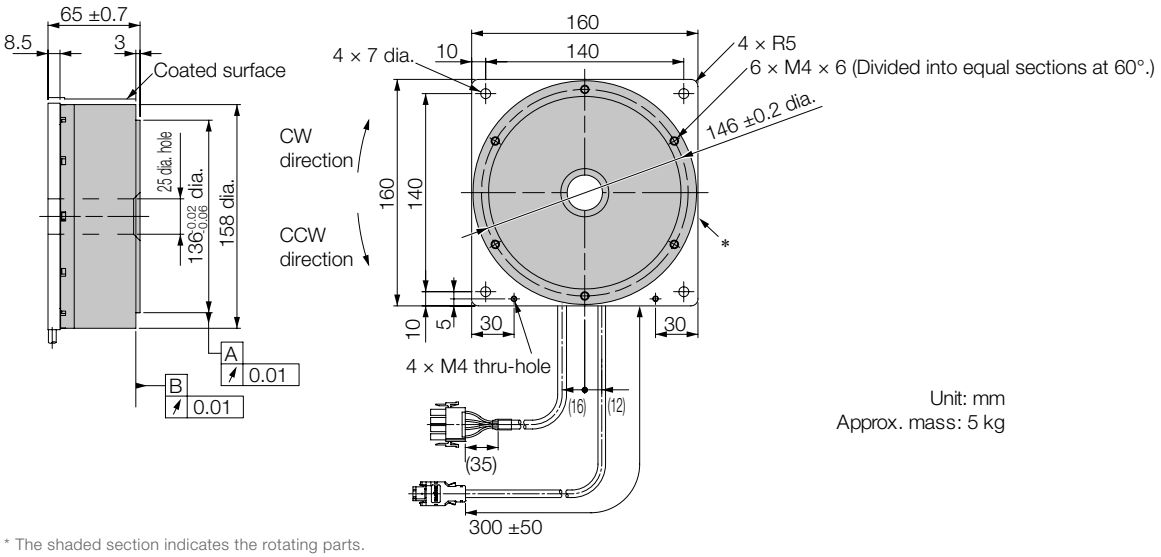

Unit: mm
Approx. mass: 3 kg

* The shaded section indicates the rotating parts.

Note: Values in parentheses are reference dimensions.

## SGM7D-05G

### Servomotors with the Cable on the Side



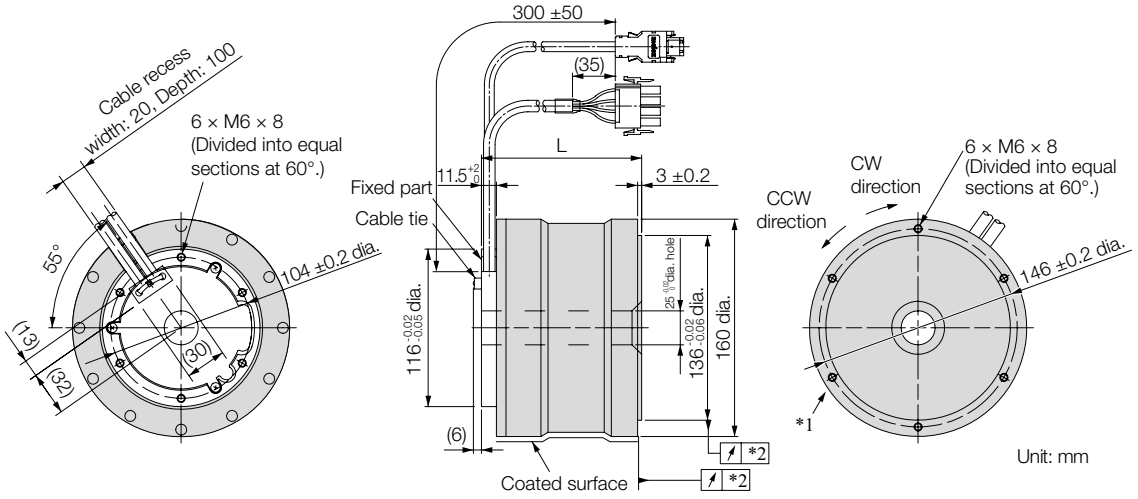

Unit: mm
Approx. mass: 5 kg

* The shaded section indicates the rotating parts.

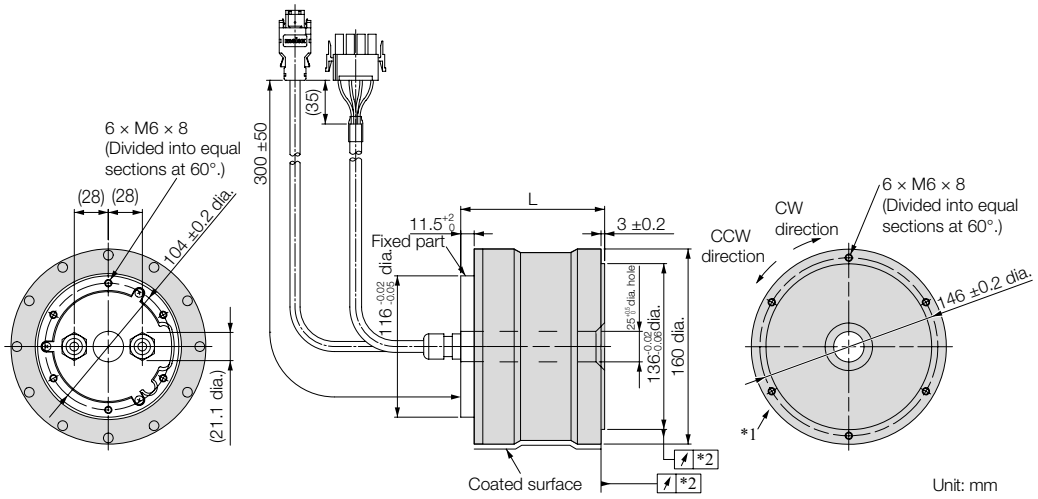
Note: Values in parentheses are reference dimensions.

# SGM7D-08G, -18G, -24G, -34G and -45G

## Servomotors with the Cable on the Side




## Servomotors with the Cable on the Bottom



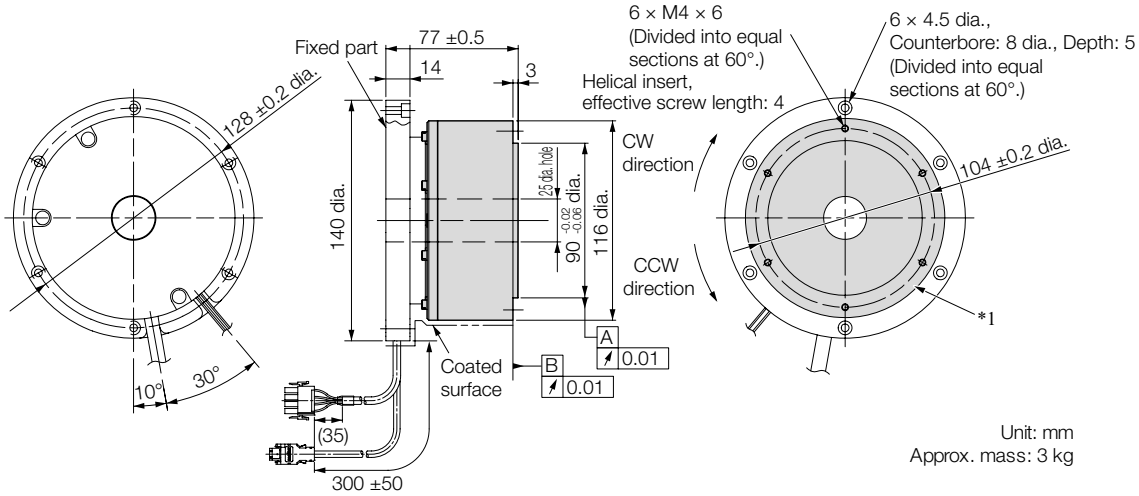

| Model SGM7D- | L | Approx. Mass [kg] |
|---|---|---|
| □□□ | | |
| □□□ | | |
| □□□ | | |
| □□□ | | |
| □□□ | | |

*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification.
Refer to the Specifications section for details.

Note: Values in parentheses are reference dimensions.

## SGM7D-03H

### Servomotors with the Cable on the Side



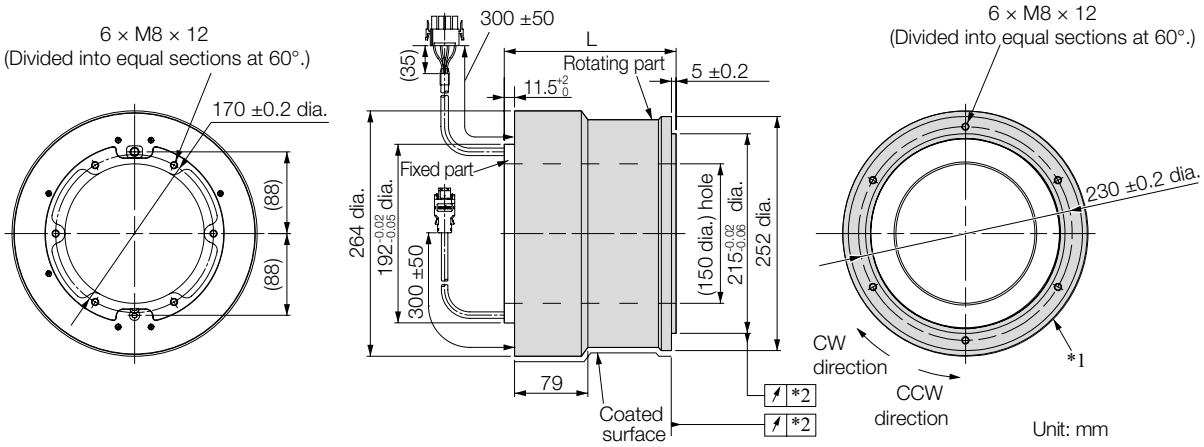

Unit: mm
Approx. mass: 3 kg

* The shaded section indicates the rotating parts.

Note: Values in parentheses are reference dimensions.

# SGM7D-□□I

## Servomotors with the Cable on the Bottom



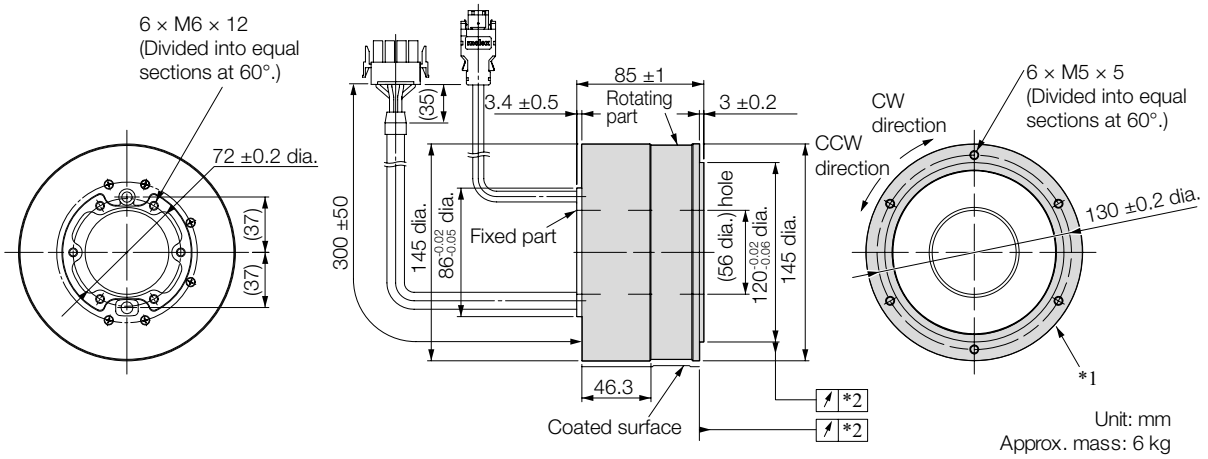

| Model SGM7D- | L | Approx. Mass [kg] |
|---|---|---|
| 28I□C5□ | 158±1 | 23 |
| 70I□C5□ | 185±1 | 28 |
| 1ZI□C5□ | 212±1 | 33 |
| 1CI□C5□ | 250±1 | 45 |
| 2BI□C5□ | 304±1 | 55 |
| 2DI□C5□ | 358±1 | 65 |

*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification. Refer to the Specifications section for details.

Note: Values in parentheses are reference dimensions.

## SGM7D-06J

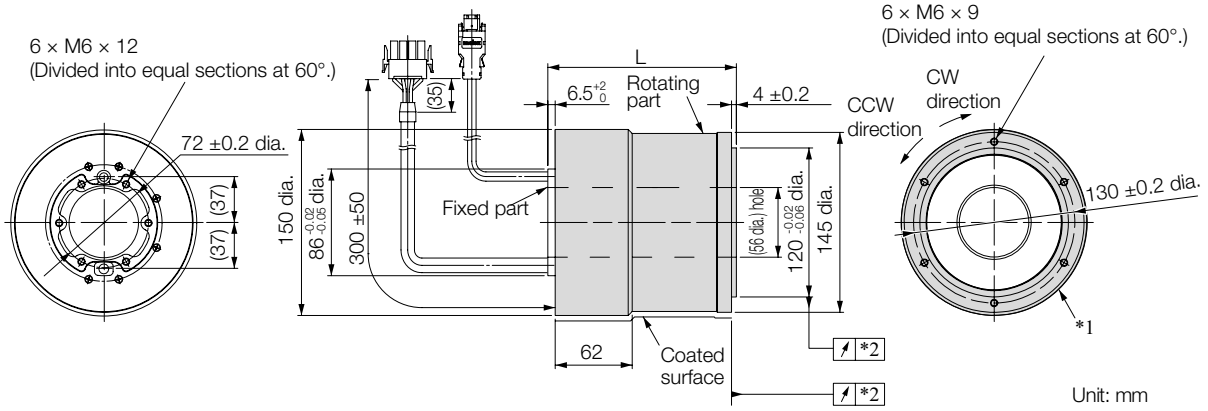
### Servomotors with the Cable on the Bottom




*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification. Refer to the Specifications section for details.
Note: Values in parentheses are reference dimensions.

## SGM7D-09J, -18J, -20J and -38J

### Servomotors with the Cable on the Bottom

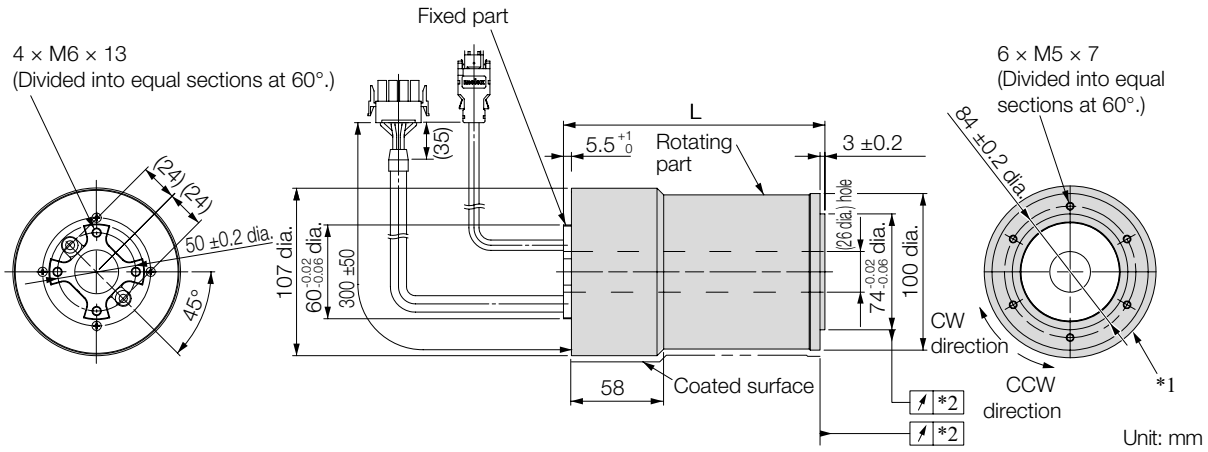



*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification. Refer to the Specifications section for details.
Note: Values in parentheses are reference dimensions.

| Model SGM7D- | L | Approx. Mass [kg] |
|---|---|---|
| 09J□C5□ | 123±1 | 8 |
| 18J□C5□ | 151±1 | 11 |
| 20J□C5□ | 179±1 | 13 |
| 38J□C5□ | 207±1 | 15.5 |

# SGM7D-□□K

## Servomotors with the Cable on the Bottom



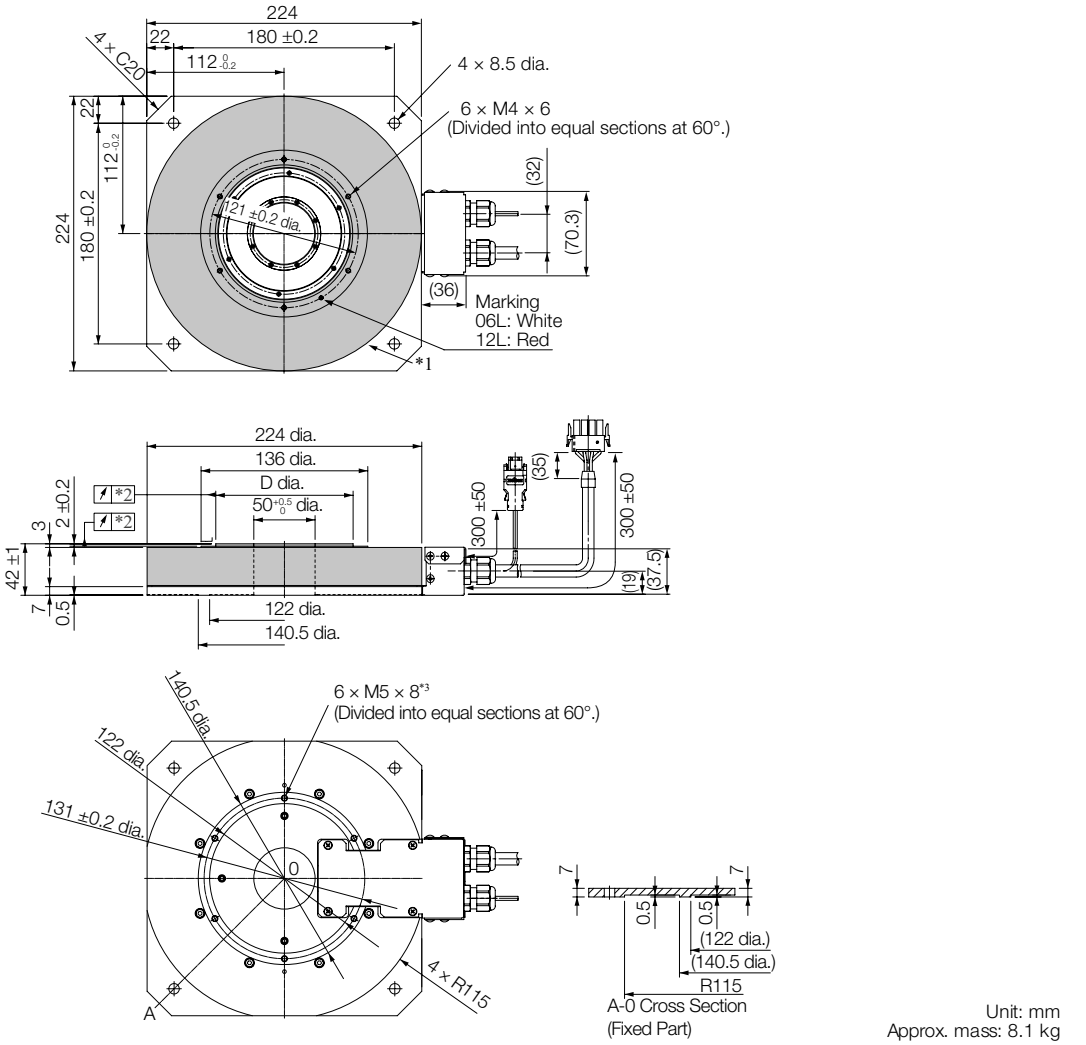

| Model SGM7D- | L | Approx. Mass [kg] |
|---|---|---|
| 02K□C5□ | 113±1 | 4 |
| 06K□C5□ | 140±1 | 5 |
| 08K□C5□ | 167±1 | 6.5 |

*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification. Refer to the Specifications section for details.

Note: Values in parentheses are reference dimensions.

## SGM7D-06L and -12L

### Servomotors with the Cable on the Side




Unit: mm
Approx. mass: 8.1 kg

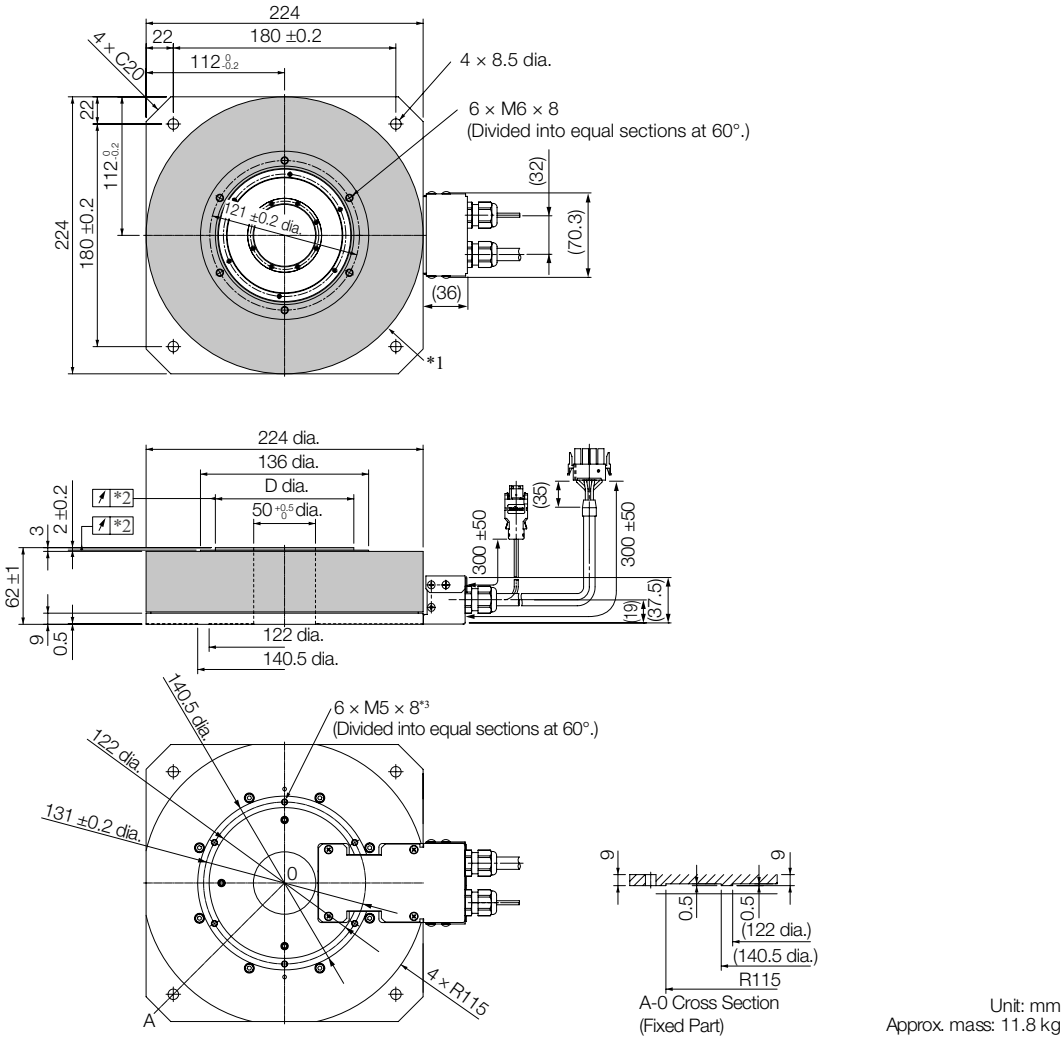
| Model SGM7D- | D |
|---|---|
| □□L□C41 (Standard mechanical precision) | 112 -0.02 -0.06 |
| □□L□C42 (High mechanical precision) | 111.9 -0.02 -0.06 |

*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification. Refer to the Specifications section for details.
*3. In the following cases, rigidity is required in the Servomotor. Therefore, secure the Servomotor with these holes.
- There is a fluctuating vertical load on the Servomotor.
- There is a moment load on the Servomotor.
- The Servomotor is used hanging upside down

Note: Values in parentheses are reference dimensions.

# SGM7D-30L

## Servomotors with the Cable on the Side




Unit: mm
Approx. mass: 11.8 kg

| Model SGM7D- | D |
|---|---|
| 30L□C41 (Standard mechanical precision) | 112 -0.02 -0.06 |
| 30L□C42 (High mechanical precision) | 111.9 -0.02 -0.06 |

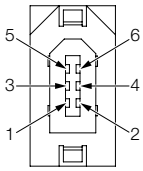
*1. The shaded section indicates the rotating parts.
*2. The precision depends on the option specification. Refer to the Specifications section for details.
*3. In the following cases, rigidity is required in the Servomotor. Therefore, secure the Servomotor with these holes.
- There is a fluctuating vertical load on the Servomotor.
- There is a moment load on the Servomotor.
- The Servomotor is used hanging upside down

Note: Values in parentheses are reference dimensions.

# Connector Specifications SGM7D

## Encoder Connector

for all Models

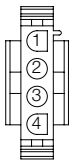



| | |
|---|---|
| 1 | PG5V |
| 2 | PG0V |
| 3* | BAT |
| 4* | BAT0 |
| 5 | PS |
| 6 | /PS |
| Connector Case | FG (frame ground) |

*) Only absolute-value models with multiturn data.
Model: 55102-0600
Manufacturer: Molex Japan LLC
Mating Connector: 54280-0609

## Servomotor Connector

for -□□F, -08G, -18G, -24G, -34G, -45G, -□□I, -06J, 09J, -18J, -20J, -38J, -06L, -12L and -30L

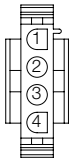



| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | Gray |
| 3 | Phase W | Blue |
| 4 | FG (frame ground) | Green (yellow) |

Models
- Plug: 350779-1
- Pins: 350218-3 or 350547-3 (No.1 to 3)
- Ground pin: 350654-1 or 350669-1 (No. 4)

Manufacturer: Tyco Electronics Japan G.K.
Mating Connector
- Cap: 350780-1
- Socket: 350536-3 or 350550-3

for -01G, -05G, -□□K and -03H




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | Gray |
| 3 | Phase W | Blue |
| 4 | FG (frame ground) | Green |

Models
- Plug: 350779-1
- Pins: 350561-3 or 350690-3 (No.1 to 3)
- Ground pin: 350654-1 or 350669-1 (No. 4)

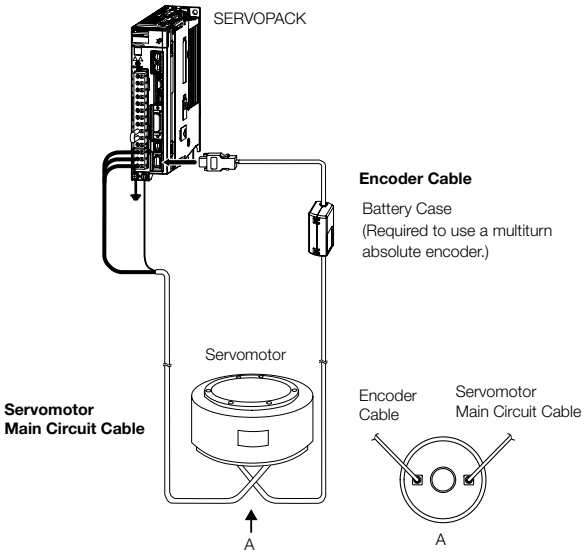
Manufacturer: Tyco Electronics Japan G.K.
Mating Connector
- Cap: 350780-1
- Socket: 350570-3 or 350689-3

# Selecting Cables SGM7D

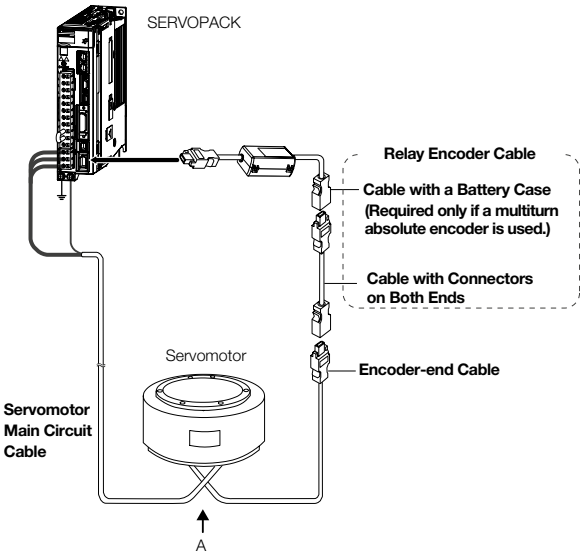
### Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

#### Encoder Cable of 20 m or less

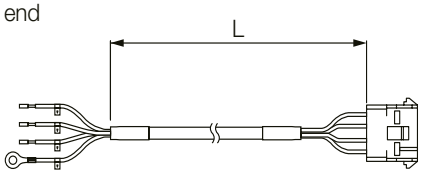
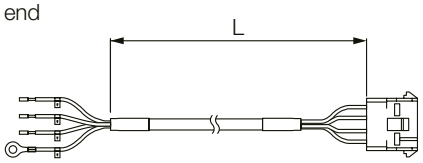



#### Encoder Cable of 30 m to 50 m (Relay Cable)



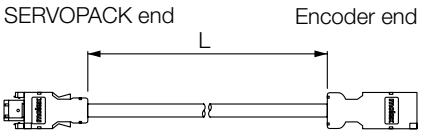
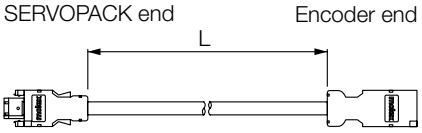
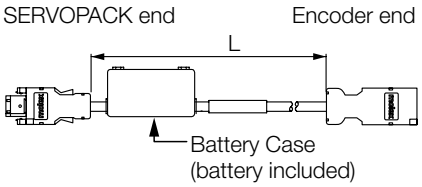

Note:
1. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
2. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials: Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

# Servomotor Main Circuit Cables

| Servomotor Model | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable* | |
| SGM7D-□□F<br>SGM7D-08G to -45G<br>SGM7D-□□I<br>SGM7D-□□J<br>SGM7D-□□L | 3 m | JZSP-CMM00-03-E | JZSP-C7DM21-03-E | SERVOPACK end / Motor end<br>  |
| | 5 m | JZSP-CMM00-05-E | JZSP-C7DM21-05-E | |
| | 10 m | JZSP-CMM00-10-E | JZSP-C7DM21-10-E | |
| | 15 m | JZSP-CMM00-15-E | JZSP-C7DM21-15-E | |
| | 20 m | JZSP-CMM00-20-E | JZSP-C7DM21-20-E | |
| SGM7D-01G or -05G<br>SGM7D-□□H<br>SGM7D-□□K | 3 m | JZSP-CMM00-03-E | JZSP-CMM01-03-E | SERVOPACK end / Motor end<br>  |
| | 5 m | JZSP-CMM00-05-E | JZSP-CMM01-05-E | |
| | 10 m | JZSP-CMM00-10-E | JZSP-CMM01-10-E | |
| | 15 m | JZSP-CMM00-15-E | JZSP-CMM01-15-E | |
| | 20 m | JZSP-CMM00-20-E | JZSP-CMM01-20-E | |

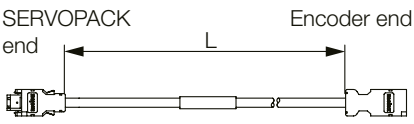
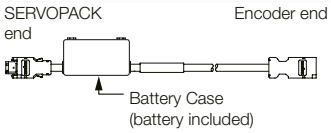
* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
Note: Direct Drive Servomotors are not available with holding brakes.

## Encoder Cables of 20 m or less

| Servomotor Model | Description | Length | Order Number | | Appearance |
|---|---|---|---|---|---|
| | | | Standard Cable | Flexible Cable*1 | |
| All SGM7D Models | For incremental encoder: Without Battery Case | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| | For multiturn absolute encoder: Without Battery Case*2 | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| | For multiturn absolute encoder: With Battery Case | 3 m | JZSP-CSP19-03-E | JZSP-CSP29-03-E |  |
| | | 5 m | JZSP-CSP19-05-E | JZSP-CSP29-05-E | |
| | | 10 m | JZSP-CSP19-10-E | JZSP-CSP29-10-E | |
| | | 15 m | JZSP-CSP19-15-E | JZSP-CSP29-15-E | |
| | | 20 m | JZSP-CSP19-20-E | JZSP-CSP29-20-E | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 68 mm or larger.
*2. Use one of these Cables if a battery is connected to the host controller.

## Relay Encoder Cables of 30 m to 50 m

| Servomotor Model | Description | Length | Order Number*1 | Appearance |
|---|---|---|---|---|
| All SGM7D Models | Cables with Connectors on Both Ends (for incremental or multiturn absolute encoder) | 30 m | JZSP-UCMP00-30-E |  |
| | | 40 m | JZSP-UCMP00-40-E | |
| | | 50 m | JZSP-UCMP00-50-E | |
| | Cable with a Battery Case (for multiturn absolute encoder)*2 | 0.3 m | JZSP-CSP12-E |  |

*1. Flexible Cables are not available.
*2. This Cable is not required if a battery is connected to the host controller.

# SGM7E (Inner Rotor, Coreless)

## Model Designations

SGM7E - 02 B 7 A 1 1

| Direct Drive Servomotors | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th | digit |
|---|---|---|---|---|---|---|---|

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| 02 | 2 Nm |
| 04 | 4 Nm |
| 05 | 5 Nm |
| 07 | 7 Nm |
| 08 | 8 Nm |
| 10 | 10 Nm |
| 14 | 14 Nm |
| 16 | 16 Nm |
| 17 | 17 Nm |
| 25 | 25 Nm |
| 35 | 35 Nm |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |
| E | 290 mm dia. |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 7* | 24-bit multiturn absolute encoder |
| F* | 24-bit incremental encoder |

* Both multiturn absolute encoder and incremental encoder can be used as a single-turn absolute encoder by setting parameters.

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard version |

**6th digit - Flange**

| Code | Mounting |
|---|---|
| 1 | Non-load side |
| 4 | Non-load side with cable on side |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| 2 | High machine precision (runout at end of shaft and runout of shaft surface: 0.01 mm) |

Note:
1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## Manufactured Models

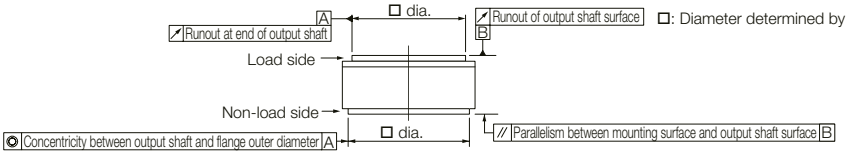
| Rated Torque [Nm] | Servomotor Outer Diameter | | | |
|---|---|---|---|---|
| | B (135 mm dia.) | C (175 mm dia.) | D (230 mm dia.) | E (290 mm dia.) |
| 2 | SGM7E-02B | — | — | — |
| 4 | — | SGM7E-04C | — | — |
| 5 | SGM7E-05B | — | — | — |
| 7 | SGM7E-07B | — | — | — |
| 8 | — | — | SGM7E-08D | — |
| 10 | — | SGM7E-10C | — | — |
| 14 | — | SGM7E-14C | — | — |
| 16 | — | — | — | SGM7E-16E |
| 17 | — | — | SGM7E-17D | — |
| 25 | — | — | SGM7E-25D | — |
| 35 | — | — | — | SGM7E-35E |

Note:
The above table shows combinations of the rated torque and outer diameter.
The fourth through seventh digits have been omitted.

# Specifications

| Model SGM7E- | | | 02B | 05B | 07B | 04C | 10C | 14C | 08D | 17D | 25D | 16E | 35E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time Rating | | | Continuous | | | | | | | | | | |
| Thermal Class | | | A | | | | | | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MΩ min. | | | | | | | | | | |
| Withstand Voltage | | | 1,500 VAC for 1 minute | | | | | | | | | | |
| Excitation | | | Permanent magnet | | | | | | | | | | |
| Mounting | | | Flange-mounted | | | | | | | | | | |
| Drive Method | | | Direct drive | | | | | | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | | | | | | |
| Vibration Class*1 | | | V15 | | | | | | | | | | |
| Absolute Accuracy | | | ±15 s | | | | | | | | | | |
| Repeatability | | | ±1.3 s | | | | | | | | | | |
| Protective Structure*2 | | | Totally enclosed, self-cooled, IP42 (The protective structure is IP40 for CE marking) | | | | | | | | | | |
| Environmental Conditions | Ambient Air Temperature | | 0°C to 40°C (without freezing) | | | | | | | | | | |
| | Ambient Air Humidity | | 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| | Installation Site | | · Must be indoors and free of corrosive and explosive gases.<br>· Must be well-ventilated and free of dust and moisture.<br>· Must facilitate inspection and cleaning.<br>· Must have an altitude of 1,000 m or less.<br>· Must be free of strong magnetic fields. | | | | | | | | | | |
| | Storage Environment | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| Mechanical Tolerances*3 | Runout of Output Shaft Surface | mm | 0.02 (0.01 for high machine precision option) | | | | | | | | | | |
| | Runout at End of Output Shaft | mm | 0.04 (0.01 for high machine precision option) | | | | | | | | | | |
| | Parallelism between Mounting Surface and Output Shaft Surface | mm | 0.07 | | | | | | 0.08 | | | | |
| | Concentricity between Output Shaft and Flange Outer Diameter | mm | 0.07 | | | | | | 0.08 | | | | |
| Shock Resistance*4 | Impact Acceleration Rate at Flange | | 490 m/s$^2$ | | | | | | | | | | |
| | Number of Impacts | | 2 times | | | | | | | | | | |
| Vibration Resistance*4 | Vibration Acceleration Rate of Flange | | 49 m/s$^2$ | | | | | | | | | | |
| Applicable SERVOPACKs | | SGD7S- | 2R8A, 2R1F | | | 2R8A, 2R8F | | | | | | | 5R5A |
| | | SGD7W-, SGD7C- | 2R8A | | | | | | | | | | |

*1. A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2. The hollow hole section, motor mounting surface, output shaft surface, and gap around the rotating part of the shaft are excluded.
Protective structure specifications apply only when the special cable is used.
*3. Refer to the following figure for the relevant locations on the Servomotor.
Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.



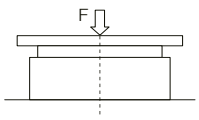

*4. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures.
The strength of the vibration that the Servomotor can withstand depends on the application. Check the vibration acceleration rate.

# Ratings

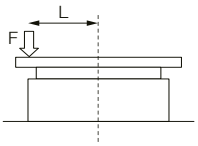
| Model SGM7E- | | | 02B | 05B | 07B | 04C | 10C | 14C | 08D | 17D | 25D | 16E | 35E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated Output*1 | | W | 42 | 105 | 147 | 84 | 209 | 293 | 168 | 356 | 393 | 335 | 550 |
| Rated Torque *1,*2 | | Nm | 2 | 5 | 7 | 4 | 10 | 14 | 8 | 17 | 25 | 16 | 35 |
| Instantaneous Maximum Torque*1 | | Nm | 6 | 15 | 21 | 12 | 30 | 42 | 24 | 51 | 75 | 48 | 105 |
| Stall Torque*1 | | Nm | 2.05 | 5.15 | 7.32 | 4.09 | 10.1 | 14.2 | 8.23 | 17.4 | 25.4 | 16.5 | 35.6 |
| Rated Current*1 | | A | 1.8 | 1.7 | 1.4 | 2.2 | | 2.8 | 1.9 | 2.5 | 2.6 | 3.3 | 3.5 |
| Instantaneous Maximum Current*1 | | A | 5.4 | 5.1 | 4.1 | 7 | | 8.3 | 5.6 | 7.5 | 8 | 9.4 | 10 |
| Rated Motor Speed*1 | | $min^{-1}$ | 200 | | | | | | | | 150 | 200 | 150 |
| Maximum Motor Speed*1 | | $min^{-1}$ | 500 | | | | 400 | 300 | 500 | 350 | 250 | 500 | 250 |
| Torque Constant | | Nm/A | 1.18 | 3.17 | 5.44 | 2.04 | 5.05 | 5.39 | 5.10 | 7.79 | 10.8 | 5.58 | 11.1 |
| Motor Moment of Inertia | | $\times10^{-4}$ kg·$m^2$ | 28 | 51 | 77 | | 140 | 220 | 285 | 510 | 750 | 930 | 1,430 |
| Rated Power Rate*1 | | kW/s | 1.43 | 4.90 | 6.36 | 2.08 | 7.14 | 8.91 | 2.25 | 5.67 | 8.33 | 2.75 | 8.57 |
| Rated Angular Acceleration Rate*1 | | rad/$s^2$ | 710 | 980 | 910 | 520 | 710 | 640 | 280 | 330 | | 170 | 240 |
| Heat Sink Size | | mm | 350 x 350 x 12 | | | 450 x 450 x 12 | | | 550 x 550 x 12 | | | 650 x 650 x 12 | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | times | 10 times | | | | 5 times | 3 times | | | | | |
| | With External Regenerative Resistor and External Dynamic Brake Resistor *3 | times | 10 times | | | | 5 times | 3 times | | | | | |
| Allowable Load*4 | Allowable Thrust Load | N | 1,500 | | | 3,300 | | | 4,000 | | | 11,000 | |
| | Allowable Moment Load | Nm | 40 | 50 | 64 | 70 | 75 | 90 | 93 | 103 | 135 | 250 | 320 |

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
The values for other items are at 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with a steel heat sink of the dimensions given in the table.
*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

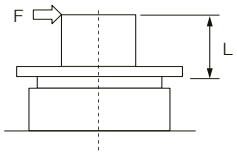
*4. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns.
Design the machine so that the thrust loads or moment loads will not exceed the values given in the table.




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L



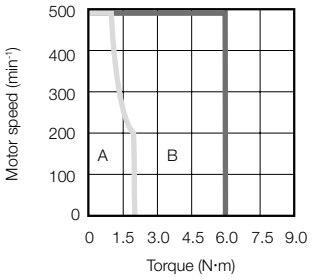

Where F is the external force,
Thrust load = Load mass
Moment load = F × L

Note:
For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

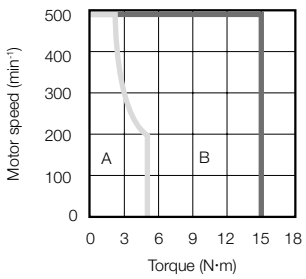
# Torque-Motor Speed Characteristics

A : Continuous duty zone ——— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 100-V input

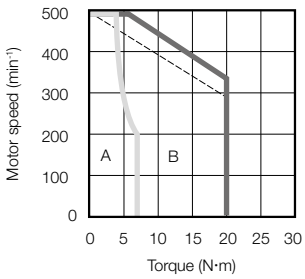
SGM7E-02B



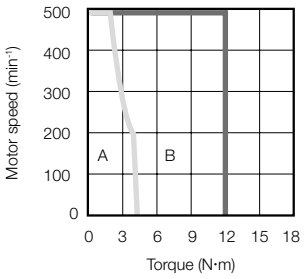

SGM7E-05B



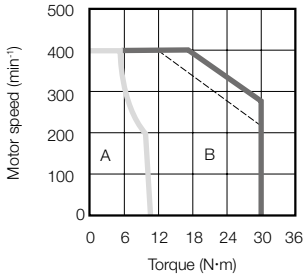

SGM7E-07B



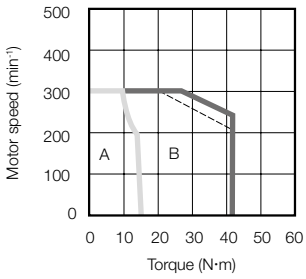

SGM7E-04C



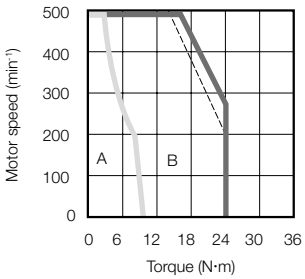

SGM7E-10C



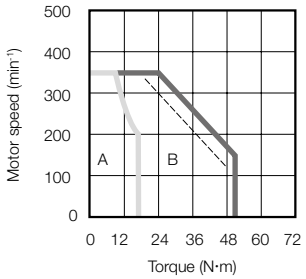

SGM7E-14C



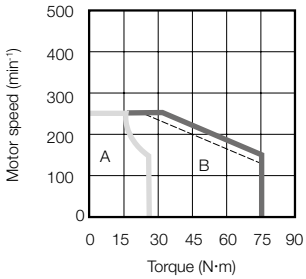

SGM7E-08D



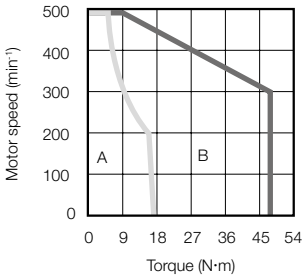

SGM7E-17D



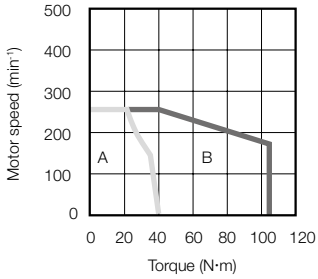

SGM7E-25D




SGM7E-16E




SGM7E-35E

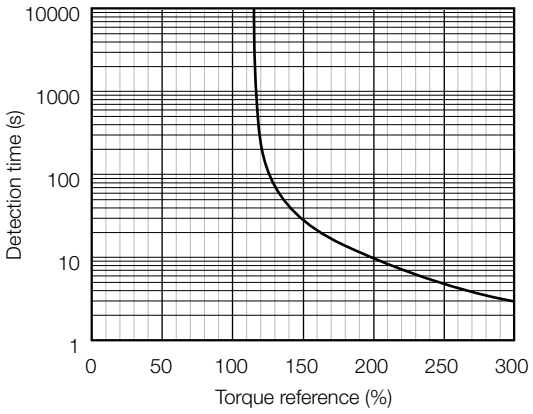



Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

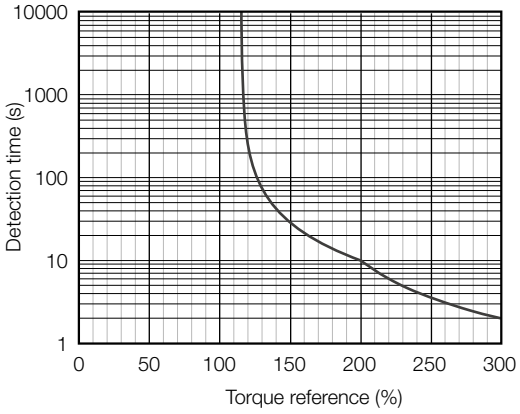
# Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions witg a Servomotor surrounding air temperature of 40ºC.

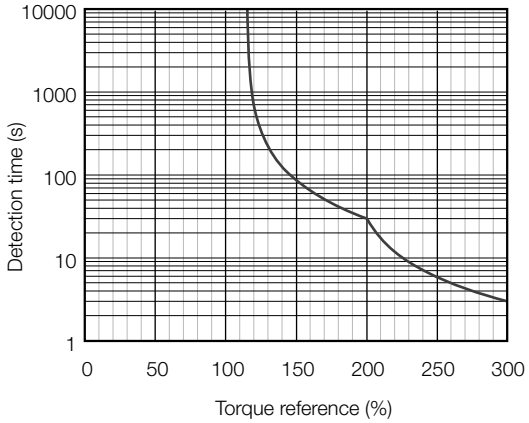
SGM7E-02B, -05B, -07B, -10C, -17D, and -35E



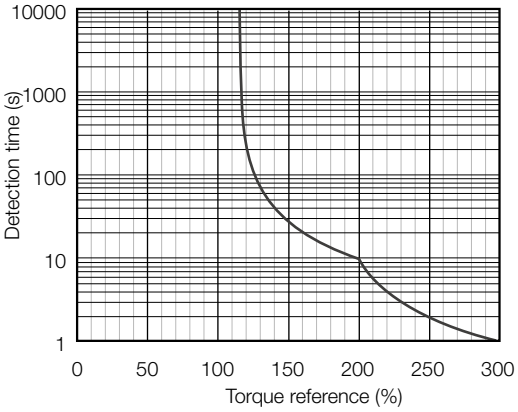

SGM7E-04C



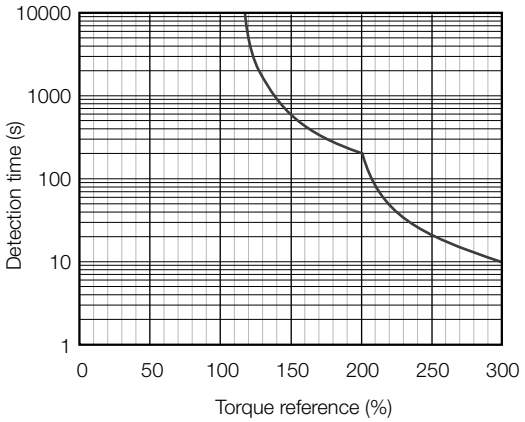

SGM7E-14C




SGM7E-08D and -16E




SGM7E-25D




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Ratings. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.
Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions.
Contact your YASKAWA representative for information on this program.

## Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

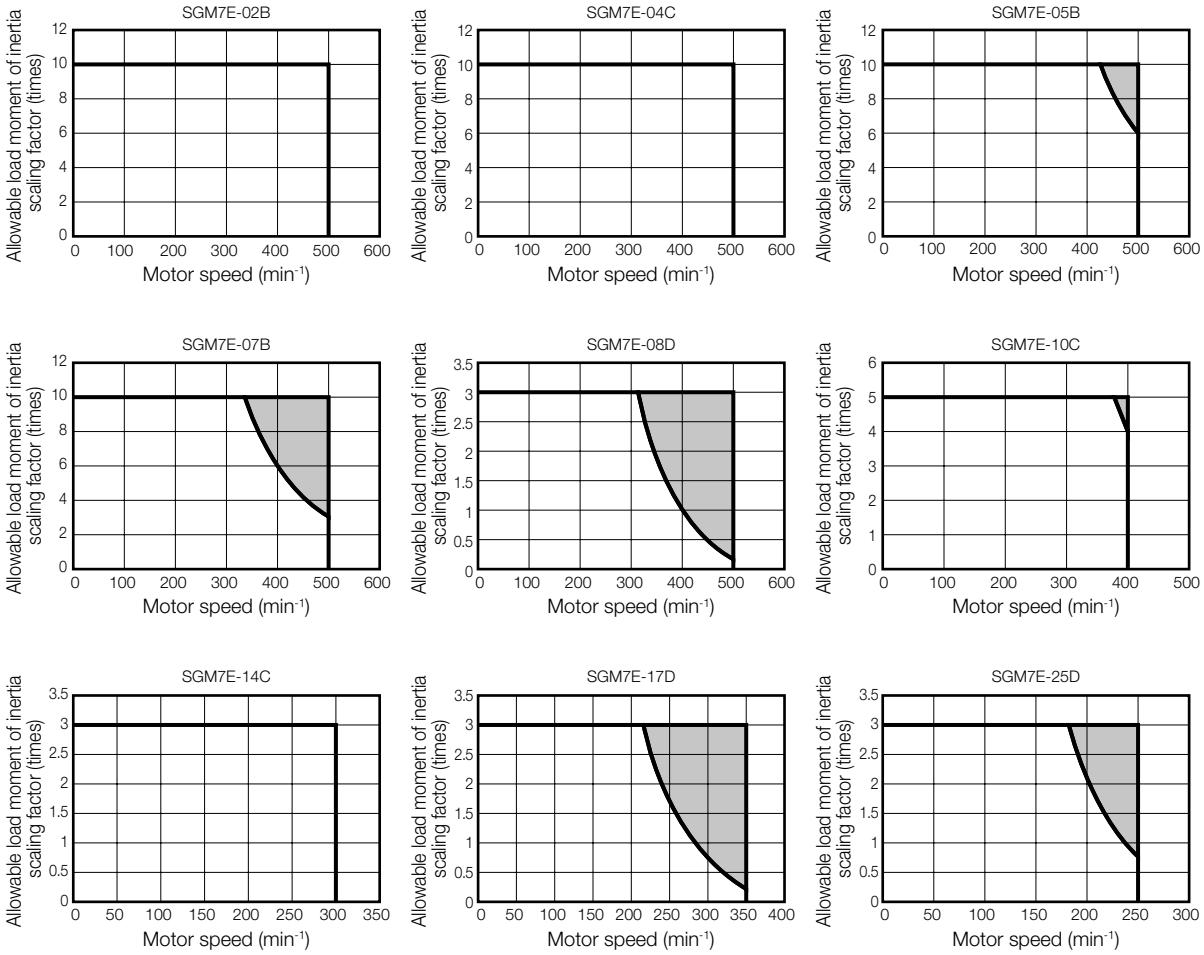
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to “Built-In Regenerative Resistor” for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

# SERVOPACKs without built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.




Note
Applicable SERVOPACK models: SGD7S-2R8A and -2R8F

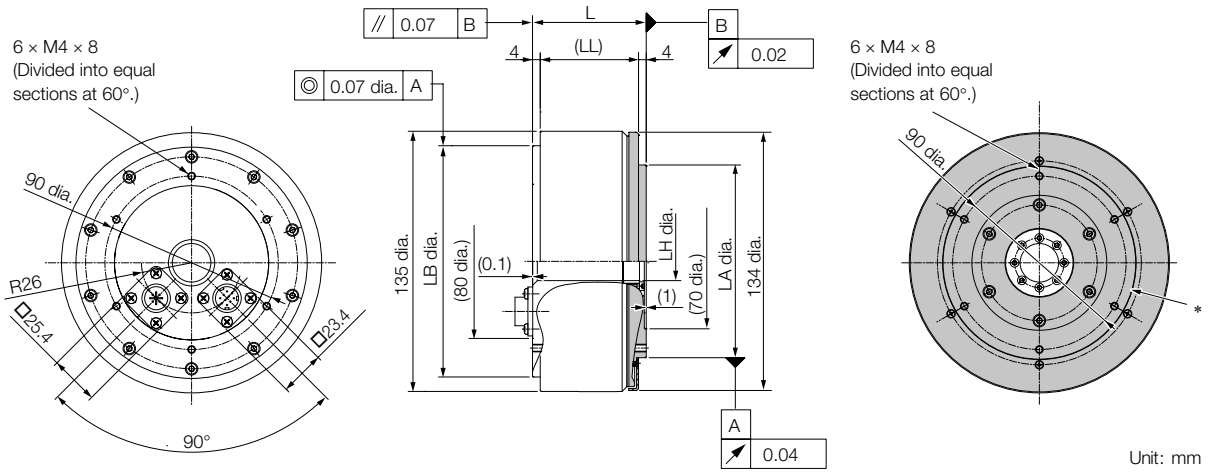
## When an external Regenerative Resistor is required

Install the External Regenerative Resistor. Refer to the External Regenerative Resistor section for the recommended products.

# External Dimensions

## SGM7E-□□B

### Flange Specification 1

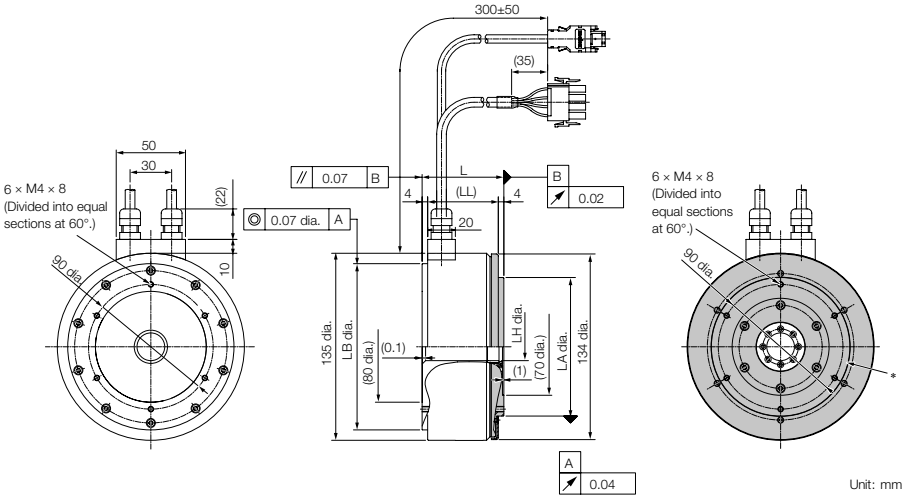



Unit: mm

* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 02B□A11 | 59 | 51 | $120^{\ 0}_{-0.035}$ | $20^{+0.4}_{\ 0}$ | $100^{\ 0}_{-0.035}$ | 4.8 |
| 05B□A11 | 88 | 80 | $120^{\ 0}_{-0.035}$ | $20^{+0.4}_{\ 0}$ | $100^{\ 0}_{-0.035}$ | 5.8 |
| 07B□A11 | 128 | 120 | $120^{\ 0}_{-0.035}$ | $20^{+0.4}_{\ 0}$ | $100^{\ 0}_{-0.035}$ | 8.2 |

### Flange Specification 4



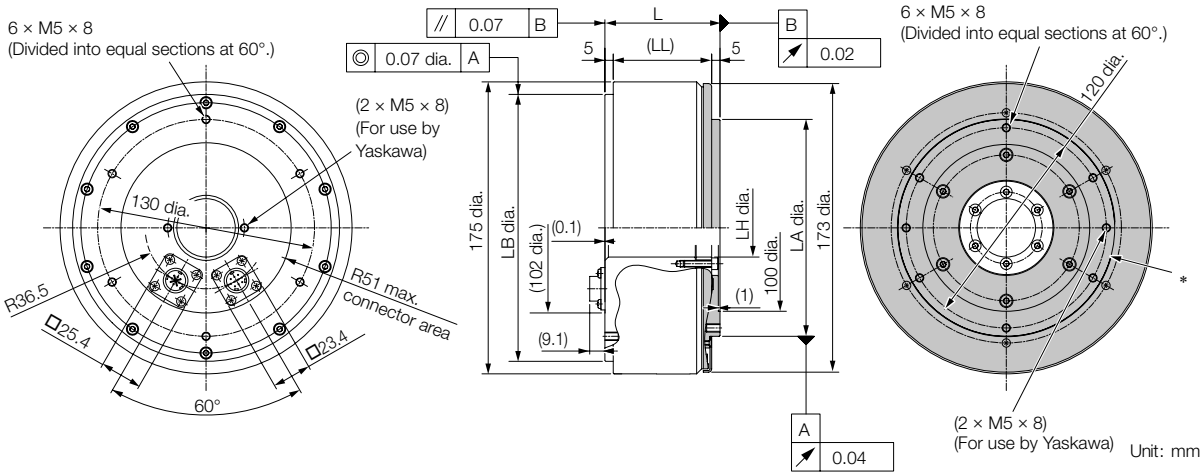

Unit: mm

* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 02B□A41 | 59 | 51 | $120^{\ 0}_{-0.035}$ | $20^{+0.4}_{\ 0}$ | $100^{\ 0}_{-0.035}$ | 4.8 |
| 05B□A41 | 88 | 80 | $120^{\ 0}_{-0.035}$ | $20^{+0.4}_{\ 0}$ | $100^{\ 0}_{-0.035}$ | 5.8 |
| 07B□A41 | 128 | 120 | $120^{\ 0}_{-0.035}$ | $20^{+0.4}_{\ 0}$ | $100^{\ 0}_{-0.035}$ | 8.2 |

# SGM7E-□□C

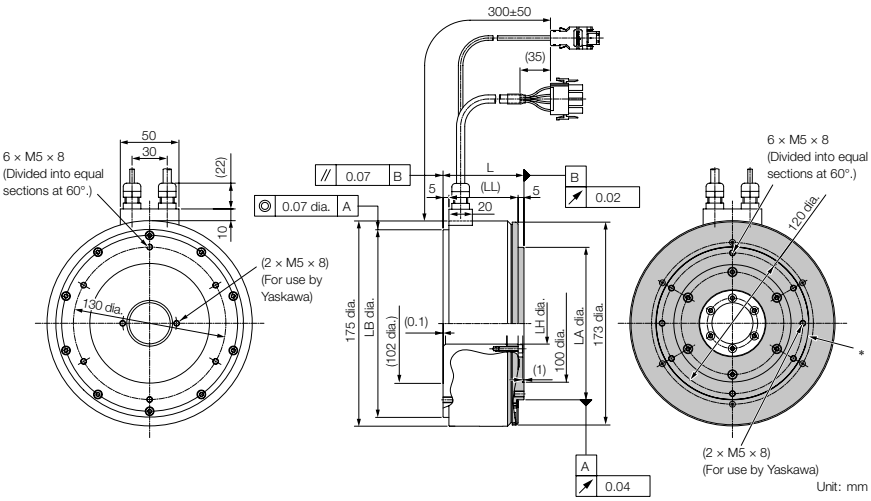
## Flange Specification 1




* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 04C□A11 | 69 | 59 | $160^{\ 0}_{-0.040}$ | $35^{+0.4}_{\ 0}$ | $130^{\ 0}_{-0.040}$ | 7.2 |
| 10C□A11 | 90 | 80 | $160^{\ 0}_{-0.040}$ | $35^{+0.4}_{\ 0}$ | $130^{\ 0}_{-0.040}$ | 10.2 |
| 14C□A11 | 130 | 120 | $160^{\ 0}_{-0.040}$ | $35^{+0.4}_{\ 0}$ | $130^{\ 0}_{-0.040}$ | 14.2 |

## Flange Specification 4



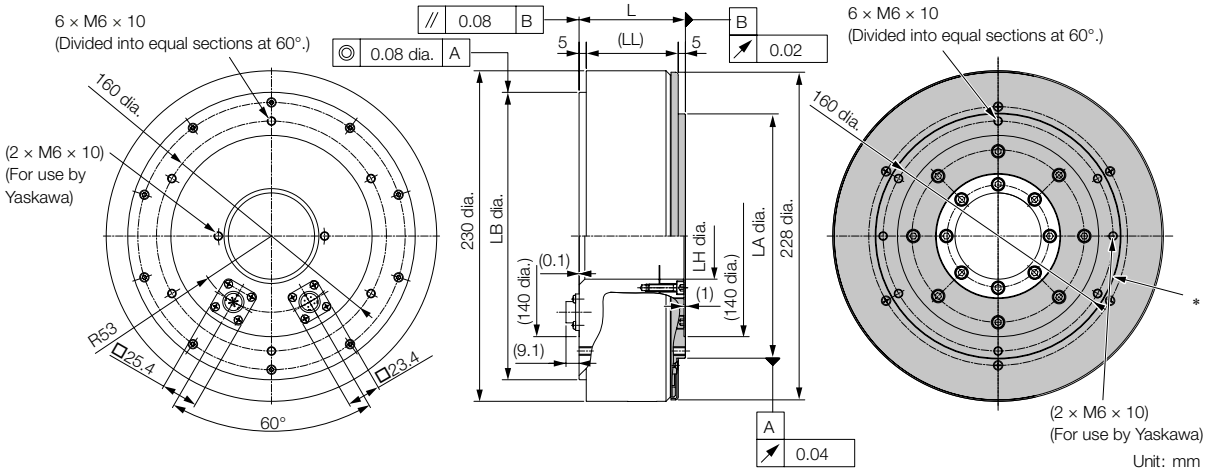

* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 04C□A41 | 69 | 59 | $160^{\ 0}_{-0.040}$ | $35^{+0.4}_{\ 0}$ | $130^{\ 0}_{-0.040}$ | 7.2 |
| 10C□A41 | 90 | 80 | $160^{\ 0}_{-0.040}$ | $35^{+0.4}_{\ 0}$ | $130^{\ 0}_{-0.040}$ | 10.2 |
| 14C□A41 | 130 | 120 | $160^{\ 0}_{-0.040}$ | $35^{+0.4}_{\ 0}$ | $130^{\ 0}_{-0.040}$ | 14.2 |

Refer to the Connector Specifications section for information on connectors.

# SGM7E-□□D

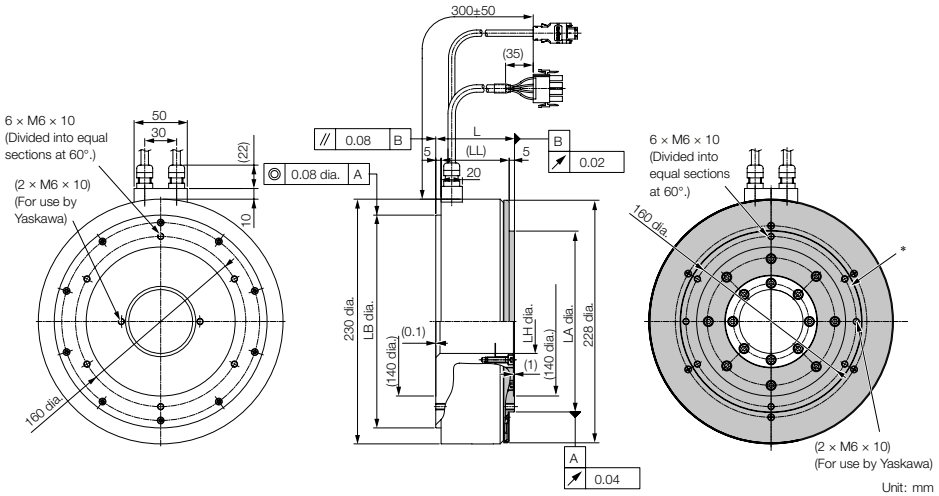
## Flange Specification 1




* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 08D□A11 | 74 | 64 | 200 $^{0}_{-0.046}$ | 60 $^{+0.4}_{0}$ | 170 $^{0}_{-0.040}$ | 14 |
| 17D□A11 | 110 | 100 | 200 $^{0}_{-0.046}$ | 60 $^{+0.4}_{0}$ | 170 $^{0}_{-0.040}$ | 22 |
| 25D□A11 | 160 | 150 | 200 $^{0}_{-0.046}$ | 60 $^{+0.4}_{0}$ | 170 $^{0}_{-0.040}$ | 29.7 |

## Flange Specification 4



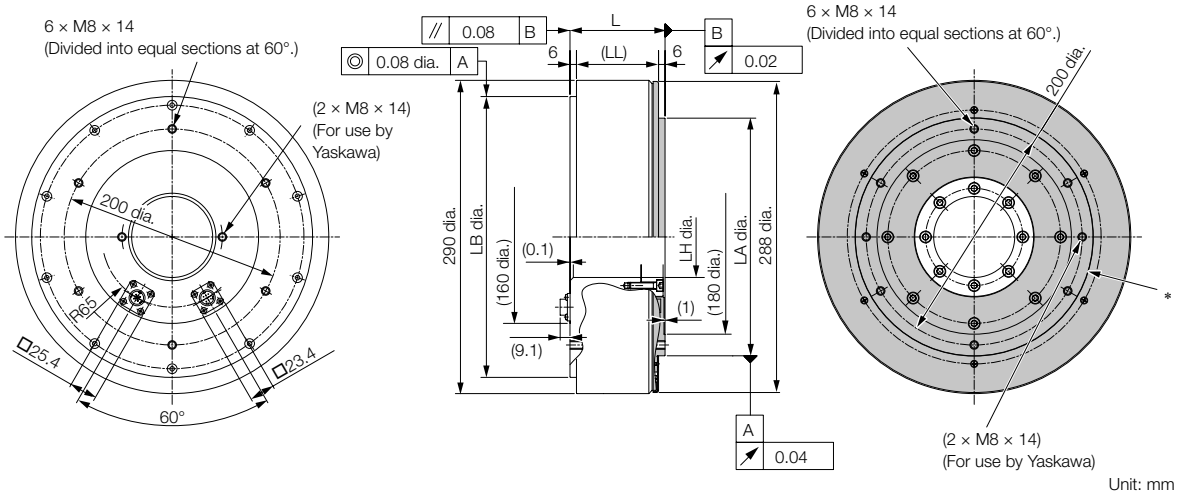

* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 08D□A41 | 74 | 64 | 200 $^{0}_{-0.046}$ | 60 $^{+0.4}_{0}$ | 170 $^{0}_{-0.040}$ | 14 |
| 17D□A41 | 110 | 100 | 200 $^{0}_{-0.046}$ | 60 $^{+0.4}_{0}$ | 170 $^{0}_{-0.040}$ | 22 |
| 25D□A41 | 160 | 150 | 200 $^{0}_{-0.046}$ | 60 $^{+0.4}_{0}$ | 170 $^{0}_{-0.040}$ | 29.7 |

Refer to the Connector Specifications section for information on connectors.

# SGM7E-□□E

## Flange Specification 1

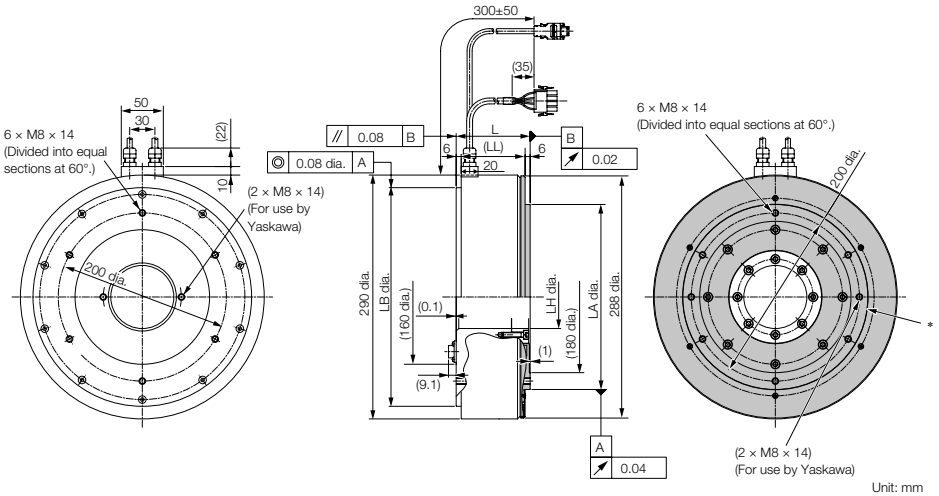



Unit: mm

* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16E□A11 | 88 | 76 | $260^{\ 0}_{-0.052}$ | $75^{+0.4}_{\ 0}$ | $220^{\ 0}_{-0.046}$ | 26 |
| 35E□A11 | 112 | 100 | $260^{\ 0}_{-0.052}$ | $75^{+0.4}_{\ 0}$ | $220^{\ 0}_{-0.046}$ | 34 |

## Flange Specification 4




Unit: mm

* The shaded section indicates the rotating parts.
Note: Values in parentheses are reference dimensions.

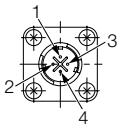
| Model SGM7E- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16E□A41 | 88 | 76 | $260^{\ 0}_{-0.052}$ | $75^{+0.4}_{\ 0}$ | $220^{\ 0}_{-0.046}$ | 26 |
| 35E□A41 | 112 | 100 | $260^{\ 0}_{-0.052}$ | $75^{+0.4}_{\ 0}$ | $220^{\ 0}_{-0.046}$ | 34 |

Refer to the Connector Specifications section for information on connectors.

# Connector Specifications SGM7E

## Flange Specification 1

### Servomotor Connector

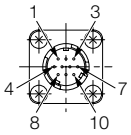



| | |
|---|---|
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | FG (frame ground) |

Model: JN1AS04MK2R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating Connector: JN1DS04FK1
(Not provided by YASKAWA)

### Encoder Connector



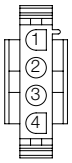

| | |
|---|---|
| 1 | PS |
| 2 | /PS |
| 3 | – |
| 4 | PG5V |
| 5* | BAT0 |
| 6 | – |
| 7 | FG (frame ground) |
| 8* | BAT |
| 9 | PG0V |
| 10 | – |

* Only absolute-value models with multiturn data.
Model: JN1AS10ML1-R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating connector: JN1DS10SL1
(Not provided by YASKAWA)

## Flange Specification 4

### Servomotor Connector



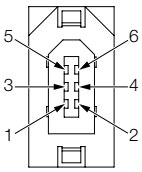

| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG (frame ground) | Green (yellow) |

Models
- Plug: 350779-1
- Pins: 350561-3 or 350690-3 (No.1 to 3)
- Ground pin: 350654-1 or 350669-1 (No. 4)

Manufacturer: Tyco Electronics Japan G.K.

Mating Connector
- Cap: 350780-1
- Socket: 350570-3 or 350689-3

### Encoder Connector




| | |
|---|---|
| 1 | PG5V |
| 2 | PG0V |
| 3* | BAT |
| 4* | BAT0 |
| 5 | PS |
| 6 | /PS |
| Connector Case | FG (frame ground) |

* Only absolute-value models with multiturn data.
Model: 55102-0600
Manufacturer: Molex Japan LLC

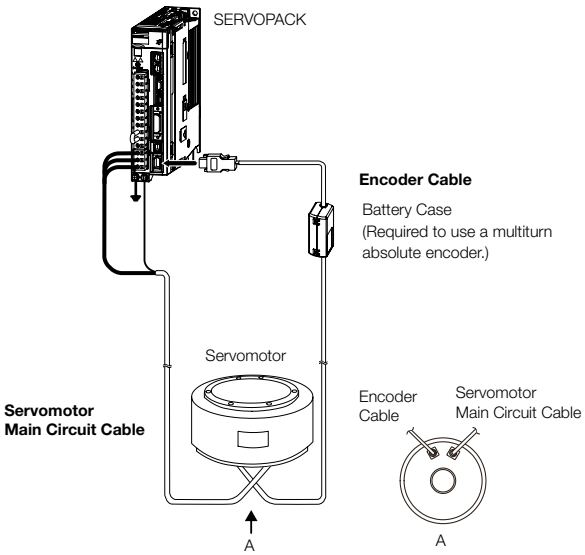
Mating Connector: 54280-0609

# Selecting Cables SGM7E

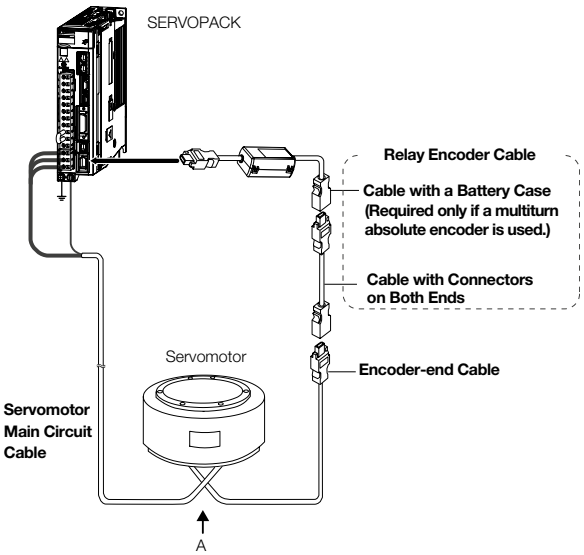
### Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

#### Encoder Cable of 20 m or less

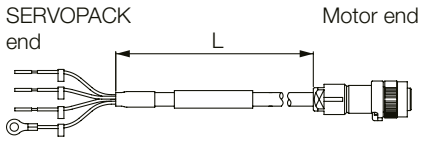
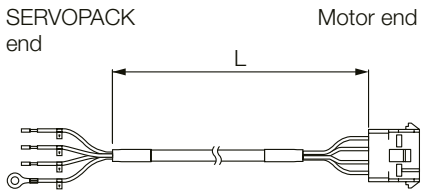



#### Encoder Cable of 30 m to 50 m (Relay Cable)




Note:
1. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
2. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials: Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

# Servomotor Main Circuit Cables

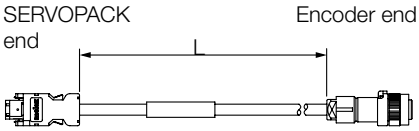
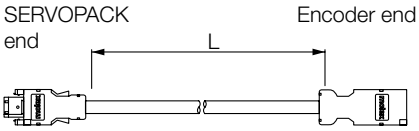
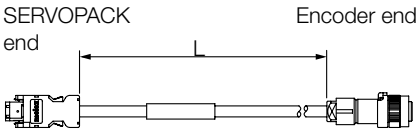
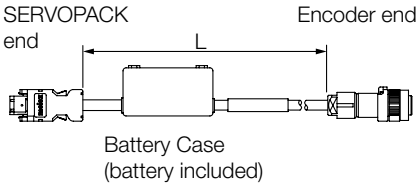
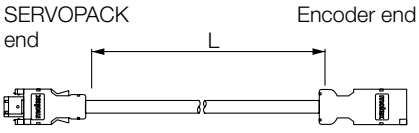
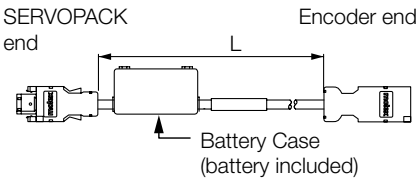
| Servomotor Model | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable*1 | |
| SGM7E-□□□□<br>Flange specification: 1 *2<br>Non-load side installation | 3 m | JZSP-CMM60-03-E | JZSP-C7MDN23-03-E |  |
| | 5 m | JZSP-CMM60-05-E | JZSP-C7MDN23-05-E | |
| | 10 m | JZSP-CMM60-10-E | JZSP-C7MDN23-10-E | |
| | 15 m | JZSP-CMM60-15-E | JZSP-C7MDN23-15-E | |
| | 20 m | JZSP-CMM60-20-E | JZSP-C7MDN23-20-E | |
| SGM7E-□□□□<br>Flange specification: 4 *2<br>Non-load side installation<br>(with cable on side) | 3 m | JZSP-CMM00-03-E | JZSP-C7MDS23-03-E |  |
| | 5 m | JZSP-CMM00-05-E | JZSP-C7MDS23-05-E | |
| | 10 m | JZSP-CMM00-10-E | JZSP-C7MDS23-10-E | |
| | 15 m | JZSP-CMM00-15-E | JZSP-C7MDS23-15-E | |
| | 20 m | JZSP-CMM00-20-E | JZSP-C7MDS23-20-E | |





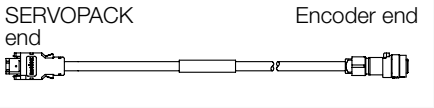
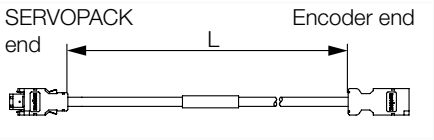
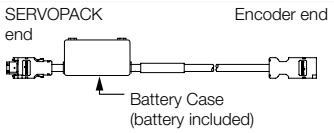
*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. Refer to the Model Designations for the flange specifications.
Note: Direct Drive Servomotors are not available with holding brakes.

## Encoder Cables of 20 m or less

| Servomotor Model | Description | Length | Order Number | | Appearance |
|---|---|---|---|---|---|
| | | | Standard Cable | Flexible Cable*1 | |
| SGM7E-□□□F Flange specification: 1*2 | For incremental encoder | 3 m | JZSP-CMP60-03-E | JZSP-CSP60-03-E |  |
| | | 5 m | JZSP-CMP60-05-E | JZSP-CSP60-05-E | |
| | | 10 m | JZSP-CMP60-10-E | JZSP-CSP60-10-E | |
| | | 15 m | JZSP-CMP60-15-E | JZSP-CSP60-15-E | |
| | | 20 m | JZSP-CMP60-20-E | JZSP-CSP60-20-E | |
| SGM7E-□□□F Flange specification: 4*2 | | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| SGM7E-□□□7 Flange specification: 1*2 | For multiturn absolute encoder (without Battery Case*3) | 3 m | JZSP-C7PI00-03-E | JZSP-C7PI20-03-E |  |
| | | 5 m | JZSP-C7PI00-05-E | JZSP-C7PI20-05-E | |
| | | 10 m | JZSP-C7PI00-10-E | JZSP-C7PI20-10-E | |
| | | 15 m | JZSP-C7PI00-15-E | JZSP-C7PI20-15-E | |
| | | 20 m | JZSP-C7PI00-20-E | JZSP-C7PI20-20-E | |
| | For multiturn absolute encoder (with Battery Case) | 3 m | JZSP-C7PA00-03-E | JZSP-C7PA20-03-E |  |
| | | 5 m | JZSP-C7PA00-05-E | JZSP-C7PA20-05-E | |
| | | 10 m | JZSP-C7PA00-10-E | JZSP-C7PA20-10-E | |
| | | 15 m | JZSP-C7PA00-15-E | JZSP-C7PA20-15-E | |
| | | 20 m | JZSP-C7PA00-20-E | JZSP-C7PA20-20-E | |
| SGM7E-□□□7 Flange specification: 4*2 | For multiturn absolute encoder (without Battery Case*3) | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| | For multiturn absolute encoder (with Battery Case) | 3 m | JZSP-CSP19-03-E | JZSP-CSP29-03-E |  |
| | | 5 m | JZSP-CSP19-05-E | JZSP-CSP29-05-E | |
| | | 10 m | JZSP-CSP19-10-E | JZSP-CSP29-10-E | |
| | | 15 m | JZSP-CSP19-15-E | JZSP-CSP29-15-E | |
| | | 20 m | JZSP-CSP19-20-E | JZSP-CSP29-20-E | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 68 mm or larger.
*2. Refer to the Model Designations for the flange specifications.
*3. Use one of these Cables if a battery is connected to the host controller.

## Relay Encoder Cables of 30 m to 50 m

| Servomotor Model | Description | Length | Order Number*1 | Appearance |
|---|---|---|---|---|
| SGM7E-□□□F<br>SGM7E-□□□7<br>Flange specification: 1*2 | Encoder-end Cable (for single-turn/ multiturn absolute encoder) | 0.3 m | JZSP-C7PRC0-E |  |
| SGM7E-□□□F<br>SGM7E-□□□7<br>Flange specification: 1 or 4*2 | Cables with Connectors on Both Ends (for single-turn/multiturn absolute encoder) | 30 m | JZSP-UCMP00-30-E |  |
| | | 40 m | JZSP-UCMP00-40-E | |
| | | 50 m | JZSP-UCMP00-50-E | |
| SGM7E-□□□7<br>Flange specification: 1 or 4*2 | Cable with a Battery Case (for multiturn absolute encoder)*3 | 0.3 m | ZSP-CSP12-E |  |

*1. Flexible Cables are not available.
*2. Refer to the Model Designations for the flange specifications.
*3. Use one of these Cables if a battery is connected to the host controller.

# SGM7F (Inner Rotor, with Core)

## Model Designations

SGM7F - 02 A 7 A 1 1

| Direct Drive Servomotors | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit |
|---|---|---|---|---|---|---|

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| **Small Capacity** | |
| 02 | 2 Nm |
| 04 | 4 Nm |
| 05 | 5 Nm |
| 07 | 7 Nm |
| 08 | 8 Nm |
| 10 | 10 Nm |
| 14 | 14 Nm |
| 16 | 16 Nm |
| 17 | 17 Nm |
| 25 | 25 Nm |
| 35 | 35 Nm |
| **Medium Capacity** | |
| 45 | 45 Nm |
| 80 | 80 Nm |
| 1A | 110 Nm |
| 1E | 150 Nm |
| 2Z | 200 Nm |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| A | 100 mm dia. |
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |
| M | 280 mm dia. |
| N | 360 mm dia. |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 7* | 24-bit multiturn absolute encoder |
| F* | 24-bit incremental encoder |

* Both multiturn absolute encoder and incremental encoder can be used as a single-turn absolute encoder by setting parameters.

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Version |

**6th digit - Flange**

| Code | Mounting | Servomotor Outer Diameter Code (3rd digit) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | M | N |
| 1 | Non-load side | ✓ | ✓ | ✓ | ✓ | — | — |
| | Load side | — | — | — | — | ✓ | ✓ |
| 3 | Non-load side | — | — | — | — | ✓ | ✓ |
| 4 | Non-load side (with cable on side) | ✓ | ✓ | ✓ | ✓ | — | — |

✓ : Applicable models

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without Options |
| 2 | High machine precision (runout at end of shaft and runout of shaft surface: 0.01 mm) |

Note:
1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## Manufactured Models

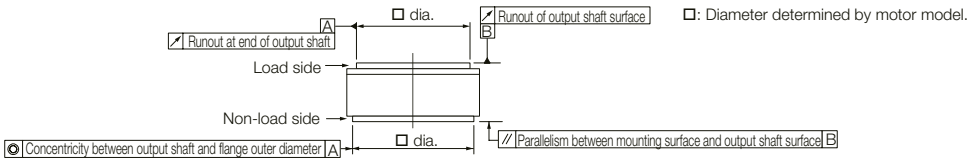
| Rated Torque [Nm] | Servomotor Outer Diameter | | | | | |
|---|---|---|---|---|---|---|
| | A (100 mm dia.) | B (135 mm dia.) | C (175 mm dia.) | D (230 mm dia.) | M (280 mm dia.) | N (360 mm dia.) |
| 2 | SGM7F-02A | — | — | — | — | — |
| 4 | — | SGM7F-04B | — | — | — | — |
| 5 | SGM7F-05A | — | — | — | — | — |
| 7 | SGM7F-07A | — | — | — | — | — |
| 8 | — | — | SGM7F-08C | — | — | — |
| 10 | — | SGM7F-10B | — | — | — | — |
| 14 | — | SGM7F-14B | — | — | — | — |
| 16 | — | — | — | SGM7F-16D | — | — |
| 17 | — | — | SGM7F-17C | — | — | — |
| 25 | — | — | SGM7F-25C | — | — | — |
| 35 | — | — | — | SGM7F-35D | — | — |
| 45 | — | — | — | — | SGM7F-45M | — |
| 80 | — | — | — | — | SGM7F-80M | SGM7F-80N |
| 110 | — | — | — | — | SGM7F-1AM | — |
| 150 | — | — | — | — | — | SGM7F-1EN |
| 200 | — | — | — | — | — | SGM7F-2ZN |

Note: The above table shows combinations of the rated torque and outer diameter. The fourth through seventh digits have been omitted.

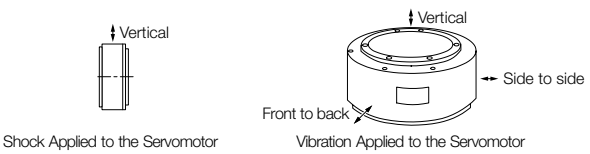
# Small Capacity
## Specifications

| Model SGM7F- | | | 02A | 05A | 07A | 04B | 10B | 14B | 08C | 17C | 25C | 16D | 35D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time Rating | | | Continuous | | | | | | | | | | |
| Thermal Class | | | A | | | | | | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MΩ min. | | | | | | | | | | |
| Withstand Voltage | | | 1,500 VAC for 1 minute | | | | | | | | | | |
| Excitation | | | Permanent magnet | | | | | | | | | | |
| Mounting | | | Flange-mounted | | | | | | | | | | |
| Drive Method | | | Direct drive | | | | | | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | | | | | | |
| Vibration Class*1 | | | V15 | | | | | | | | | | |
| Absolute Accuracy | | | ±15 s | | | | | | | | | | |
| Repeatability | | | ±1.3 s | | | | | | | | | | |
| Protective Structure*2 | | | Totally enclosed, self-cooled, IP42 (The protective structure is IP40 for CE marking) | | | | | | | | | | |
| Environmental Conditions | Ambient Air Temperature | | 0°C to 40°C (without freezing) | | | | | | | | | | |
| | Ambient Air Humidity | | 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| | Installation Site | | · Must be indoors and free of corrosive and explosive gases.<br>· Must be well-ventilated and free of dust and moisture.<br>· Must facilitate inspection and cleaning.<br>· Must have an altitude of 1,000 m or less.<br>· Must be free of strong magnetic fields. | | | | | | | | | | |
| | Storage Environment | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| 0Mechanical Tolerances*3 | Runout of Output Shaft Surface | mm | 0.02 (0.01 for high machine precision option) | | | | | | | | | | |
| | Runout at End of Output Shaft | mm | 0.04 (0.01 for high machine precision option) | | | | | | | | | | |
| | Parallelism between Mounting Surface and Output Shaft Surface | mm | 0.07 | | | | | | | | | | |
| | Concentricity between Output Shaft and Flange Outer Diameter | mm | 0.07 | | | | | | | | | | |
| Shock Resistance*4 | Impact Acceleration Rate at Flange | | 490 m/s$^2$ | | | | | | | | | | |
| | Number of Impacts | | 2 times | | | | | | | | | | |
| Vibration Resistance*4 | Vibration Acceleration Rate of Flange | | 49 m/s$^2$ | | | | | | | | | | |
| Applicable SERVOPACKs | | SGD7S- | 2R8A, 2R1F | | 2R8A, 2R8F | | | 5R5A | 2R8A, 2R8F | 5R5A | 7R6A | 5R5A | 7R6A*5, 120A |
| | | SGD7W-<br>SGD7C- | 2R8A | | | | | 5R5A | 2R8A | 5R5A | 7R6A | 5R5A | 7R6A*5 |

*1. A vibration class of V15 indicates a vibration amplitude of 15 mm maximum on the Servomotor without a load at the rated motor speed.
*2. The hollow hole section, motor mounting surface, output shaft surface, and gap around the rotating part of the shaft are excluded. Protective structure specifications apply only when the special cable is used.
*3. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.




*4. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures. The strength of the vibration that the Servomotor can withstand depends on the application. Check the vibration acceleration rate.



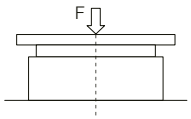

*5. Use derated values for this combination. Refer to the Ratings section for information on derating values.

## Ratings

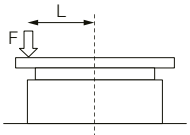
| Model SGM7F- | | | 02A | 05A | 07A | 04B | 10B | 14B | 08C | 17C | 25C | 16D | 35D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated Output*1 | | W | 63 | 157 | 220 | 126 | 314 | 440 | 251 | 534 | 785 | 503 | 1,100 (1,000*5) |
| Rated Torque *1,*2 | | Nm | 2 | 5 | 7 | 4 | 10 | 14 | 8 | 17 | 25 | 16 | 35 |
| Instantaneous Maximum Torque*1 | | Nm | 6 | 15 | 21 | 12 | 30 | 42 | 24 | 51 | 75 | 48 | 105 |
| Stall Torque*1 | | Nm | 2 | 5 | 7 | 4 | 10 | 14 | 8 | 17 | 25 | 16 | 35 |
| Rated Current*1 | | A | 1.7 | 1.8 | 2.1 | 2 | 2.8 | 4.6 | 2.4 | 4.5 | | 5.0 | |
| Instantaneous Maximum Current*1 | | A | 5.1 | 5.4 | 6.3 | 6.4 | 8.9 | 14.1 | 8.6 | 14.7 | 13.9 | 16.9 | 16 |
| Rated Motor Speed*1 | | min$^{-1}$ | 300 | | | | | | | | | | 300 (270*5) |
| Maximum Motor Speed*1 | | min$^{-1}$ | 600 | | | | | | | | 500 | 600 | 400 |
| Torque Constant | | Nm/A | 1.28 | 3.01 | 3.64 | 2.21 | 3.81 | 3.27 | 3.52 | 4.04 | 6.04 | 3.35 | 7.33 |
| Motor Moment of Inertia | | ×10$^{-4}$ kg·m$^2$ | 8.04 | 14.5 | 19.3 | 16.2 | 25.2 | 36.9 | 56.5 | 78.5 | 111 | 178 | 276 |
| Rated Power Rate*1 | | kW/s | 4.98 | 17.2 | 25.4 | 9.88 | 39.7 | 53.1 | 11.3 | 36.8 | 56.3 | 14.4 | 44.4 |
| Rated Angular Acceleration Rate*1 | | rad/s$^2$ | 2,490 | 3,450 | 3,630 | 2,470 | 3,970 | 3,790 | 1,420 | 2,170 | 2,250 | 899 | 1,270 |
| Heat Sink Size | | mm | 300 x 300 x12 | | | 350 x 350 x12 | | | 450 x 450 x12 | | | 550 x 550 x 12 | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | times | 25 | 35 | | 25 | 40 | 45 | 15 | 25 | | 10 | 15 |
| | With External Regenerative Resistor and External Dynamic Brake Resistor *3 | times | 25 | 35 | | 25 | 40 | 45 | 15 | 25 | | 10 | 15 |
| Allowable Load*4 | Allowable Thrust Load | N | 22 | 24 | 26 | | 1,500 | | | 3,300 | | 4,000 | |
| | Allowable Moment Load | Nm | | 1,100 | | 45 | 55 | 65 | 92 | 98 | 110 | 210 | 225 |

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with a steel heat sink of the dimensions given in the table.
*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

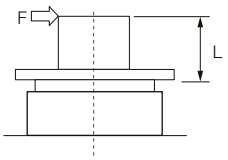
*4. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns. Design the machine so that the thrust loads or moment loads will not exceed the values given in the table.
*5. If you use an SGD7S-7R6A SERVOPACK and SGM7F-35D Servomotor together, use this value (a derated value).




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L



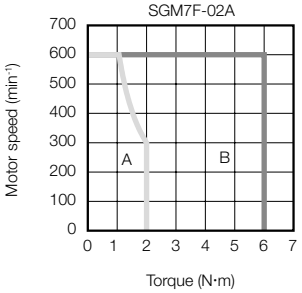

Where F is the external force,
Thrust load = Load mass
Moment load = F × L

Note:
For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

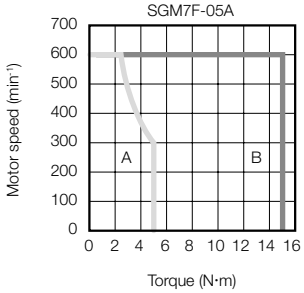
# Torque-Motor Speed Characteristics

A : Continuous duty zone ——— (solid lines): With three-phase 200-V or single-phase 230-V input
B : Intermittent duty zone - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input

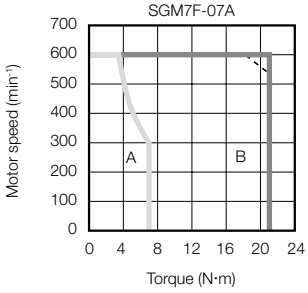
SGM7F-02A



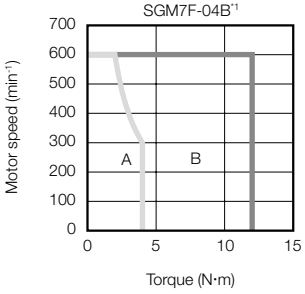

SGM7F-05A



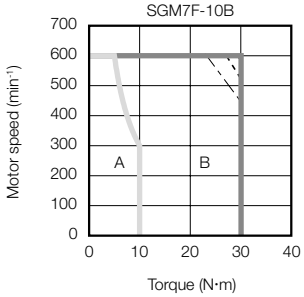

SGM7F-07A



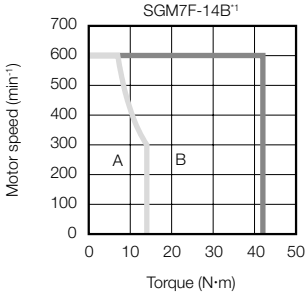

SGM7F-04B*1



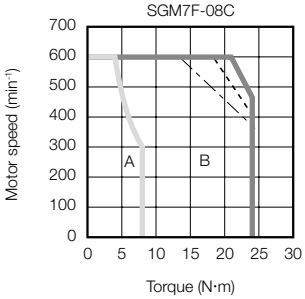

SGM7F-10B



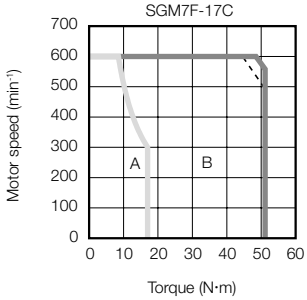

SGM7F-14B*1



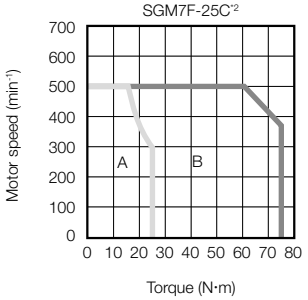

SGM7F-08C



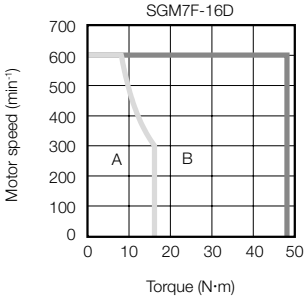

SGM7F-17C



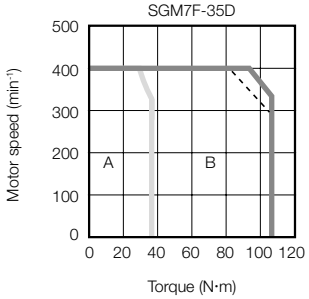

SGM7F-25C*2




SGM7F-16D




SGM7F-35D



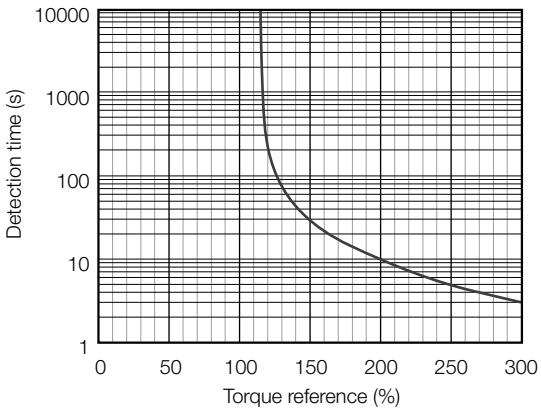

*1. The characteristics are the same for three-phase 200 V, single-phase 200 V, and single-phase 100 V.
*2. Contact your YASKAWA representative for information on the SGM7F-25C.

Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

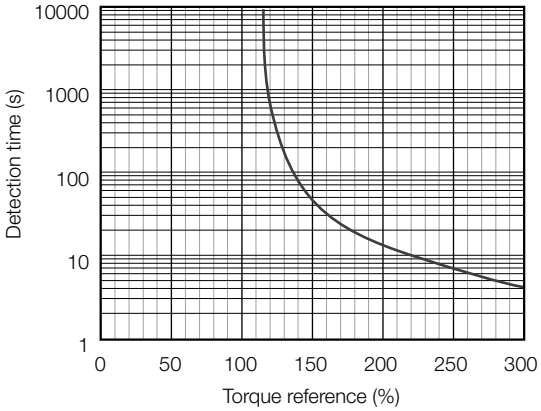
# Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions witg a Servomotor surrounding air temperature of 40ºC.

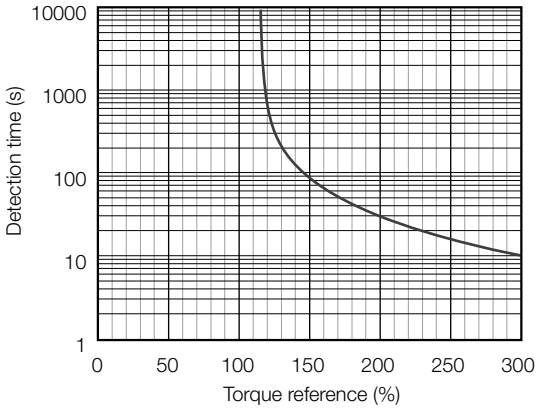
SGM7F-□□A, -□□B



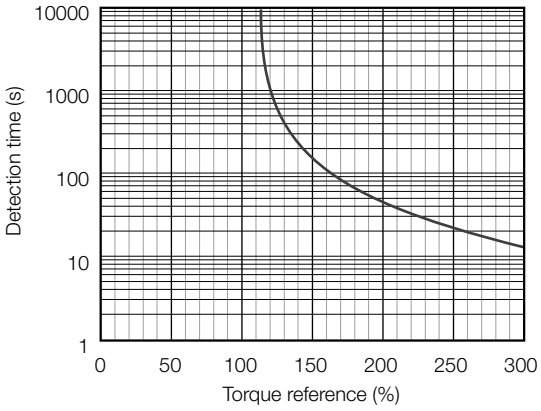

SGM7F-08C



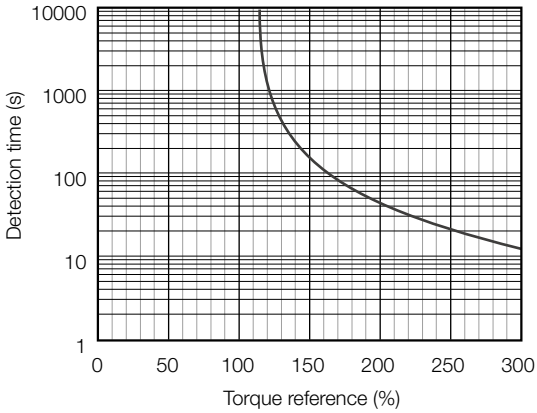

SGM7F-17C and -25C




SGM7F-16D




SGM7F-35D




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Ratings. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.
Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions.
Contact your YASKAWA representative for information on this program.

## Exceeding the allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

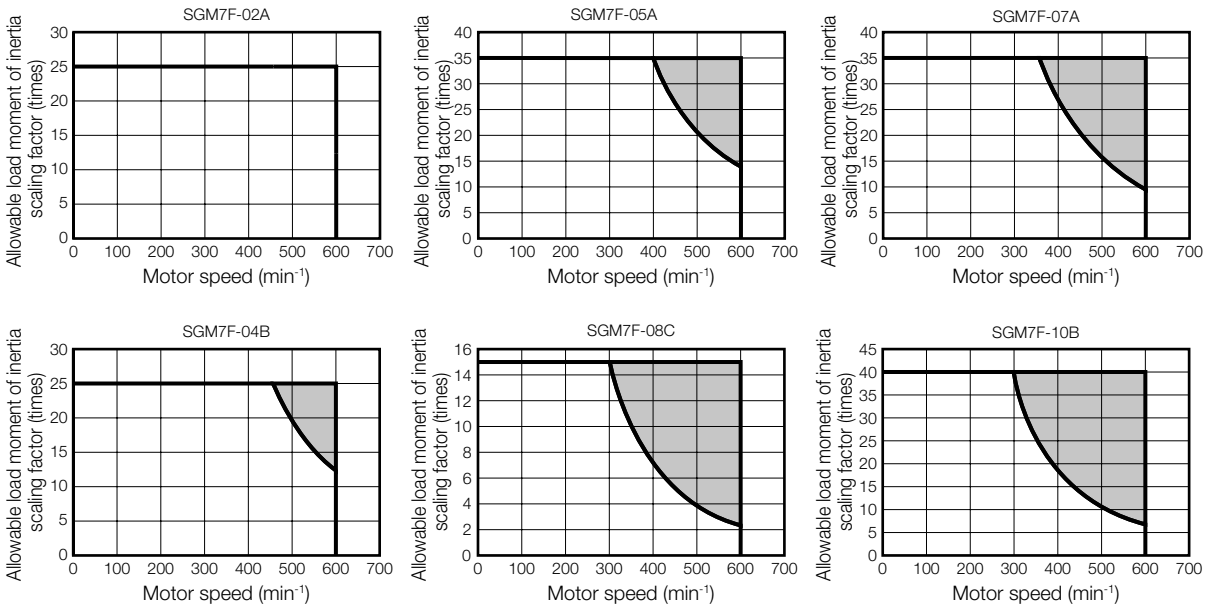
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to "Built-In Regenerative Resistor" for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

## SERVOPACKs without built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.




Note: Applicable SERVOPACK models: SGD7S-2R8A and -2R8F

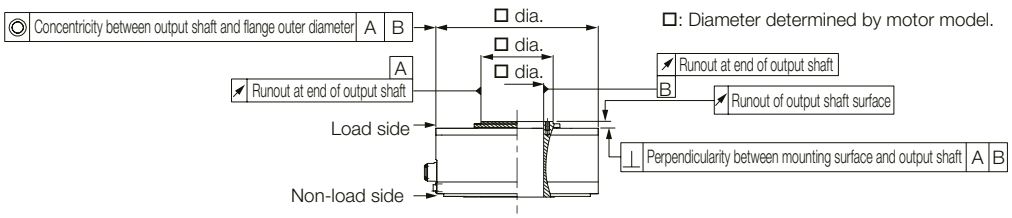
## When an External Regenerative Resistor Is Required

Install the External Regenerative Resistor. Refer to the External Regenerative Resistors section for the recommended products.

# Medium Capacity
## Specifications

| Model SGM7F- | | | 45M | 80M | 1AM | 80N | 1EN | 2ZN |
|---|---|---|---|---|---|---|---|---|
| Time Rating | | | Continuous | | | | | |
| Thermal Class | | | F | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MΩ min. | | | | | |
| Withstand Voltage | | | 1,500 VAC for 1 minute | | | | | |
| Excitation | | | Permanent magnet | | | | | |
| Mounting | | | Flange-mounted | | | | | |
| Drive Method | | | Direct drive | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | |
| Vibration Class*1 | | | V15 | | | | | |
| Absolute Accuracy | | | ±15 s | | | | | |
| Repeatability | | | ±1.3 s | | | | | |
| Protective Structure*2 | | | Totally enclosed, self-cooled, IP44 | | | | | |
| Environmental Conditions | Ambient Air Temperature | | 0°C to 40°C (without freezing) | | | | | |
| | Ambient Air Humidity | | 20% to 80% relative humidity (without condensation) | | | | | |
| | Installation Site | | · Must be indoors and free of corrosive and explosive gases.<br>· Must be well-ventilated and free of dust and moisture.<br>· Must facilitate inspection and cleaning.<br>· Must have an altitude of 1,000 m or less.<br>· Must be free of strong magnetic fields. | | | | | |
| | Storage Environment | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing<br>Storage Humidity: 20 % to 80 % relative humidity (without condensation) | | | | | |
| Mechanical Tolerances*3 | Runout of Output Shaft Surface | mm | 0.02 (0.01 for high machine precision option) | | | | | |
| | Runout at End of Output Shaft | mm | 0.04 (0.01 for high machine precision option) | | | | | |
| | Parallelism between Mounting Surface and Output Shaft Surface | mm | – | | | | | |
| | Concentricity between Output Shaft and Flange Outer Diameter | mm | 0.08 | | | | | |
| | Perpendicularity between Mounting Surface and Output Shaft | mm | 0.08 | | | | | |
| Shock Resistance*4 | Impact Acceleration Rate at Flange | | 490 m/s$^2$ | | | | | |
| | Number of Impacts | | 2 times | | | | | |
| Vibration Resistance*4 | Vibration Acceleration Rate of Flange | | 24.5 m/s$^2$ | | | | | |
| Applicable SERVOPACKs | | SGD7S- | 7R6A | 120A | 180A | 120A | 200A | |
| | | SGD7W-, SGD7C- | 7R6A | – | | | | |

*1. A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*3. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.

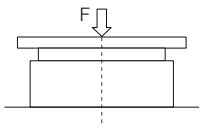



*4. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures.
The strength of the vibration that the Servomotor can withstand depends on the application. Check the vibration acceleration rate.

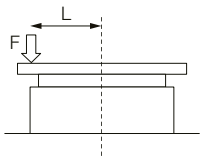
## Ratings

| Model SGM7F- | | | 45M | 80M | 1AM | 80N | 1EN | 2ZN |
|---|---|---|---|---|---|---|---|---|
| Rated Output*1 | | W | 707 | 1,260 | 1,730 | 1,260 | 2,360 | 3,140 |
| Rated Torque *1,*2 | | Nm | 45 | 80 | 110 | 80 | 150 | 200 |
| Instantaneous Maximum Torque*1 | | Nm | 135 | 240 | 330 | 240 | 450 | 600 |
| Stall Torque*1 | | Nm | 45 | 80 | 110 | 80 | 150 | 200 |
| Rated Current*1 | | A | 5.8 | 9.7 | 13.4 | 9.4 | 17.4 | 18.9 |
| Instantaneous Maximum Current*1 | | A | 17 | 28 | 42 | 28 | 56 | |
| Rated Motor Speed*1 | | $min^{-1}$ | 150 | | | | | |
| Maximum Motor Speed*1 | | $min^{-1}$ | 300 | | | | 250 | |
| Torque Constant | | Nm/A | 8.39 | 8.91 | 8.45 | 9.08 | 9.05 | 11.5 |
| Motor Moment of Inertia | | $\times 10^{-4}$ kg·$m^2$ | 388 | 627 | 865 | 1,360 | 2,470 | 3,060 |
| Rated Power Rate*1 | | kW/s | 52.2 | 102 | 140 | 47.1 | 91.1 | 131 |
| Rated Angular Acceleration Rate*1 | | rad/$s^2$ | 1,160 | 1,280 | 1,270 | 588 | 607 | 654 |
| Heat Sink Size | | mm | 750 x 750 x 45 | | | | | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | times | 3 | | | | | |
| | With External Regenerative Resistor and External Dynamic Brake Resistor | times | 3 | | | | | |
| Allowable Load*3 | A | mm | 33 | | | 37.5 | | |
| | Allowable Thrust Load | N | 9,000 | | | 16,000 | | |
| | Allowable Moment Load | Nm | 180 | | | 350 | | |

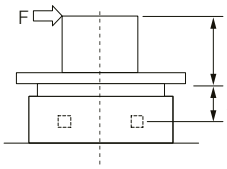
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with a steel heat sink of the dimensions given in the table.
*3. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns. Design the machine so that the thrust loads or moment loads will not exceed the values given in the table.




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L



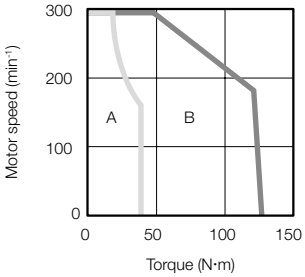

Where F is the external force,
Thrust load = Load mass
Moment load = F × (L + A)

Note:
For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

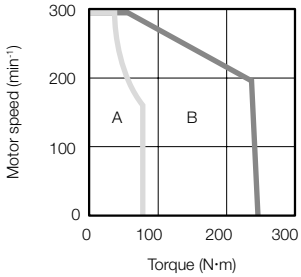
# Torque-Motor Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone

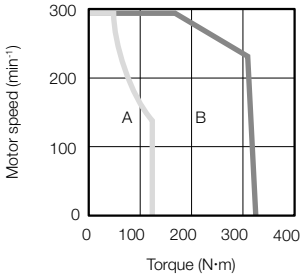
SGM7F-45M



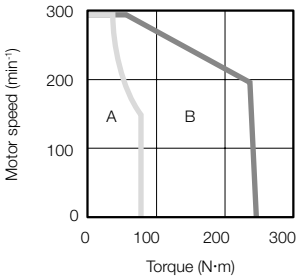

SGM7F-80M



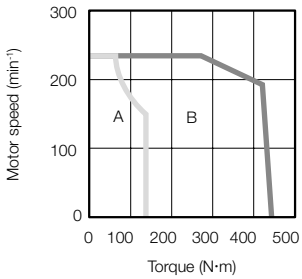

SGM7F-1AM



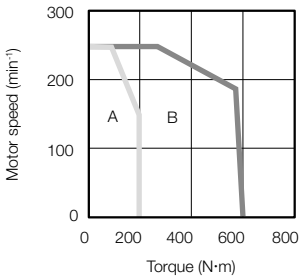

SGM7F-80N




SGM7F-1EN




SGM7F-2ZN

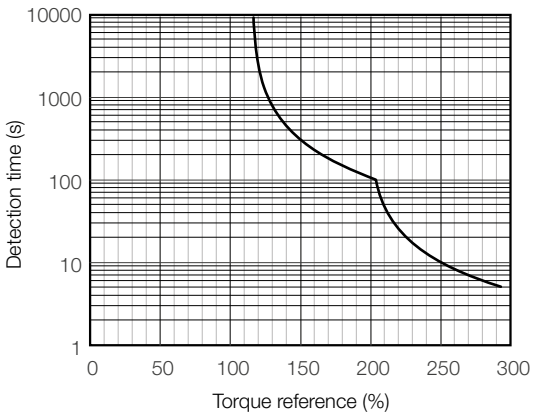



Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C.
2. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
3. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

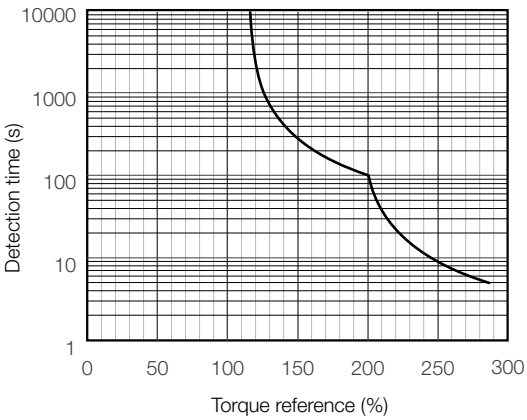
# Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions witg a Servomotor surrounding air temperature of 40ºC.

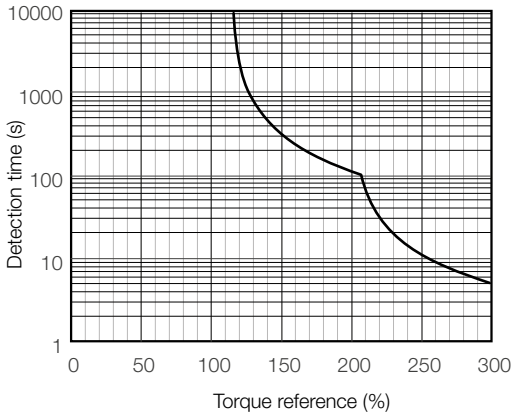
SGM7F-45M



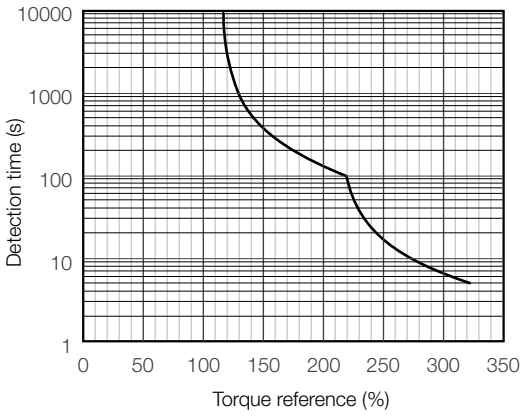

SGM7F-80M



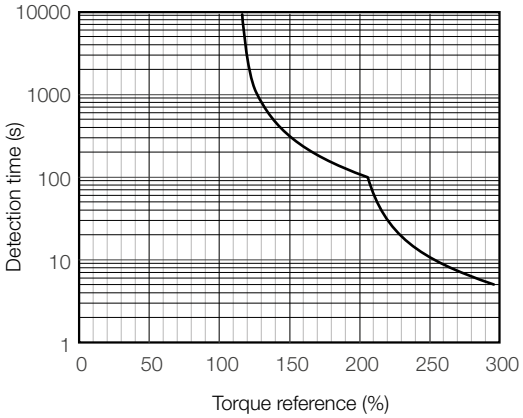

SGM7F-1AM and -80N




SGM7F-1EN




SGM7F-2ZN




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Ratings. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.
Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions.
Contact your YASKAWA representative for information on this program.

## Exceeding the allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to “Built-In Regenerative Resistor” for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

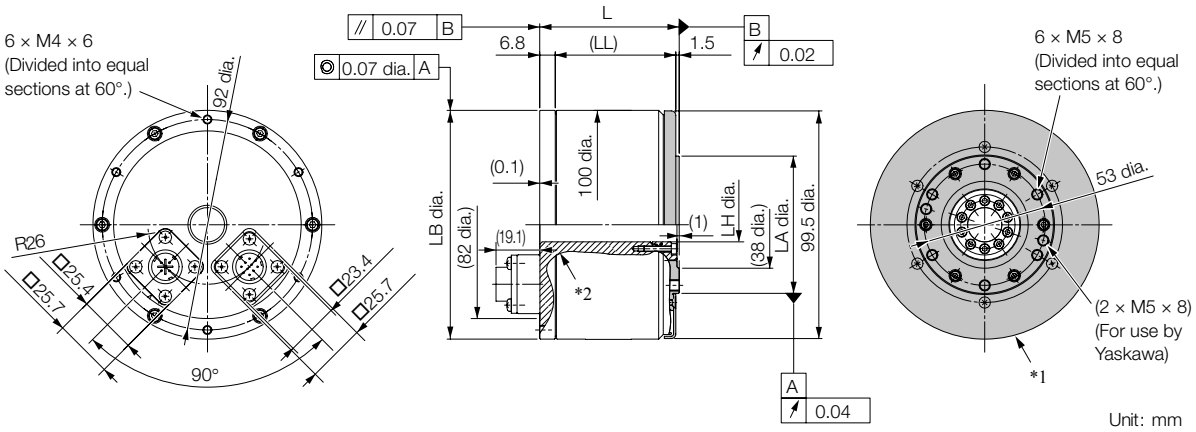
## When an external Regenerative Resistor is required

Install the External Regenerative Resistor. Refer to the External Regenerative Resistors section for the recommended products.

# External Dimensions

## SGM7F-□□A

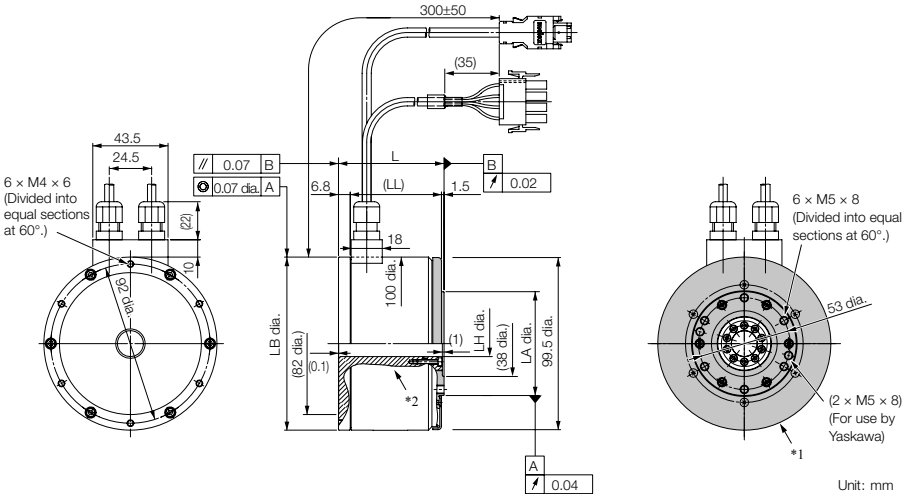
### Flange Specification 1




*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 02A□A11 | 61 | (52.7) | $100^{\ 0}_{-0.035}$ | $15^{+0.4}_{\ 0}$ | $60^{\ 0}_{-0.035}$ | 2.5 |
| 05A□A11 | 96 | (87.7) | $100^{\ 0}_{-0.035}$ | $15^{+0.4}_{\ 0}$ | $60^{\ 0}_{-0.035}$ | 4.5 |
| 07A□A11 | 122 | (113.7) | $100^{\ 0}_{-0.035}$ | $15^{+0.4}_{\ 0}$ | $60^{\ 0}_{-0.035}$ | 5.5 |

### Flange Specification 4



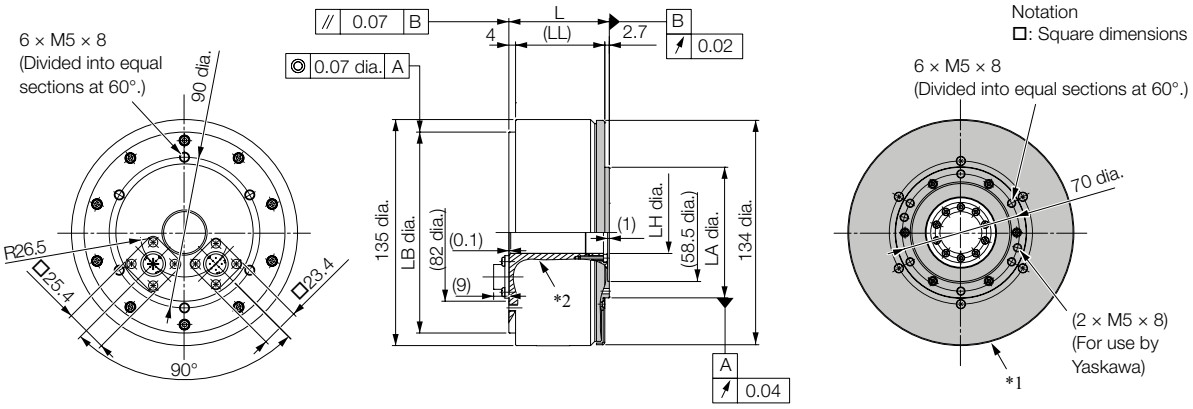

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 02A□A41 | 61 | (52.7) | $100^{\ 0}_{-0.035}$ | $15^{+0.4}_{\ 0}$ | $60^{\ 0}_{-0.035}$ | 2.5 |
| 05A□A41 | 96 | (87.7) | $100^{\ 0}_{-0.035}$ | $15^{+0.4}_{\ 0}$ | $60^{\ 0}_{-0.035}$ | 4.5 |
| 07A□A41 | 122 | (113.7) | $100^{\ 0}_{-0.035}$ | $15^{+0.4}_{\ 0}$ | $60^{\ 0}_{-0.035}$ | 5.5 |

Refer to the Connector Specifications section for information on connectors.

# SGM7F-□□B

## Flange Specification 1

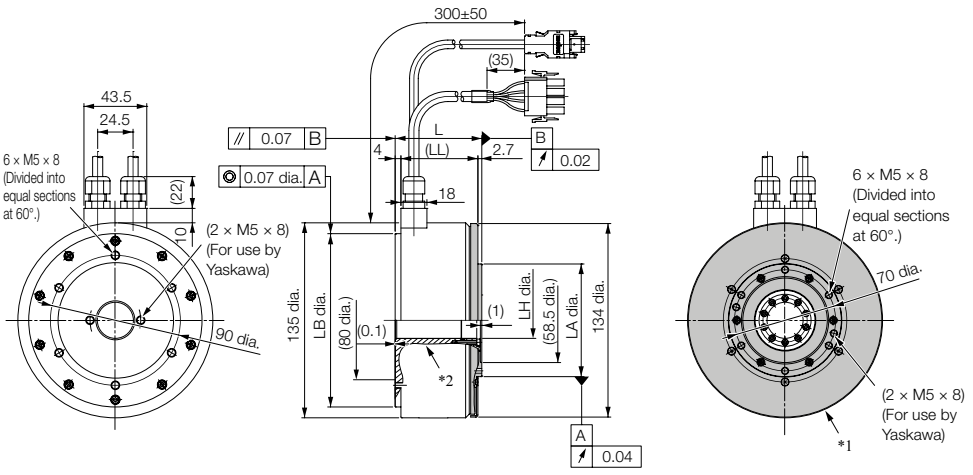



Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 04B□A11 | 60 | 53.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.03}$ | 5 |
| 10B□A11 | 85 | 78.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.03}$ | 6.5 |
| 14B□A11 | 115 | 108.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.03}$ | 9 |

## Flange Specification 4




Unit: mm

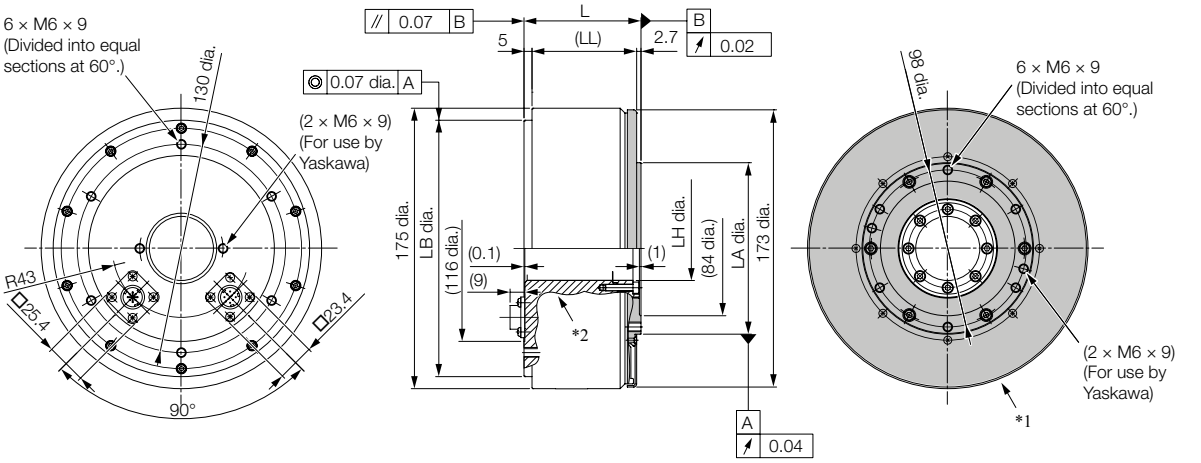
*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 04B□A41 | 60 | 53.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.03}$ | 5 |
| 10B□A41 | 85 | 78.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.03}$ | 6.5 |
| 14B□A41 | 115 | 108.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.03}$ | 9 |

Refer to the Connector Specifications section for information on connectors.

# SGM7F-□□C

## Flange Specification 1

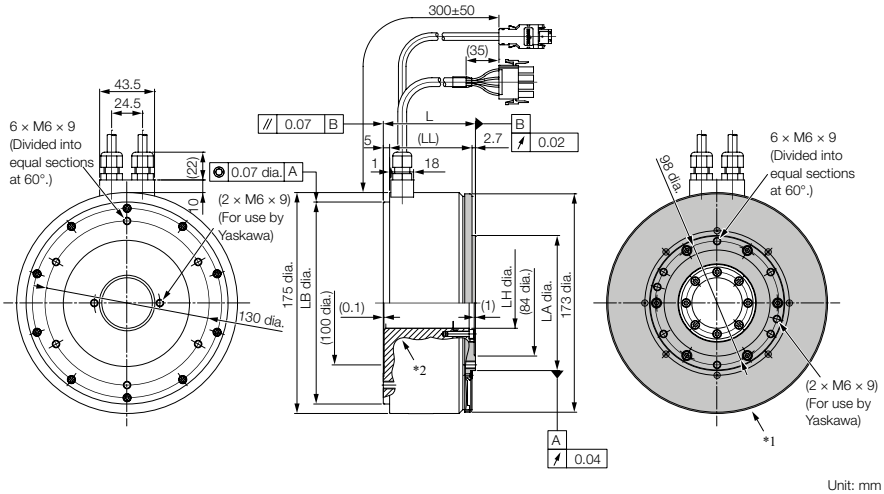



Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 08C□A11 | 73 | 65.3 | $160^{\ 0}_{-0.04}$ | $40^{+0.3}_{+0.1}$ | $107^{\ 0}_{-0.035}$ | 9 |
| 17C□A11 | 87 | 79.3 | $160^{\ 0}_{-0.04}$ | $40^{+0.3}_{+0.1}$ | $107^{\ 0}_{-0.035}$ | 11 |
| 25C□A11 | 117 | 109.3 | $160^{\ 0}_{-0.04}$ | $40^{+0.3}_{+0.1}$ | $107^{\ 0}_{-0.035}$ | 15 |

## Flange Specification 4




Unit: mm

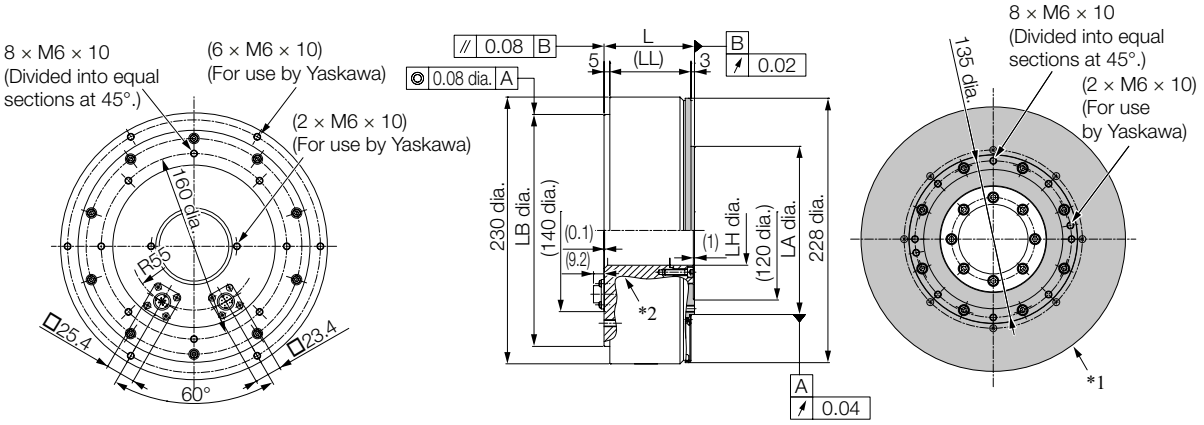
*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 08C□A41 | 73 | 65.3 | $160^{\ 0}_{-0.04}$ | $40^{+0.3}_{+0.1}$ | $107^{\ 0}_{-0.035}$ | 9 |
| 17C□A41 | 87 | 79.3 | $160^{\ 0}_{-0.04}$ | $40^{+0.3}_{+0.1}$ | $107^{\ 0}_{-0.035}$ | 11 |
| 25C□A41 | 117 | 109.3 | $160^{\ 0}_{-0.04}$ | $40^{+0.3}_{+0.1}$ | $107^{\ 0}_{-0.035}$ | 15 |

Refer to the Connector Specifications section for information on connectors.

# SGM7F-□□D

## Flange Specification 1

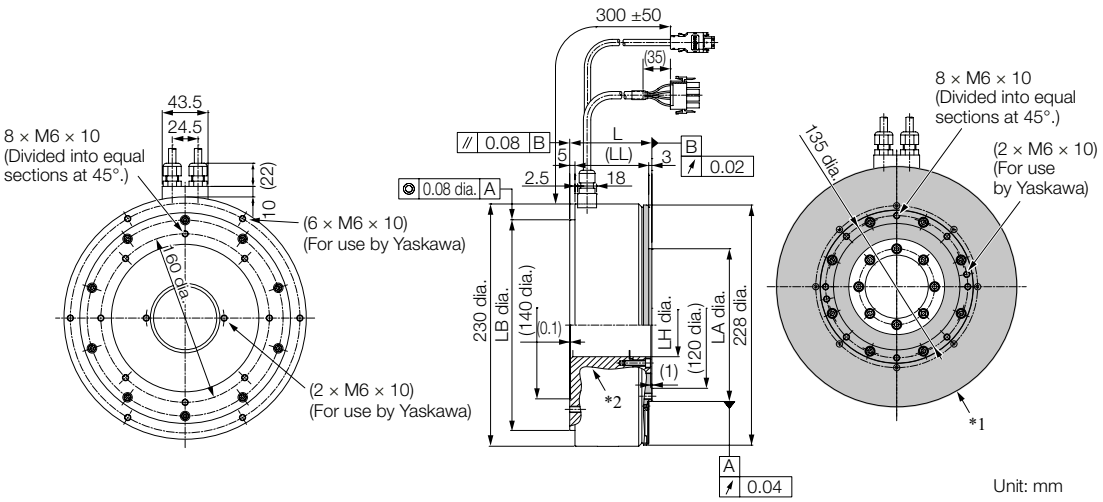



Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16D□A11 | 78 | 70 | $200^{\ 0}_{-0.046}$ | $60^{+0.4}_{\ 0}$ | $145^{\ 0}_{-0.04}$ | 16 |
| 35D□A11 | 107 | 99 | $200^{\ 0}_{-0.046}$ | $60^{+0.4}_{\ 0}$ | $145^{\ 0}_{-0.04}$ | 25 |

## Flange Specification 4




Unit: mm

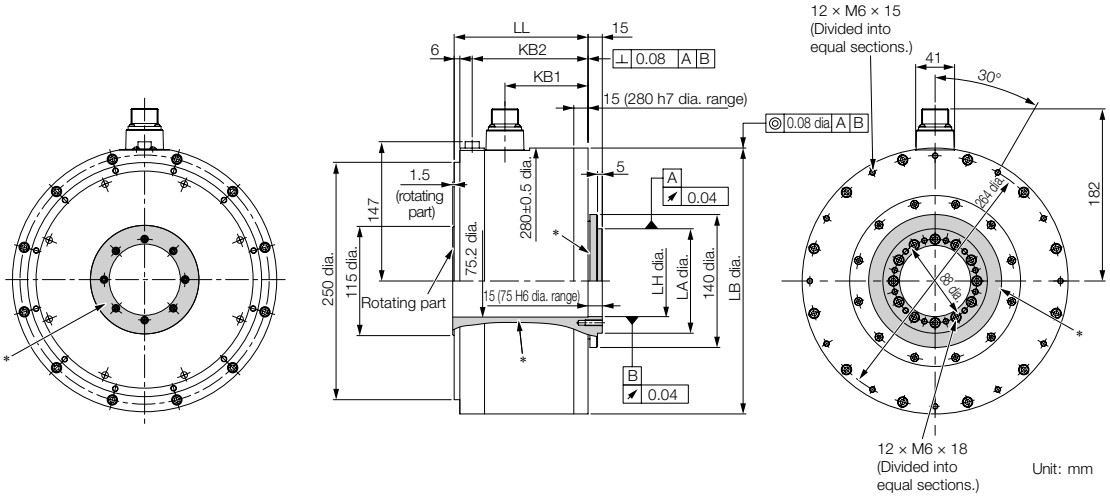
*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGM7F- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16D□A41 | 78 | 70 | $200^{\ 0}_{-0.046}$ | $60^{+0.4}_{\ 0}$ | $145^{\ 0}_{-0.04}$ | 16 |
| 35D□A41 | 107 | 99 | $200^{\ 0}_{-0.046}$ | $60^{+0.4}_{\ 0}$ | $145^{\ 0}_{-0.04}$ | 25 |

Refer to the Connector Specifications section for information on connectors.

# SGM7F-□□M

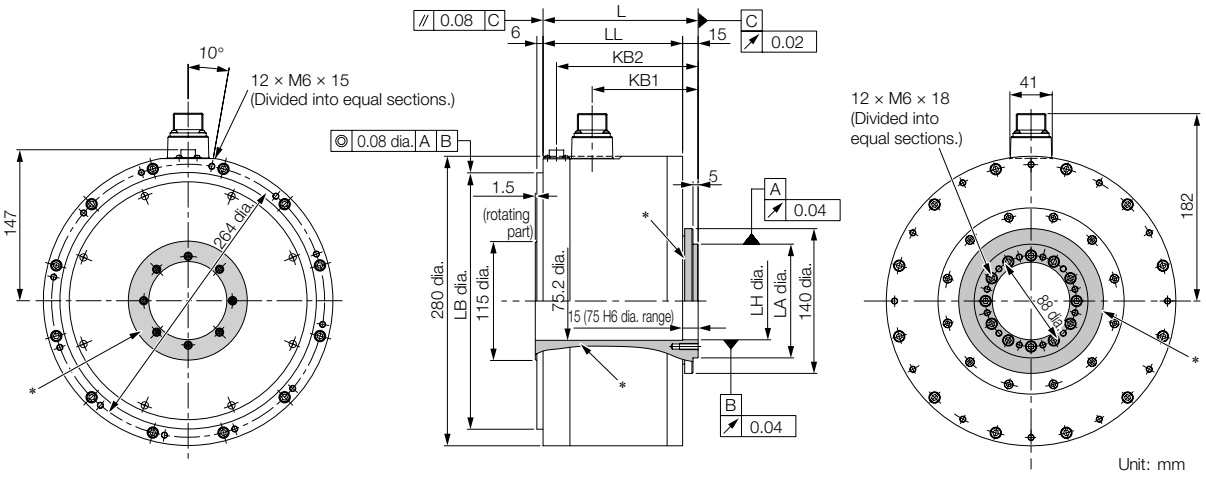
## Flange Specification 1




* The shaded section indicates the rotating parts.

| Model SGM7F- | LL | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|
| 45M□A11 | 141 | 87.5 | 122 | $280^{\ 0}_{-0.052}$ | $75^{+0.019}_{\ 0}$ | $110^{\ 0}_{-0.035}$ | 38 |
| 80M□A11 | 191 | 137.5 | 172 | $280^{\ 0}_{-0.052}$ | $75^{+0.019}_{\ 0}$ | $110^{\ 0}_{-0.035}$ | 45 |
| 1AM□A11 | 241 | 187.5 | 222 | $280^{\ 0}_{-0.052}$ | $75^{+0.019}_{\ 0}$ | $110^{\ 0}_{-0.035}$ | 51 |

## Flange Specification 3



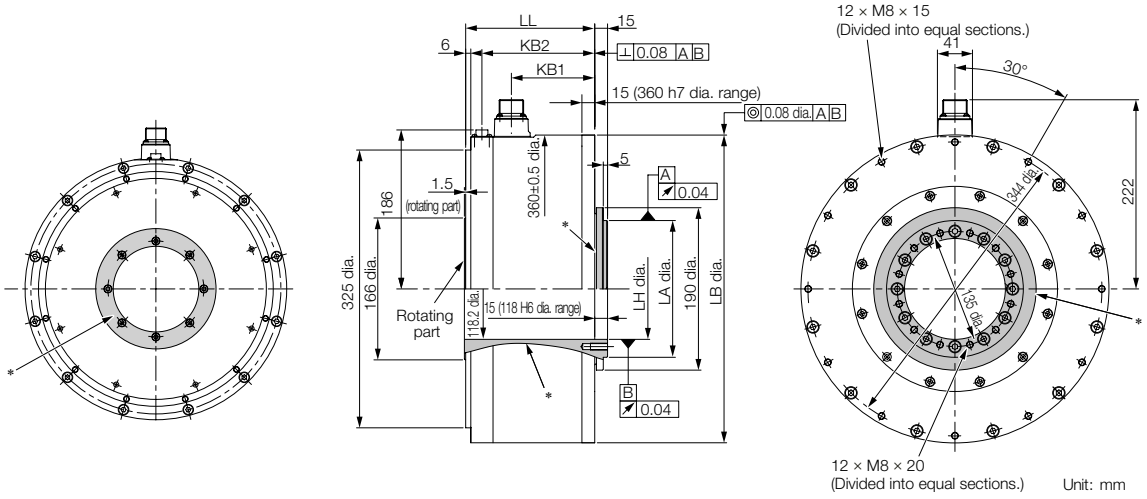

* The shaded section indicates the rotating parts.

| Model SGM7F- | L | LL | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 45M□A31 | 150 | 135 | 102.5 | 137 | $248^{\ 0}_{-0.046}$ | $75^{+0.019}_{\ 0}$ | $110^{\ 0}_{-0.035}$ | 38 |
| 80M□A31 | 200 | 185 | 152.5 | 187 | $248^{\ 0}_{-0.046}$ | $75^{+0.019}_{\ 0}$ | $110^{\ 0}_{-0.035}$ | 45 |
| 1AM□A31 | 250 | 235 | 202.5 | 237 | $248^{\ 0}_{-0.046}$ | $75^{+0.019}_{\ 0}$ | $110^{\ 0}_{-0.035}$ | 51 |

Refer to the Connector Specifications section for information on connectors.

# SGM7F-□□N

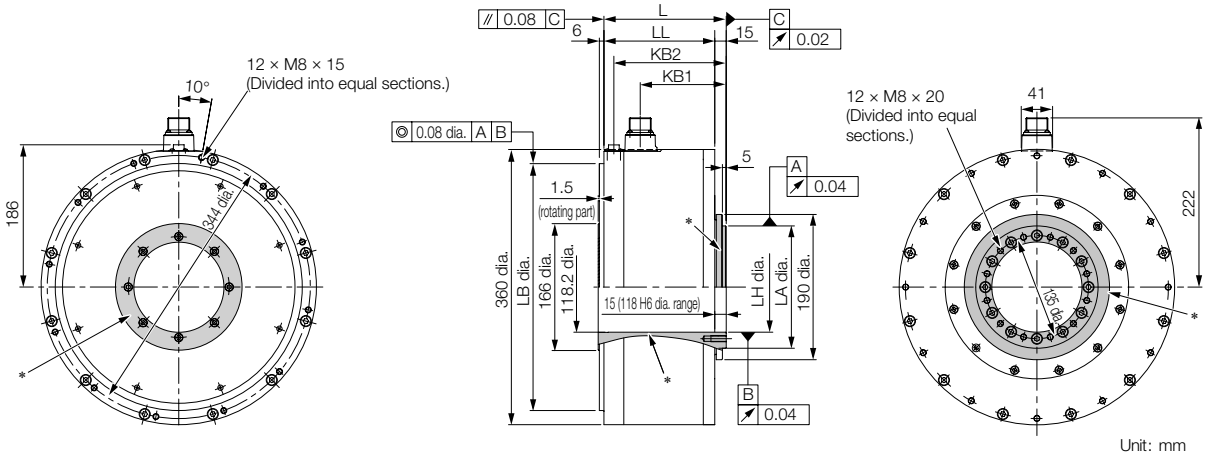
## Flange Specification 1




* The shaded section indicates the rotating parts.

| Model SGM7F- | LL | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|
| 80N□A11 | 151 | 98 | 132 | 360 $^{0}_{-0.057}$ | 118 $^{+0.022}_{0}$ | 160 $^{0}_{-0.04}$ | 50 |
| 1EN□A11 | 201 | 148 | 182 | 360 $^{0}_{-0.057}$ | 118 $^{+0.022}_{0}$ | 160 $^{0}_{-0.04}$ | 68 |
| 2ZN□A11 | 251 | 198 | 232 | 360 $^{0}_{-0.057}$ | 118 $^{+0.022}_{0}$ | 160 $^{0}_{-0.04}$ | 86 |

## Flange Specification 3




* The shaded section indicates the rotating parts.

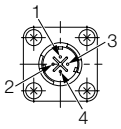
| Model SGM7F- | L | LL | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 80N□A31 | 160 | 145 | 113 | 147 | 323 $^{0}_{-0.057}$ | 118 $^{+0.022}_{0}$ | 160 $^{0}_{-0.04}$ | 50 |
| 1EN□A31 | 210 | 195 | 163 | 197 | 323 $^{0}_{-0.057}$ | 118 $^{+0.022}_{0}$ | 160 $^{0}_{-0.04}$ | 68 |
| 2ZN□A31 | 260 | 245 | 213 | 247 | 323 $^{0}_{-0.057}$ | 118 $^{+0.022}_{0}$ | 160 $^{0}_{-0.04}$ | 86 |

Refer to the Connector Specifications section for information on connectors.

# Connector Specifications SGM7F

## SGM7F-□□A, -□□B, -□□C or -□□D: Flange Specification 1

### Servomotor Connector

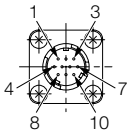



| | |
|---|---|
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | FG (frame ground) |

Model: JN1AS04MK2R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating Connector: JN1DS04FK1
(Not provided by YASKAWA)

### Encoder Connector



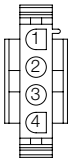

| | |
|---|---|
| 1 | PS |
| 2 | /PS |
| 3 | – |
| 4 | PG5V |
| 5* | BAT0 |
| 6 | – |
| 7 | FG (frame ground) |
| 8* | BAT |
| 9 | PG0V |
| 10 | – |

* Only absolute-value models with multiturn data.
Model: JN1AS10ML1-R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating connector: JN1DS10SL1
(Not provided by YASKAWA)

## SGM7F-□□A, -□□B, -□□C or -□□D: Flange Specification 4

### Servomotor Connector



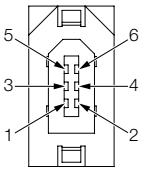

| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG (frame ground) | Green (yellow) |

Models
- Plug: 350779-1
- Pins: 350561-3 or 350690-3 (No.1 to 3)
- Ground pin: 350654-1 or 350669-1 (No. 4)

Manufacturer: Tyco Electronics Japan G.K.

Mating Connector
- Cap: 350780-1
- Socket: 350570-3 or 350689-3

### Encoder Connector



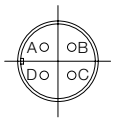

| | |
|---|---|
| 1 | PG5V |
| 2 | PG0V |
| 3* | BAT |
| 4* | BAT0 |
| 5 | PS |
| 6 | /PS |
| Connector Case | FG (frame ground) |

* Only absolute-value models with multiturn data.
Model: 55102-0600
Manufacturer: Molex Japan LLC

Mating Connector: 54280-0609

## SGM7F-□□M or -□□N: Flange Specification 1 or 3

### Servomotor Connector

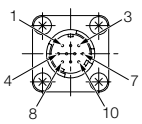



| | |
|---|---|
| A | Phase U |
| B | Phase V |
| C | Phase W |
| D | FG (frame ground) |

Models: CE05-2A18-10PD
Manufacturer: DDK Ltd.

Mating Connector
- Plug: CE05-6A18-10SD-B-BSS
- Cable clamp: CE3057-10A-□(D265)

### Encoder Connector




| | |
|---|---|
| 1 | PS |
| 2 | /PS |
| 3 | – |
| 4 | PG5V |
| 5* | BAT0 |
| 6 | – |
| 7 | FG (frame ground) |
| 8* | BAT |
| 9 | PG0V |
| 10 | – |

* Only absolute-value models with multiturn data.
Model: JN1AS10ML1
Manufacturer: Japan Aviation Electronics Industry, Ltd.

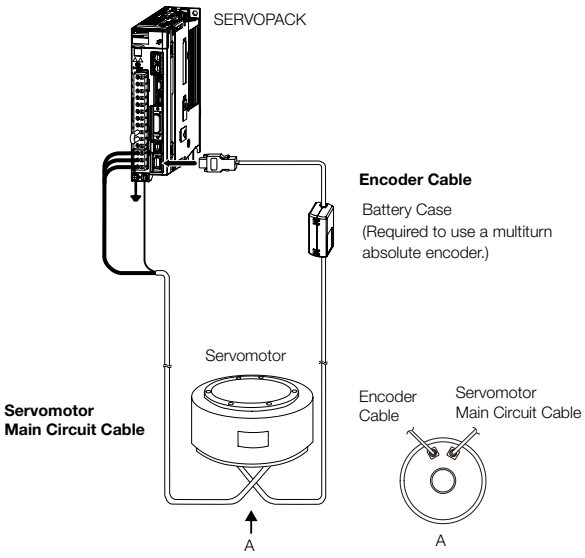
Mating Connector: JN1DS10SL1

# Selecting Cables SGM7F

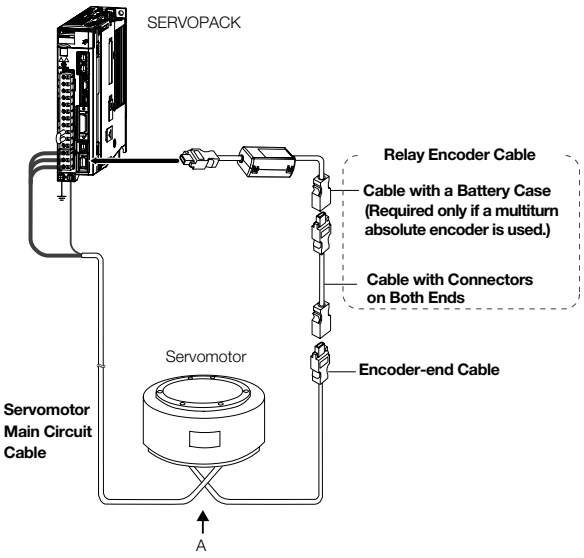
### Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

#### Encoder Cable of 20 m or less

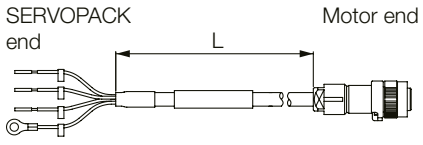
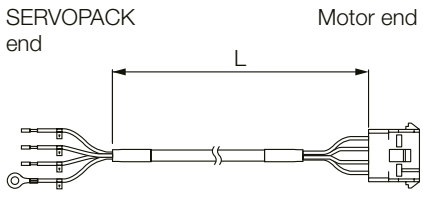



#### Encoder Cable of 30 m to 50 m (Relay Cable)



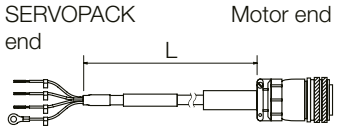
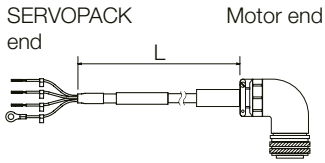
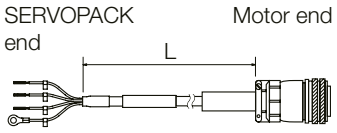
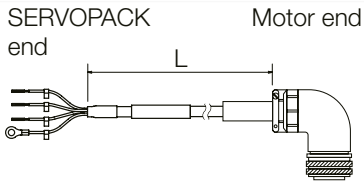
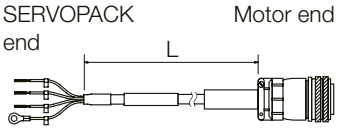
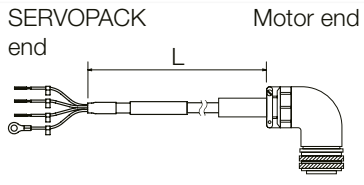

Note:
1. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
2. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials: Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

# Servomotor Main Circuit Cables

| Servomotor Model | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable*1 | |
| SGM7F-□□A<br>SGM7F-□□B<br>SGM7F-□□C<br>SGM7F-□□D<br><br>Flange specification: 1 *2<br>Non-load side installation | 3 m | JZSP-CMM60-03-E | JZSP-C7MDN23-03-E |  |
| | 5 m | JZSP-CMM60-05-E | JZSP-C7MDN23-05-E | |
| | 10 m | JZSP-CMM60-10-E | JZSP-C7MDN23-10-E | |
| | 15 m | JZSP-CMM60-15-E | JZSP-C7MDN23-15-E | |
| | 20 m | JZSP-CMM60-20-E | JZSP-C7MDN23-20-E | |
| SGM7F-□□A<br>SGM7F-□□B<br>SGM7F-□□C<br>SGM7F-□□D<br><br>Flange specification: 4 *2<br>Non-load side installation<br>(with cable on side) | 3 m | JZSP-CMM00-03-E | JZSP-C7MDS23-03-E |  |
| | 5 m | JZSP-CMM00-05-E | JZSP-C7MDS23-05-E | |
| | 10 m | JZSP-CMM00-10-E | JZSP-C7MDS23-10-E | |
| | 15 m | JZSP-CMM00-15-E | JZSP-C7MDS23-15-E | |
| | 20 m | JZSP-CMM00-20-E | JZSP-C7MDS23-20-E | |

Continued on next page.

Continued from previous page.

| Servomotor Model | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable*1 | |
| SGM7F-□□M<br>SGM7F-□□N<br><br>□□: 45<br>□□: 80 | 3 m | JZSP-USA101-03-E | JZSP-USA121-03-E |  |
| | 5 m | JZSP-USA101-05-E | JZSP-USA121-05-E | |
| | 10 m | JZSP-USA101-10-E | JZSP-USA121-10-E | |
| | 15 m | JZSP-USA101-15-E | JZSP-USA121-15-E | |
| | 20 m | JZSP-USA101-20-E | JZSP-USA121-20-E | |
| | 3 m | JZSP-USA102-03-E | JZSP-USA122-03-E |  |
| | 5 m | JZSP-USA102-05-E | JZSP-USA122-05-E | |
| | 10 m | JZSP-USA102-10-E | JZSP-USA122-10-E | |
| | 15 m | JZSP-USA102-15-E | JZSP-USA122-15-E | |
| | 20 m | JZSP-USA102-20-E | JZSP-USA122-20-E | |
| SGM7F-□□M<br>SGM7F-□□N<br><br>□□: 1A | 3 m | JZSP-USA301-03-E | JZSP-USA321-03-E |  |
| | 5 m | JZSP-USA301-05-E | JZSP-USA321-05-E | |
| | 10 m | JZSP-USA301-10-E | JZSP-USA321-10-E | |
| | 15 m | JZSP-USA301-15-E | JZSP-USA321-15-E | |
| | 20 m | JZSP-USA301-20-E | JZSP-USA321-20-E | |
| | 3 m | JZSP-USA302-03-E | JZSP-USA322-03-E |  |
| | 5 m | JZSP-USA302-05-E | JZSP-USA322-05-E | |
| | 10 m | JZSP-USA302-10-E | JZSP-USA322-10-E | |
| | 15 m | JZSP-USA302-15-E | JZSP-USA322-15-E | |
| | 20 m | JZSP-USA302-20-E | JZSP-USA322-20-E | |
| SGM7F-□□M<br>SGM7F-□□N<br><br>□□: 1E<br>□□: 2Z | 3 m | JZSP-USA501-03-E | JZSP-USA521-03-E |  |
| | 5 m | JZSP-USA501-05-E | JZSP-USA521-05-E | |
| | 10 m | JZSP-USA501-10-E | JZSP-USA521-10-E | |
| | 15 m | JZSP-USA501-15-E | JZSP-USA521-15-E | |
| | 20 m | JZSP-USA501-20-E | JZSP-USA521-20-E | |
| | 3 m | JZSP-USA502-03-E | JZSP-USA522-03-E |  |
| | 5 m | JZSP-USA502-05-E | JZSP-USA522-05-E | |
| | 10 m | JZSP-USA502-10-E | JZSP-USA522-10-E | |
| | 15 m | JZSP-USA502-15-E | JZSP-USA522-15-E | |
| | 20 m | JZSP-USA502-20-E | JZSP-USA522-20-E | |

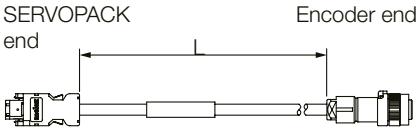
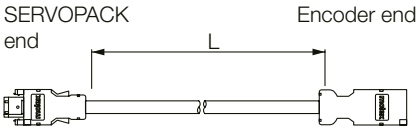
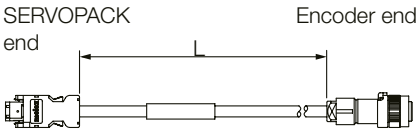
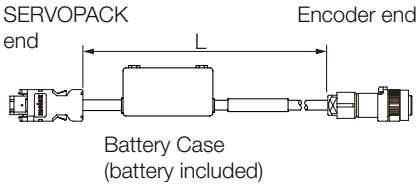
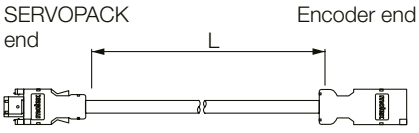
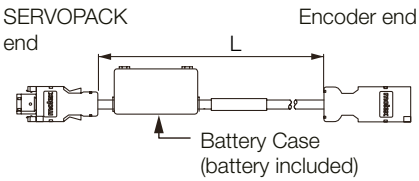
*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius of the Flexible Cables are given in the following table.

| Order Number | Recommended Bending Radius (R) | Order Number | Recommended Bending Radius (R) |
|---|---|---|---|
| JZSP-C7MDN23-□□-E | 90 mm min. | JZSP-USA321-□□-E | 113 mm min. |
| JZSP-C7MDS23-□□-E | | JZSP-USA322-□□-E | |
| JZSP-USA121-□□-E | 96 mm min. | JZSP-USA521-□□-E | 150 mm min. |
| JZSP-USA122-□□-E | | JZSP-USA522-□□-E | |

*2. Refer to the Model Designations section for the flange specifications.

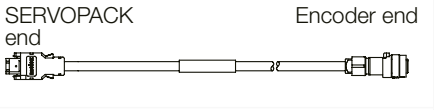
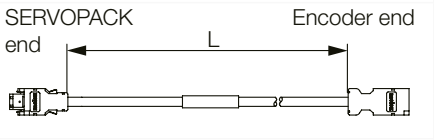
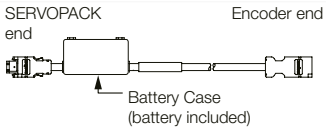
Note: Direct Drive Servomotors are not available with holding brakes.

## Encoder Cables of 20 m or less

| Servomotor Model | Description | Length | Order Number | | Appearance |
|---|---|---|---|---|---|
| | | | Standard Cable | Flexible Cable*1 | |
| SGM7F-□□□F<br>Flange specification:<br>1 or 3 *2 | For incremental encoder | 3 m | JZSP-CMP60-03-E | JZSP-CSP60-03-E |  |
| | | 5 m | JZSP-CMP60-05-E | JZSP-CSP60-05-E | |
| | | 10 m | JZSP-CMP60-10-E | JZSP-CSP60-10-E | |
| | | 15 m | JZSP-CMP60-15-E | JZSP-CSP60-15-E | |
| | | 20 m | JZSP-CMP60-20-E | JZSP-CSP60-20-E | |
| SGM7F-□□AF<br>SGM7F-□□BF<br>SGM7F-□□CF<br>SGM7F-□□DF<br><br>Flange specification:<br>4 *2 | | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| SGM7F-□□□7<br>Flange specification:<br>1 or 3 *2 | For multiturn absolute encoder (without Battery Case*3) | 3 m | JZSP-C7PI00-03-E | JZSP-C7PI20-03-E |  |
| | | 5 m | JZSP-C7PI00-05-E | JZSP-C7PI20-05-E | |
| | | 10 m | JZSP-C7PI00-10-E | JZSP-C7PI20-10-E | |
| | | 15 m | JZSP-C7PI00-15-E | JZSP-C7PI20-15-E | |
| | | 20 m | JZSP-C7PI00-20-E | JZSP-C7PI20-20-E | |
| | For multiturn absolute encoder (with Battery Case) | 3 m | JZSP-C7PA00-03-E | JZSP-C7PA20-03-E |  |
| | | 5 m | JZSP-C7PA00-05-E | JZSP-C7PA20-05-E | |
| | | 10 m | JZSP-C7PA00-10-E | JZSP-C7PA20-10-E | |
| | | 15 m | JZSP-C7PA00-15-E | JZSP-C7PA20-15-E | |
| | | 20 m | JZSP-C7PA00-20-E | JZSP-C7PA20-20-E | |
| SGM7F-□□A7<br>SGM7F-□□B7<br>SGM7F-□□C7<br>SGM7F-□□D7<br><br>Flange specification:<br>4 *2 | For multiturn absolute encoder (without Battery Case*3) | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| | For multiturn absolute encoder (with Battery Case) | 3 m | JZSP-CSP19-03-E | JZSP-CSP29-03-E |  |
| | | 5 m | JZSP-CSP19-05-E | JZSP-CSP29-05-E | |
| | | 10 m | JZSP-CSP19-10-E | JZSP-CSP29-10-E | |
| | | 15 m | JZSP-CSP19-15-E | JZSP-CSP29-15-E | |
| | | 20 m | JZSP-CSP19-20-E | JZSP-CSP29-20-E | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 68 mm or larger.
*2. Refer to the Model Designations section for the flange specifications.
*3. Use one of these Cables if a battery is connected to the host controller.

## Relay Encoder Cables of 30 m to 50 m

| Servomotor Model | Description | Length | Order Number*1 | Appearance |
|---|---|---|---|---|
| SGM7F-□□□F<br>SGM7F-□□□7<br>Flange specification:<br>1 or 3 *2 | Encoder-end Cable (for single-turn/ multiturn absolute encoder) | 0.3 m | JZSP-C7PRC0-E |  |
| SGM7F-□□□F<br>SGM7F-□□□7<br>Flange specification:<br>1, 3 or 4*2 | Cables with Connectors on Both Ends (for single-turn/multiturn absolute encoder) | 30 m | JZSP-UCMP00-30-E |  |
| | | 40 m | JZSP-UCMP00-40-E | |
| | | 50 m | JZSP-UCMP00-50-E | |
| SGM7F-□□□7<br>Flange specification:<br>1, 3 or 4*2 | Cable with a Battery Case (for multiturn absolute encoder)*3 | 0.3 m | ZSP-CSP12-E |  |

*1. Flexible Cables are not available.
*2. Refer to the Model Designations for the flange specifications.
*3. Use one of these Cables if a battery is connected to the host controller.

# Model Designations

SGMCS - 02 B 3 C 1 1 - E

| Direct Drive Servomotors | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | digit |
|---|---|---|---|---|---|---|---|---|

**1st + 2nd digit - Rated Output**

| Code | Specification | Code | Specification |
|---|---|---|---|
| Small-capacity Series, coreless | | Medium-capacity Series, with core | |
| 02 | 2 Nm | 45 | 45 Nm |
| 04 | 4 Nm | 80 | 80 Nm |
| 05 | 5 Nm | 1A | 110 Nm |
| 07 | 7 Nm | 1E | 150 Nm |
| 08 | 8 Nm | 2Z | 200 Nm |
| 10 | 10 Nm | | |
| 14 | 14 Nm | | |
| 16 | 16 Nm | | |
| 17 | 17 Nm | | |
| 25 | 25 Nm | | |
| 35 | 35 Nm | | |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |
| E | 290 mm dia. |
| M | 280 mm dia. |
| N | 360 mm dia. |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| 3 | 20-bit single-turn absolute encoder |
| D | 20-bit incremental encoder |

**5th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Model with servomotor outer diameter code M or N |
| B | Model with servomotor outer diameter code E |
| C | Model with servomotor outer diameter code B, C, or D |

**6th digit - Flange**

| Code | Mounting | Servomotor Outer Diameter Code (3rd digit) | | | | | |
|---|---|---|---|---|---|---|---|
| | | B | C | D | E | M | N |
| 1 | Non-load side | ✓ | ✓ | ✓ | ✓ | — | — |
| | Load side | — | — | — | — | ✓ | ✓ |
| 3 | Non-load side | — | — | — | — | ✓ | ✓ |
| 4 | Non-load side (with cable on side) | ✓ | ✓ | ✓ | ✓ | — | — |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |

**8th digit**

| Code | Specification |
|---|---|
| E | RoHS II Suffix |

Note:
1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# Manufactured Models

| Rated Torque [Nm] | Servomotor Outer Diameter | | | | | |
|---|---|---|---|---|---|---|
| | B (135 mm dia.) | C (175 mm dia.) | D (230 mm dia.) | E (290 mm dia.) | M (280 mm dia.) | N (360 mm dia.) |
| 2 | SGMCS-02B | — | — | — | — | — |
| 4 | — | SGMCS-04C | — | — | — | — |
| 5 | SGMCS-05B | — | — | — | — | — |
| 7 | SGMCS-07B | — | — | — | — | — |
| 8 | — | — | SGMCS-08D | — | — | — |
| 10 | — | SGMCS-10C | — | — | — | — |
| 14 | — | SGMCS-14C | — | — | — | — |
| 16 | — | — | — | SGMCS-16E | — | — |
| 17 | — | — | SGMCS-17D | — | — | — |
| 25 | — | — | SGMCS-25D | — | — | — |
| 35 | — | — | — | SGMCS-35E | — | — |
| 45 | — | — | — | — | SGMCS-45M | — |
| 80 | — | — | — | — | SGMCS-80M | SGMCS-80N |
| 110 | — | — | — | — | SGMCS-1AM | — |
| 150 | — | — | — | — | — | SGMCS-1EN |
| 200 | — | — | — | — | — | SGMCS-2ZN |

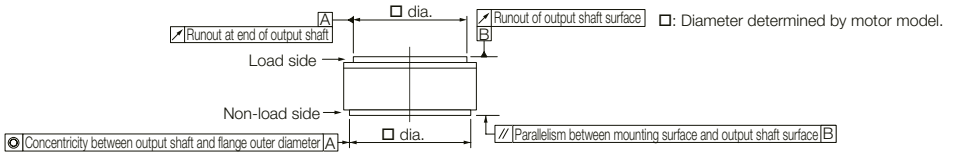
Note:
The above table shows combinations of the rated torque and outer diameter. The fourth through seventh digits have been omitted.

# Ratings and Specifications

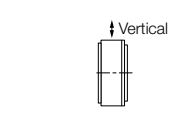
## Small-Capacity Coreless Servomotors: Specifications

| Voltage | | | 200 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SGMCS- | | | 02B | 05B | 07B | 04C | 10C | 14C | 08D | 17D | 25D | 16E | 35E |
| Time Rating | | | Continuous | | | | | | | | | | |
| Thermal Class | | | A | | | | | | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MΩ min. | | | | | | | | | | |
| Withstand Voltage | | | 1,500 VAC for 1 minute | | | | | | | | | | |
| Excitation | | | Permanent magnet | | | | | | | | | | |
| Mounting | | | Flange-mounted | | | | | | | | | | |
| Drive Method | | | Direct drive | | | | | | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | | | | | | |
| Vibration Class *1 | | | V15 | | | | | | | | | | |
| Absolute Accuracy | | | ±15 s | | | | | | | | | | |
| Repeatability | | | ±1.3 s | | | | | | | | | | |
| Protective Structure *2 | | | Totally enclosed, self-cooled, IP42 | | | | | | | | | | |
| Environmental Conditions | Ambient Air Temperature | | 0°C to 40°C (without freezing) | | | | | | | | | | |
| | Ambient Air Humidity | | 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| | Installation Site | | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | | | | | | |
| | Storage Environment | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| Mechanical Tolerances *3 | Runout of Output Shaft Surface | mm | 0.02 | | | | | | | | | | |
| | Runout at End of Output Shaft | mm | 0.04 | | | | | | | | | | |
| | Parallelism between Mounting Surface and Output Shaft Surface | mm | 0.07 | | | | | | 0.08 | | | | |
| | Concentricity between Output Shaft and Flange Outer Diameter | mm | 0.07 | | | | | | 0.08 | | | | |
| Shock Resistance *4 | Impact Acceleration Rate at Flange | | 490 m/s² | | | | | | | | | | |
| | Number of Impacts | | 2 times | | | | | | | | | | |
| Vibration Resistance *5 | Vibration Acceleration Rate at Flange | | 49 m/s² | | | | | | | | | | |
| Applicable SERVOPACKs | | SGD7S- | 2R8A, 2R1F | | | 2R8A, 2R8F | | | | | | | |
| | | SGD7W-<br>SGD7C- | 2R8A | | | | | | | | | | 5R5A |

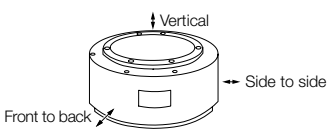
*1. A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2. The hollow hole section, motor mounting surface, output shaft surface, and gap around the rotating part of the shaft are excluded. Protective structure specifications apply only when the special cable is used.
*3. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.




*4. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures. The strength of the vibration that the Servomotor can withstand depends on the application. Check the vibration acceleration rate.



Shock Applied to the Servomotor

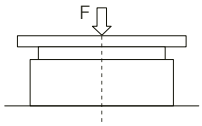


Vibration Applied to the Servomotor

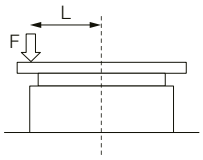
## Small-Capacity Coreless Servomotors: Ratings

| Voltage | | | 200 V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SGMCS- | | | 02B | 05B | 07B | 04C | 10C | 14C | 08D | 17D | 25D | 16E | 35E |
| Rated Output *1 | | W | 42 | 105 | 147 | 84 | 209 | 293 | 168 | 356 | 393 | 335 | 550 |
| Rated Torque *1, *2 | | Nm | 2.00 | 5.00 | 7.00 | 4.00 | 10.0 | 14.0 | 8.0 | 17.0 | 25.0 | 16.0 | 35.0 |
| Instantaneous Maximum Torque *1 | | Nm | 6.0 | 15.0 | 21.0 | 12.0 | 30.0 | 42.0 | 24.0 | 51.0 | 75.0 | 48.0 | 105.0 |
| Stall Torque *1 | | Nm | 2.05 | 5.15 | 7.32 | 4.09 | 10.1 | 14.2 | 8.23 | 17.4 | 25.4 | 16.6 | 35.6 |
| Rated Current *1 | | A | 1.8 | 1.7 | 1.4 | 2.2 | | 2.8 | 1.9 | 2.5 | 2.6 | 3.3 | 3.5 |
| Instantaneous Maximum Current *1 | | A | 5.4 | 5.1 | 4.1 | 7.0 | | 8.3 | 5.6 | 7.5 | 8.0 | 9.4 | 10.0 |
| Rated Motor Speed *1 | | $min^{-1}$ | 200 | | | 200 | | | 200 | | 150 | 200 | 150 |
| Maximum Motor Speed *1 | | $min^{-1}$ | 500 | | | 500 | 400 | 300 | 500 | 350 | 250 | 500 | 250 |
| Torque Constant | | Nm/A | 1.18 | 3.17 | 5.44 | 2.04 | 5.05 | 5.39 | 5.10 | 7.79 | 10.8 | 5.58 | 11.1 |
| Motor Moment of Inertia | | $\times 10^{-4}$ kg·$m^2$ | 28.0 | 51.0 | 77.0 | 77.0 | 140 | 220 | 285 | 510 | 750 | 930 | 1430 |
| Rated Power Rate *1 | | kW/s | 1.43 | 4.90 | 6.36 | 2.08 | 7.14 | 8.91 | 2.25 | 5.67 | 8.33 | 2.75 | 8.57 |
| Rated Angular Acceleration Rate *1 | | $rad/s^2$ | 710 | 980 | 910 | 520 | 710 | 640 | 280 | 330 | | 170 | 240 |
| Heat Sink Size | | mm | 350 x 350 x 12 | | | 450 x 450 x 12 | | | 550 x 550 x 12 | | | 650 x 650 x 12 | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | | 10 times | | | | 5 times | | 3 times | | | | |
| Allowable Load *3 | Allowable Thrust Load | N | 1,500 | | | 3,300 | | | 4,000 | | | 11,000 | |
| | Allowable Moment Load | Nm | 40 | 50 | 64 | 70 | 75 | 90 | 93 | 103 | 135 | 250 | 320 |

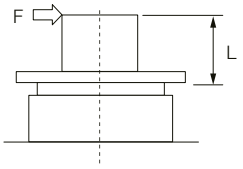
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with a steel heat sink of the dimensions given in the table.
*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
SGD7S-R70□□□A020 to -2R8□□□A020
SGD7W-1R6A20A020 to -2R8A20A020
SGD7C-1R6AMAA020 to -2R8AMAA020
*4. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns. Design the machine so that the thrust loads or moment loads will not exceed the values given in the table.




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L



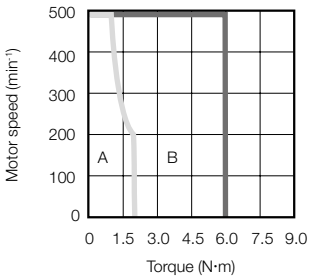

Where F is the external force
Thrust load = Load mass
Moment load = F × L

Note:
For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

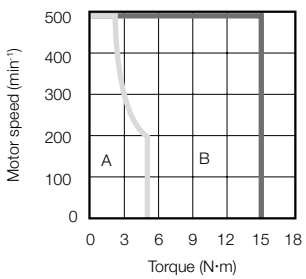
# Small-Capacity Coreless Servomotors: Torque-Motor Speed Characteristics

A : Continuous duty zone ——— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 100-V input

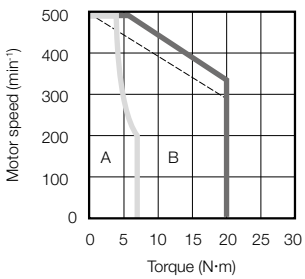
SGMCS-02B



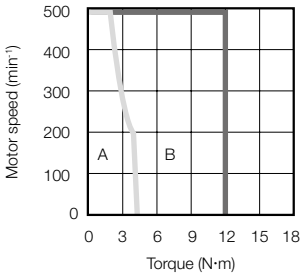

SGMCS-05B



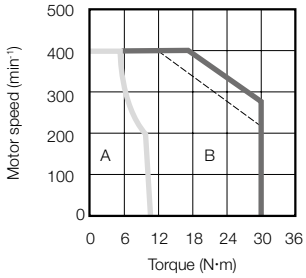

SGMCS-07B



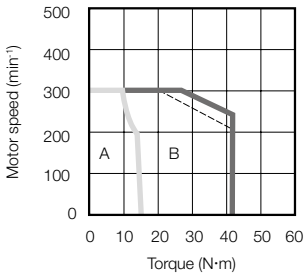

SGMCS-04C



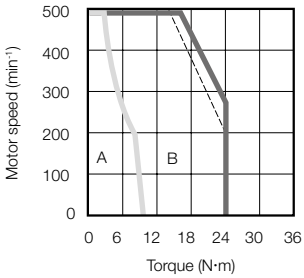

SGMCS-10C



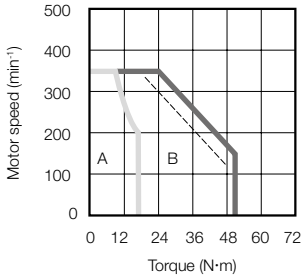

SGMCS-14C



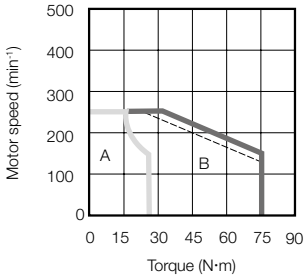

SGMCS-08D



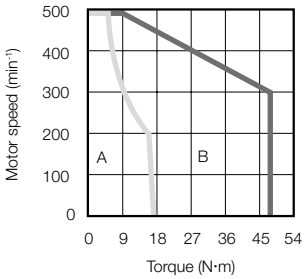

SGMCS-17D



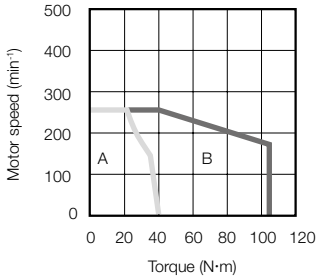

SGMCS-25D




SGMCS-16E




SGMCS-35E

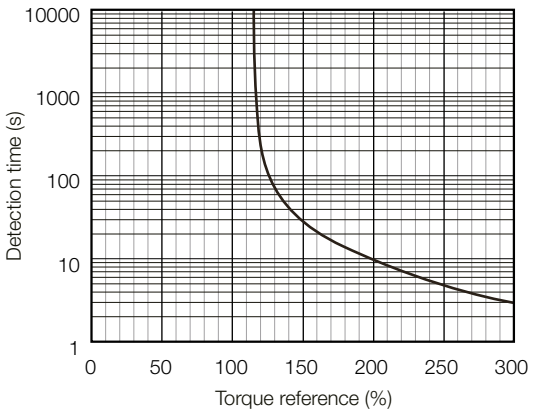



Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

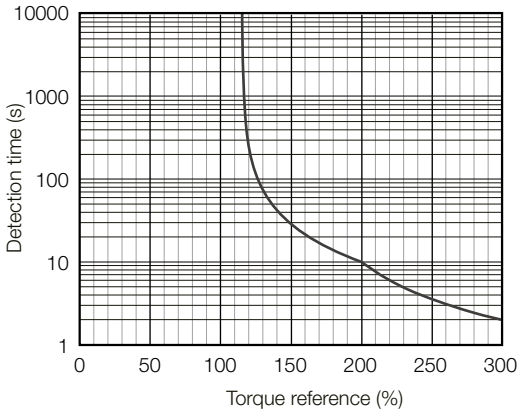
## Small-Capacity, Coreless Servomotors: Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

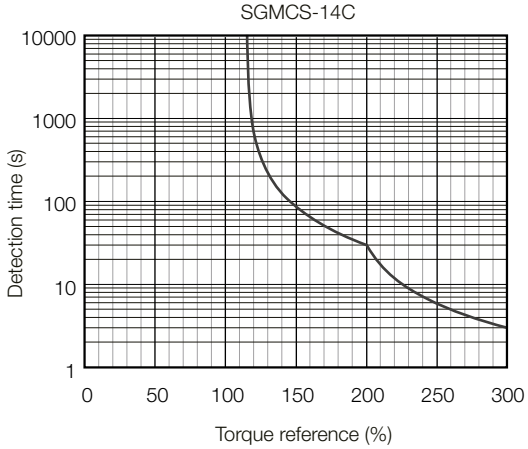
SGMCS-02B, -05B, -07B, -10C, -17D, and -35E



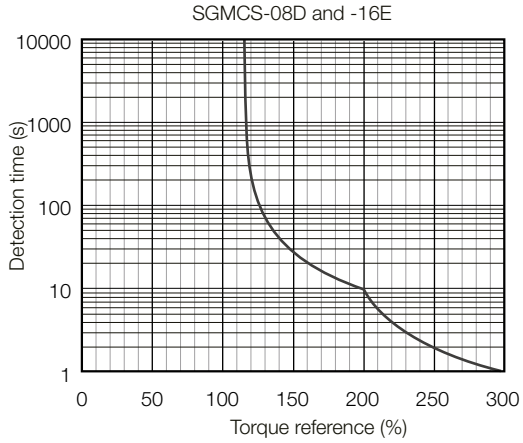

SGMCS-04C



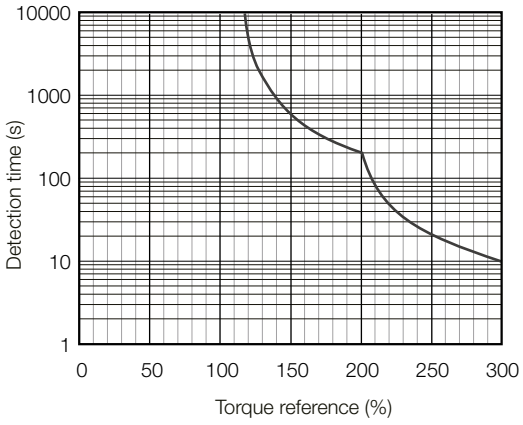

SGMCS-14C




SGMCS-08D and -16E



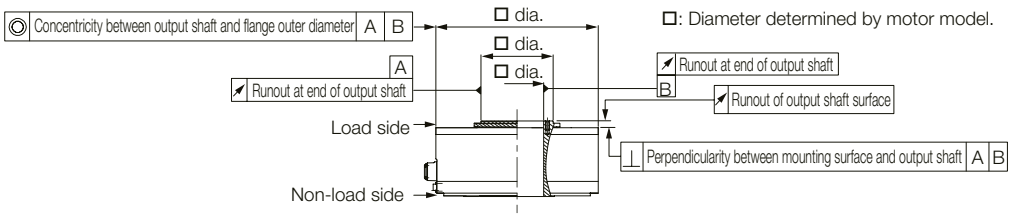

SGMCS-25D




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Small Capacity, Coreless Servomotors: Torque-Motor Speed Characteristics.

| Voltage | | | 200 V | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model SGMCS- | | | 45M | 80M | 1AM | 80N | 1EN | 2ZN |
| Time Rating | | | Continuous | | | | | |
| Thermal Class | | | F | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MΩ min. | | | | | |
| Withstand Voltage | | | 1,500 VAC for 1 minute | | | | | |
| Excitation | | | Permanent magnet | | | | | |
| Mounting | | | Flange-mounted | | | | | |
| Drive Method | | | Direct drive | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | |
| Vibration Class *1 | | | V15 | | | | | |
| Absolute Accuracy | | | ±15 s | | | | | |
| Repeatability | | | ±1.3 s | | | | | |
| Protective Structure *2 | | | Totally enclosed, self-cooled, IP44 | | | | | |
| Environmental Conditions | Ambient Air Temperature | | 0°C to 40°C (without freezing) | | | | | |
| | Ambient Air Humidity | | 20% to 80% relative humidity (without condensation) | | | | | |
| | Installation Site | | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | |
| | Storage Environment | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (withoutfreezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | |
| Mechanical Tolerances *3 | Runout of Output Shaft Surface | mm | 0.02 | | | | | |
| | Runout at End of Output Shaft | mm | 0.04 | | | | | |
| | Parallelism between Mounting Surface and Output Shaft Surface | mm | – | | | | | |
| | Concentricity between Output Shaft and Flange Outer Diameter | mm | 0.08 | | | | | |
| | Perpendicularity between Mounting Surface and Output Shaft | mm | 0.08 | | | | | |
| Shock Resistance *4 | Impact Acceleration Rate at Flange | | 490 m/s$^2$ | | | | | |
| | Number of Impacts | | 2 times | | | | | |
| Vibration Resistance *5 | Vibration Acceleration Rate at Flange | | 24.5 m/s$^2$ | | | | | |
| Applicable SERVOPACKs | SGD7S- | | 7R6A | 120A | 180A | 120A | 200A | |
| | SGD7W- | | 7R6A | – | | | | |

*1. A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2. This does not apply to the shaft opening. Protective structure specifications apply only when the special cable is used.
*3. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.




*4. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures.
The strength of the vibration that the Servomotor can withstand depends on the application. Check the vibration acceleration rate.

## Medium-Capacity Servomotors with Cores: Ratings

| Voltage | | | 200 V | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model SGMCS- | | | 45M | 80M | 1AM | 80N | 1EN | 2ZN |
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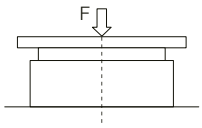
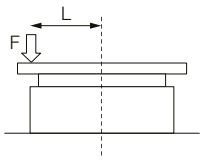
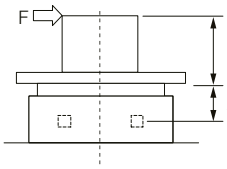
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with a steel heat sink of the dimensions given in the table.
*3. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns. Design the machine so that the thrust loads or moment loads will not exceed the values given in the table.




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0




Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L



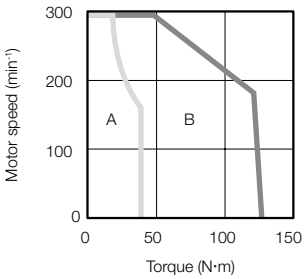

Where F is the external force,
Thrust load = Load mass
Moment load = F × (L + A)

Note:
For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.

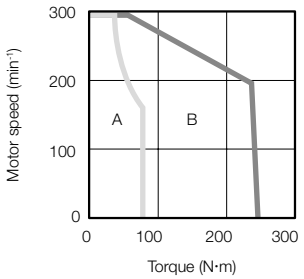
# Medium-Capacity Servomotors with Cores: Torque-Motor Speed Characteristics

A : Continuous duty zone
B : Intermittent duty zone

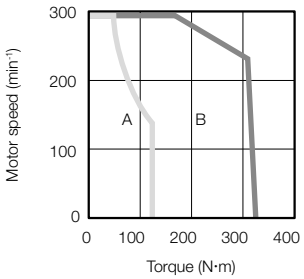
SGMCS-45M



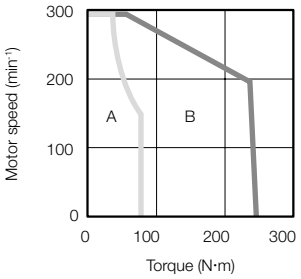

SGMCS-80M



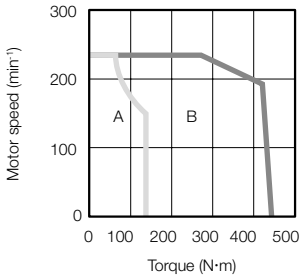

SGMCS-1AM



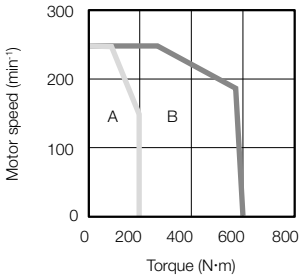

SGMCS-80N




SGMCS-1EN




SGMCS-2ZN

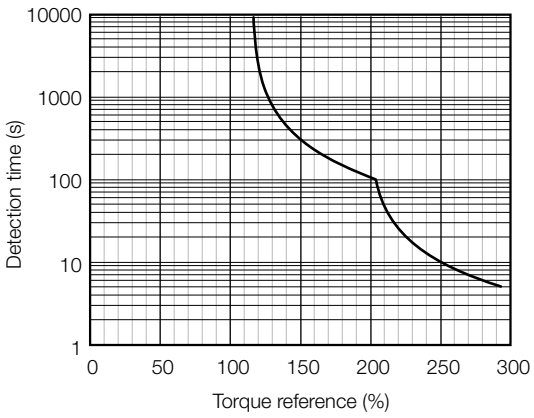



Note:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 20°C. These are typical values.
2. If the effective torque is within the allowable range for the rated torque, the Servomotor can be used within the intermittent duty zone.
3. If the length of the Servomotor Main Circuit Cable exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

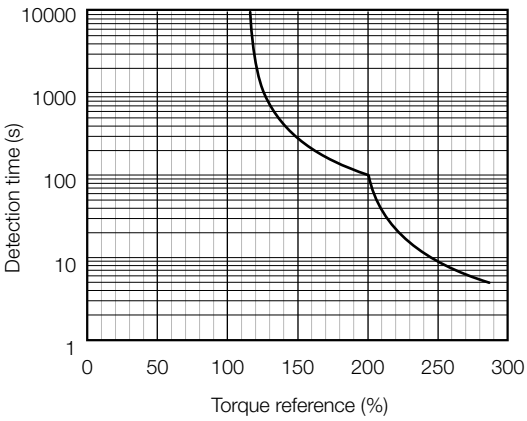
## Medium-Capacity Servomotors with Cores: Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

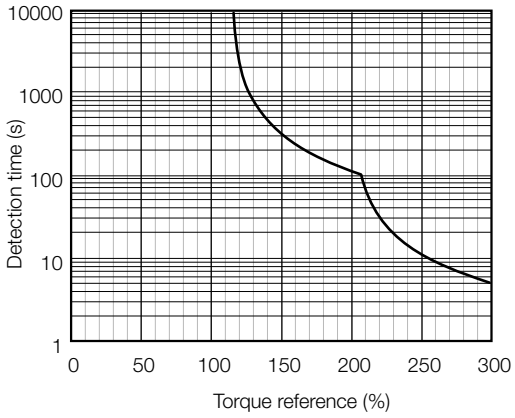
SGMCS-45A



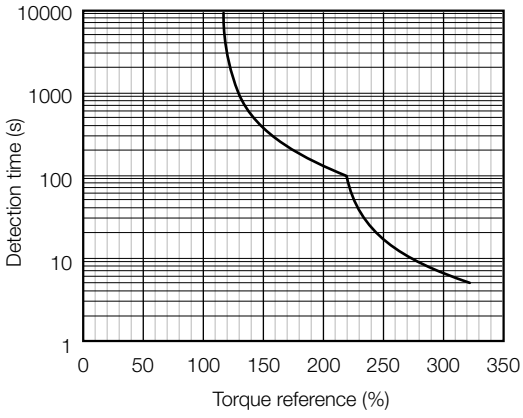

SGMCS-80M



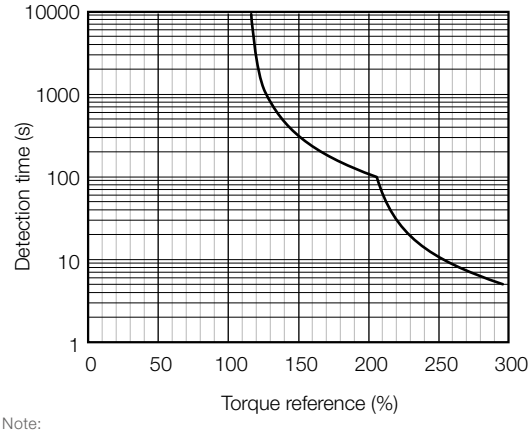

SGMCS-1AM and -80N




SGMCS-1EN




SGMCS-2ZN




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective torque remains within the continuous duty zone given in Medium-Capacity Servomotors with Cores: Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Ratings section. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.
Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.

## Exceeding the Allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

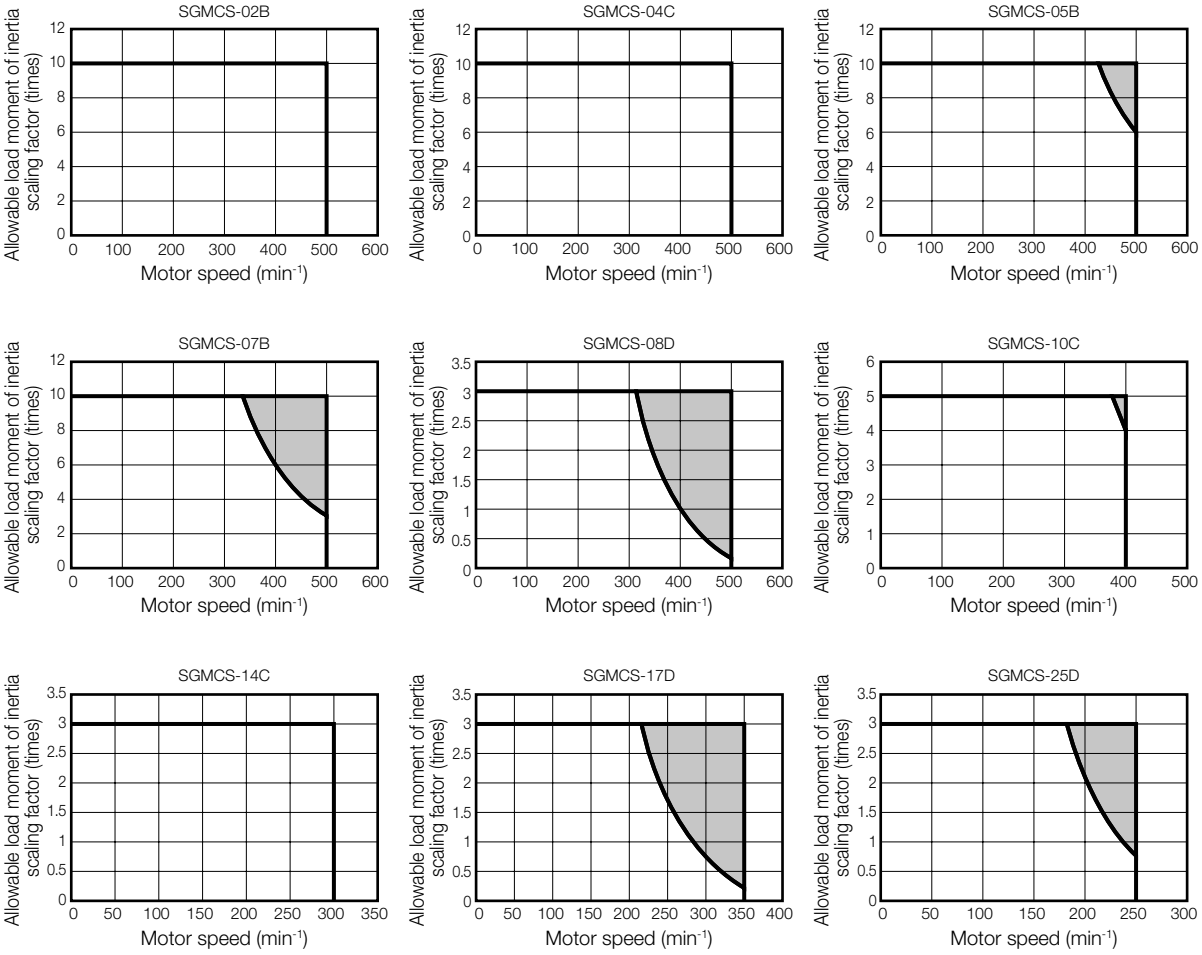
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to “Built-In Regenerative Resistor” for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

## Allowable Load Moment of Inertia Scaling Factor for SERVOPACKs without built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.



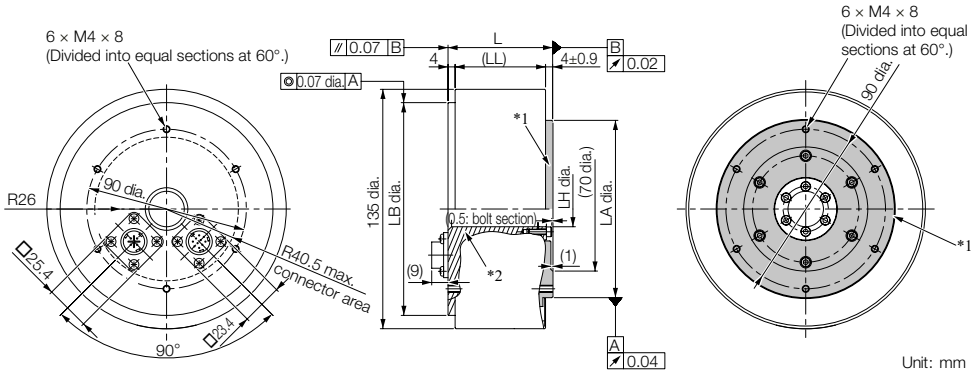

## When an external Regenerative Resistor is required

Install the External Regenerative Resistor. Refer to the External Regenerative Resistors section for the recommended products.

# External Dimensions SGMCS
## Small-Capacity, Coreless Servomotors

### SGMCS-□□B

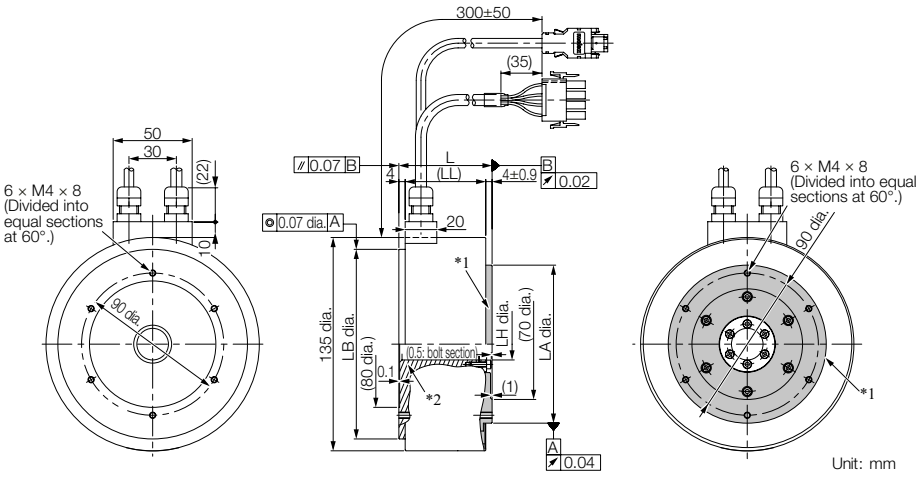
### Flange Specification 1




*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 02B□C11 | 59 | 51 | $120^{0}_{-0.035}$ | $20^{+0.4}_{0}$ | $100^{0}_{-0.035}$ | 4.8 |
| 05B□C11 | 88 | 80 | $120^{0}_{-0.035}$ | $20^{+0.4}_{0}$ | $100^{0}_{-0.035}$ | 5.8 |
| 07B□C11 | 128 | 120 | $120^{0}_{-0.035}$ | $20^{+0.4}_{0}$ | $100^{0}_{-0.035}$ | 8.2 |

### Flange Specification 4



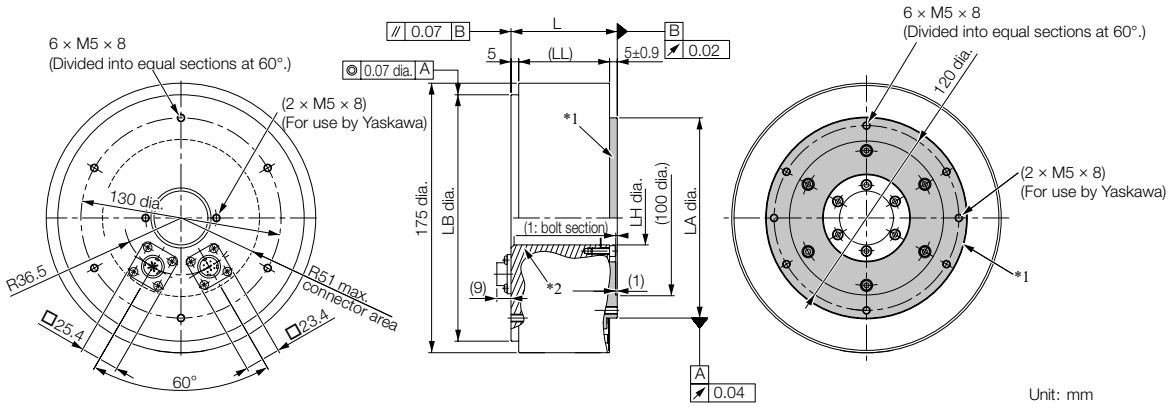

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 02B□C41 | 59 | 51 | $120^{0}_{-0.035}$ | $20^{+0.4}_{0}$ | $100^{0}_{-0.035}$ | 4.8 |
| 05B□C41 | 88 | 80 | $120^{0}_{-0.035}$ | $20^{+0.4}_{0}$ | $100^{0}_{-0.035}$ | 5.8 |
| 07B□C41 | 128 | 120 | $120^{0}_{-0.035}$ | $20^{+0.4}_{0}$ | $100^{0}_{-0.035}$ | 8.2 |

Refer to the Connector Specifications section for information on connectors.

## SGMCS-☐☐C

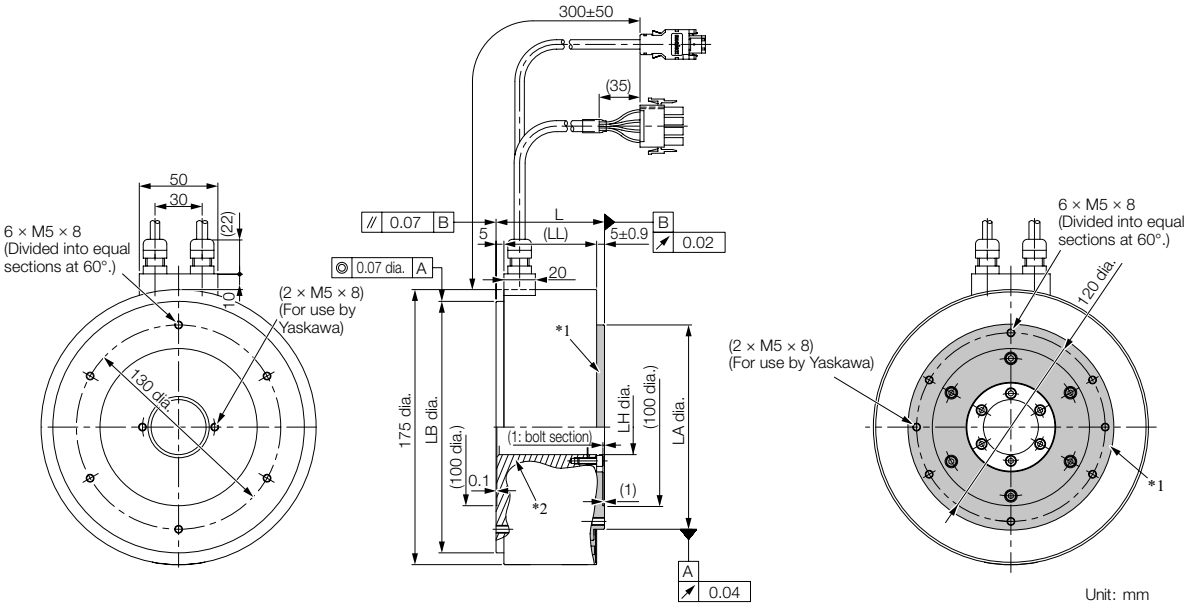
### Flange Specification 1




*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| ☐ | | | | | | |
| ☐ | | | | | | |
| ☐ | | | | | | |

### Flange Specification 4



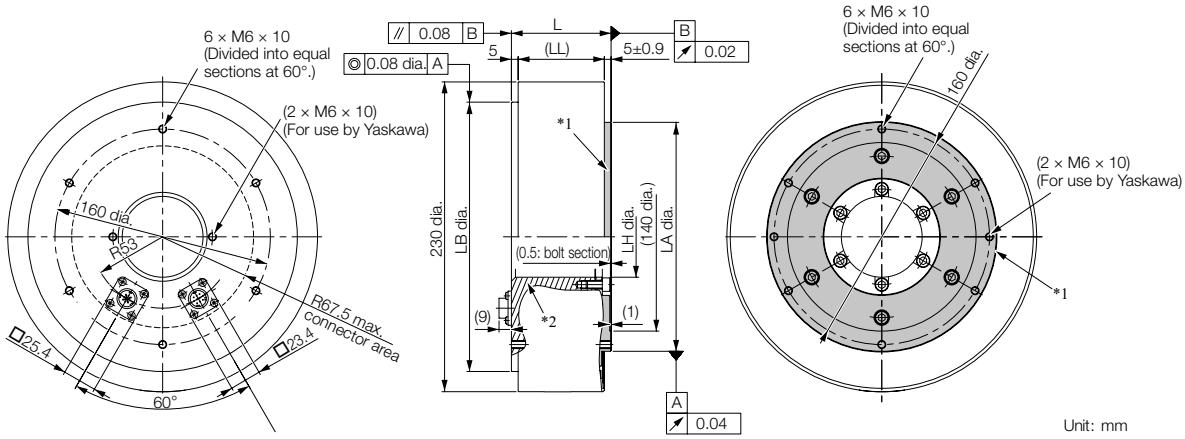

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 04C☐C41 | 69 | 59 | $160^{0}_{-0.040}$ | $35^{+0.4}_{0}$ | $130^{0}_{-0.040}$ | 7.2 |
| 10C☐C41 | 90 | 80 | $160^{0}_{-0.040}$ | $35^{+0.4}_{0}$ | $130^{0}_{-0.040}$ | 10.2 |
| 14C☐C41 | 130 | 120 | $160^{0}_{-0.040}$ | $35^{+0.4}_{0}$ | $130^{0}_{-0.040}$ | 14.2 |

Refer to the following section for information on connectors in Connector Specifications.

## SGMCS-☐☐D

### Flange Specification 1

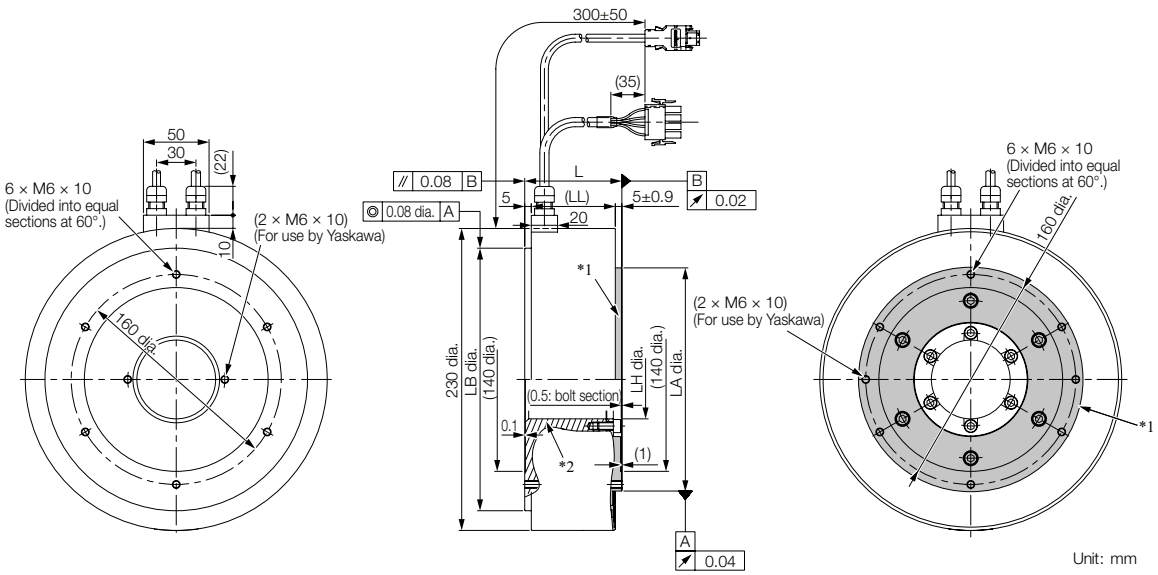



Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| ☐ | | | | | | |
| ☐ | | | | | | |
| ☐ | | | | | | |

### Flange Specification 4




Unit: mm

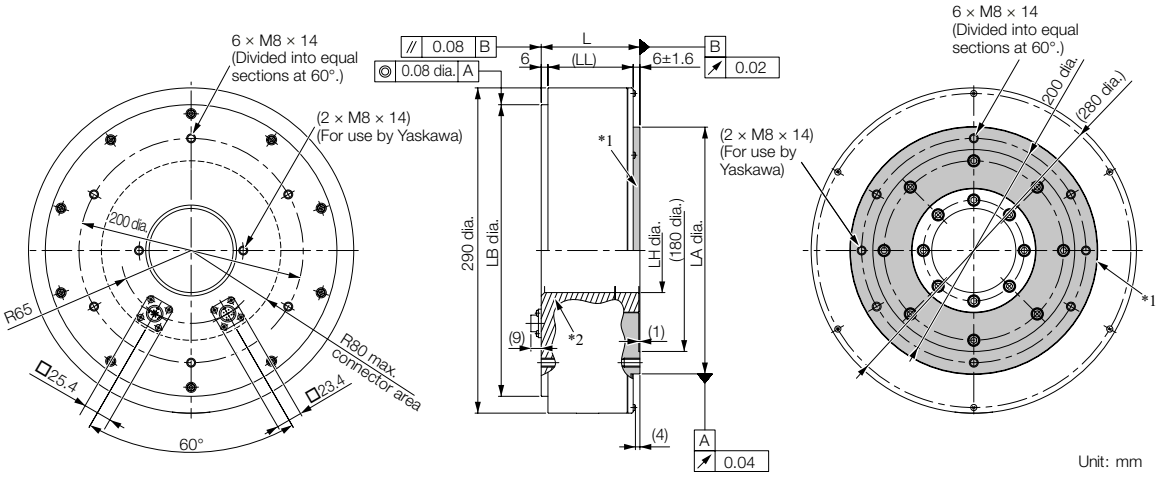
*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 08D☐C41 | 74 | 64 | $200^{0}_{-0.046}$ | $60^{+0.4}_{0}$ | $170^{0}_{-0.040}$ | 14.0 |
| 17D☐C41 | 110 | 100 | $200^{0}_{-0.046}$ | $60^{+0.4}_{0}$ | $170^{0}_{-0.040}$ | 22.0 |
| 25D☐C41 | 160 | 150 | $200^{0}_{-0.046}$ | $60^{+0.4}_{0}$ | $170^{0}_{-0.040}$ | 29.7 |

Refer to the following section for information on connectors in Connector Specifications.

## SGMCS-☐☐E

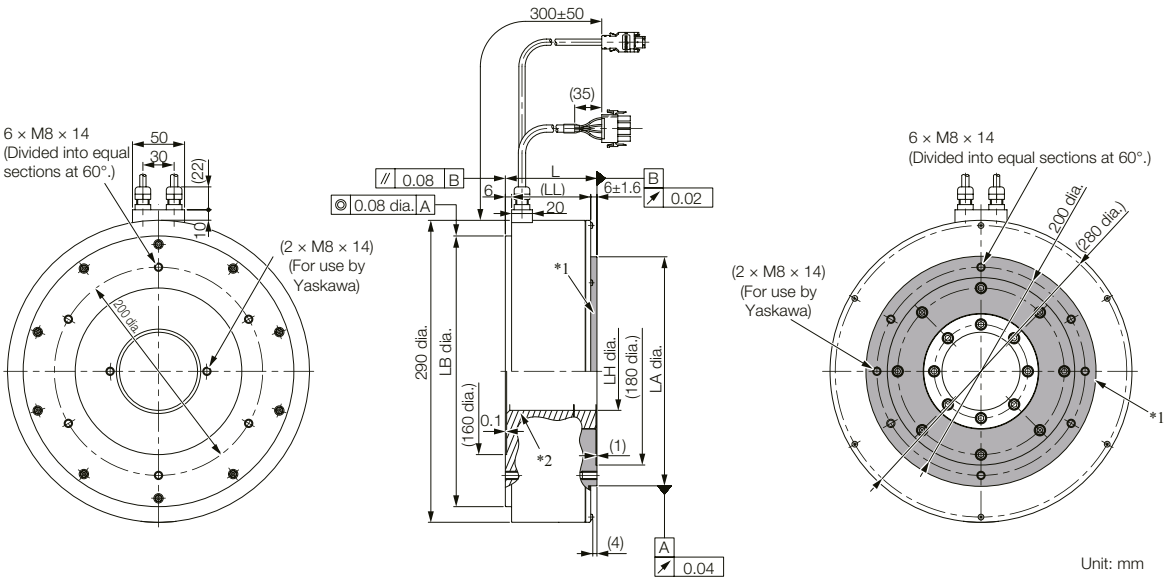
### Flange Specification 1




*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16E☐B11 | 88 | 76 | $260^{0}_{-0.052}$ | $75^{+0.4}_{0}$ | $220^{0}_{-0.046}$ | 26.0 |
| 35E☐B11 | 112 | 100 | $260^{0}_{-0.052}$ | $75^{+0.4}_{0}$ | $220^{0}_{-0.046}$ | 34.0 |

### Flange Specification 4




*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.
Note: Values in parentheses are reference dimensions.

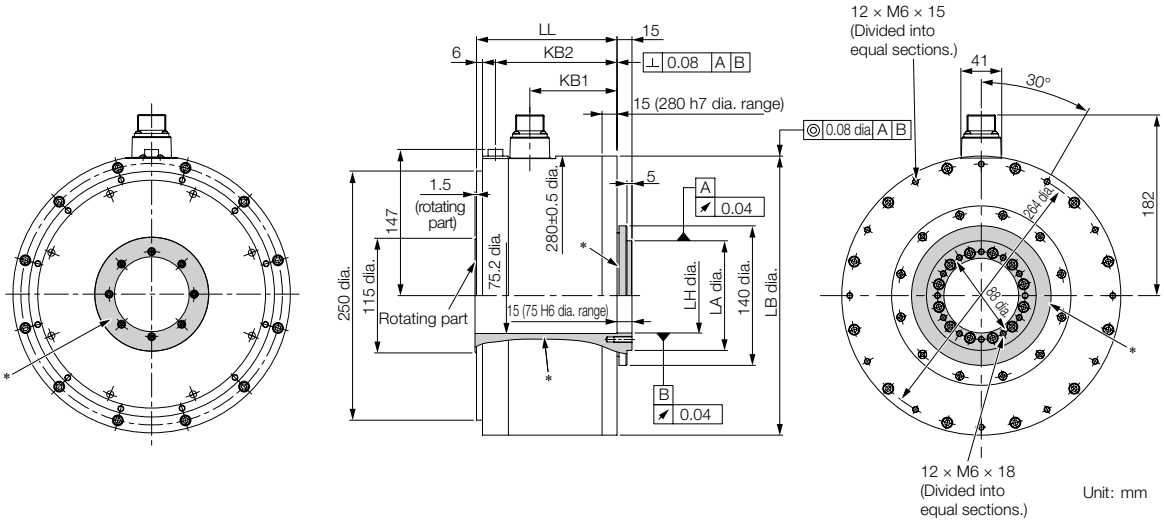
| Model SGMCS- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16E☐B41 | 88 | 76 | $260^{0}_{-0.052}$ | $75^{+0.4}_{0}$ | $220^{0}_{-0.046}$ | 26.0 |
| 35E☐B41 | 112 | 100 | $260^{0}_{-0.052}$ | $75^{+0.4}_{0}$ | $220^{0}_{-0.046}$ | 34.0 |

Refer to the following section for information on connectors in Connector Specifications.

# Medium-Capacity Motors with Cores

## SGMCS-□□M

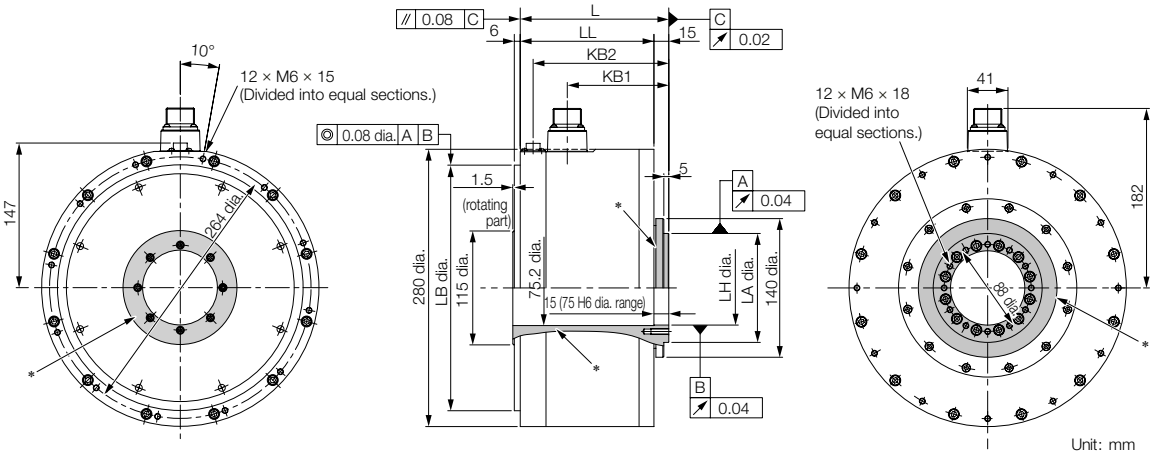
### Flange Specification 1




* The shaded section indicates the rotating parts.

| Model SGMCS- | L | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|
| 45M□A11 | 141 | 87.5 | 122 | $280^{0}_{-0.052}$ | $75^{+0.019}_{0}$ | $110^{0}_{-0.035}$ | 38 |
| 80M□A11 | 191 | 137.5 | 172 | $280^{0}_{-0.052}$ | $75^{+0.019}_{0}$ | $110^{0}_{-0.035}$ | 45 |
| 1AM□A11 | 241 | 187.5 | 222 | $280^{0}_{-0.052}$ | $75^{+0.019}_{0}$ | $110^{0}_{-0.035}$ | 51 |

### Flange Specification 3



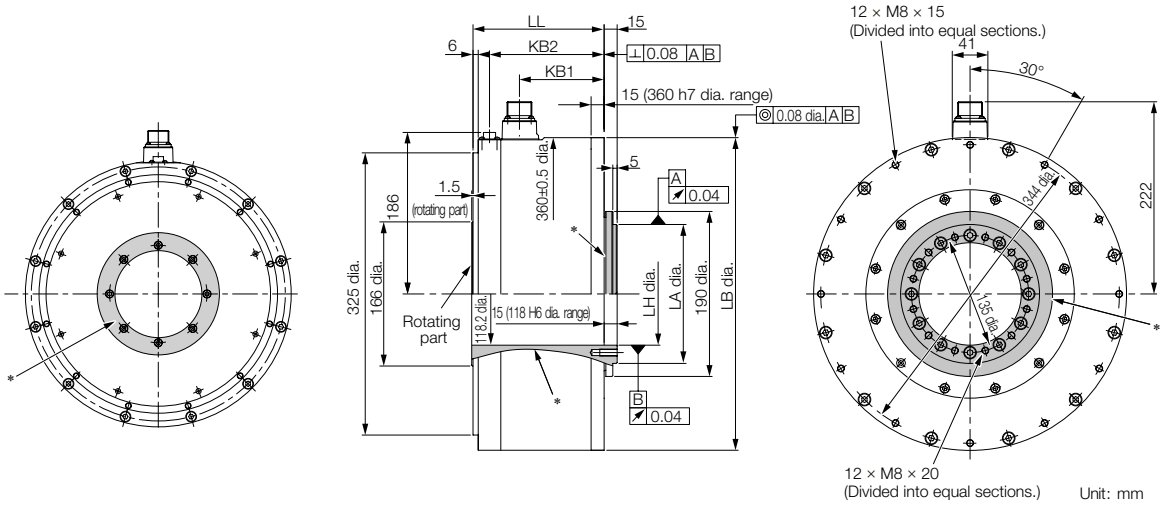

* The shaded section indicates the rotating parts.

| Model SGMCS- | L | LL | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 45M□A31 | 150 | 135 | 102.5 | 137 | $248^{0}_{-0.046}$ | $75^{+0.019}_{0}$ | $110^{0}_{-0.035}$ | 38 |
| 80M□A31 | 200 | 185 | 152.5 | 187 | $248^{0}_{-0.046}$ | $75^{+0.019}_{0}$ | $110^{0}_{-0.035}$ | 45 |
| 1AM□A31 | 250 | 235 | 202.5 | 237 | $248^{0}_{-0.046}$ | $75^{+0.019}_{0}$ | $110^{0}_{-0.035}$ | 51 |

Refer to the following section for information on connectors in Connector Specifications.

## SGMCS-☐☐N

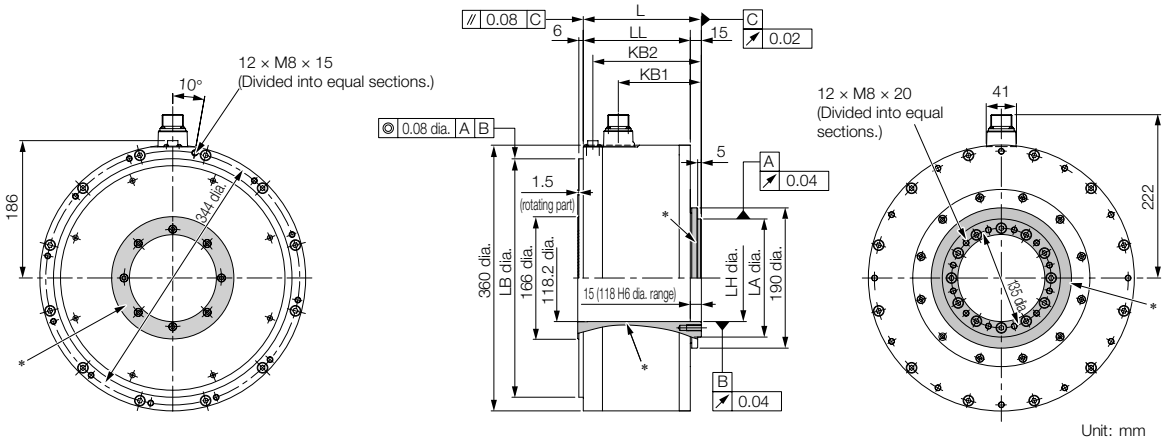
### Flange Specification 1




* The shaded section indicates the rotating parts.

| Model SGMCS- | L | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|
| 80N☐A11 | 151 | 98 | 132 | $360^{0}_{-0.057}$ | $118^{+0.022}_{0}$ | $160^{0}_{-0.040}$ | 50 |
| 1EN☐A11 | 201 | 148 | 182 | $360^{0}_{-0.057}$ | $118^{+0.022}_{0}$ | $160^{0}_{-0.040}$ | 68 |
| 2ZN☐A11 | 251 | 198 | 232 | $360^{0}_{-0.057}$ | $118^{+0.022}_{0}$ | $160^{0}_{-0.040}$ | 86 |

### Flange Specification 3




* The shaded section indicates the rotating parts.

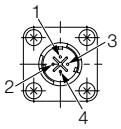
| Model SGMCS- | L | LL | KB1 | KB2 | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 80N☐A31 | 160 | 145 | 113 | 147 | $323^{0}_{-0.057}$ | $118^{+0.022}_{0}$ | $160^{0}_{-0.040}$ | 50 |
| 1EN☐A31 | 210 | 195 | 163 | 197 | $323^{0}_{-0.057}$ | $118^{+0.022}_{0}$ | $160^{0}_{-0.040}$ | 68 |
| 2ZN☐A31 | 260 | 245 | 213 | 247 | $323^{0}_{-0.057}$ | $118^{+0.022}_{0}$ | $160^{0}_{-0.040}$ | 86 |

Refer to the following section for information on connectors in Connector Specifications.

# Connector Specifications SGMCS

## SGMCS-□□B, -□□C, -□□D, or -□□E with Flange Specification 1

### Servomotor Connector

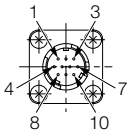



| | |
|---|---|
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | FG (frame ground) |

Model: JN1AS04MK2R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating Connector: JN1DS04FK1
(Not provided by YASKAWA)

### Encoder Connector



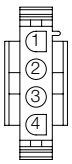

| | |
|---|---|
| 1 | PS |
| 2 | /PS |
| 3 | – |
| 4 | PG5V |
| 5 | – |
| 6 | – |
| 7 | FG (frame ground) |
| 8 | – |
| 9 | PG0V |
| 10 | – |

Model: JN1AS10ML1-R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating connector: JN1DS10SL1
(Not provided by YASKAWA)

## SGMCS-□□B, -□□C, -□□D, or -□□E with Flange Specification 4

### Servomotor Connector



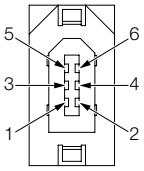

| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG (frame ground) | Green (yellow) |

Models
- Plug: 350779-1
- Pins: 350561-3 or 350690-3 (No.1 to 3)
- Ground pin: 350654-1 or 350669-1 (No. 4)

Manufacturer: Tyco Electronics Japan G.K.

Mating Connector
- Cap: 350780-1
- Socket: 350570-3 or 350689-3

### Encoder Connector



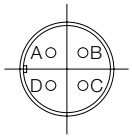

| | |
|---|---|
| 1 | PG5V |
| 2 | PG0V |
| 3 | – |
| 4 | – |
| 5 | PS |
| 6 | /PS |
| Connector Case | FG (frame ground) |

Model: 55102-0600
Manufacturer: Molex Japan LLC

Mating Connector: 54280-0609

## SGMCS-□□M or -□□N with Flange Specification 1 or 3

### Servomotor Connector

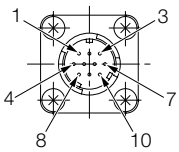



| | |
|---|---|
| A | Phase U |
| B | Phase V |
| C | Phase W |
| D | FG (frame ground) |

Model: CE05-2A18-10PD
Manufacturer: DDK Ltd.

Mating Connector
Plug: CE05-6A18-10SD-B-BSS
Cable clamp: CE3057-10A-□(D265)

### Encoder Connector




| | |
|---|---|
| 1 | PS |
| 2 | /PS |
| 3 | – |
| 4 | PG5V |
| 5 | – |
| 6 | – |
| 7 | FG (frame ground) |
| 8 | – |
| 9 | PG0V |
| 10 | – |

Model: JN1AS10ML1
Manufacturer: Japan Aviation Electronics Industry, Ltd.

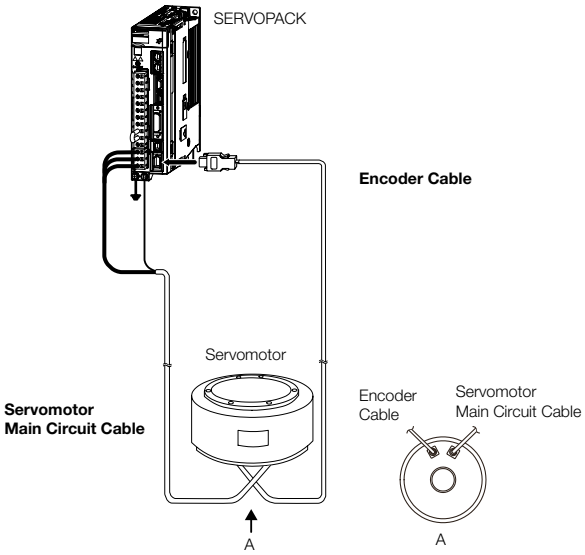
Mating connector: JN1DS10SL1
(Not provided by YASKAWA)

# Selecting Cables SGMCS

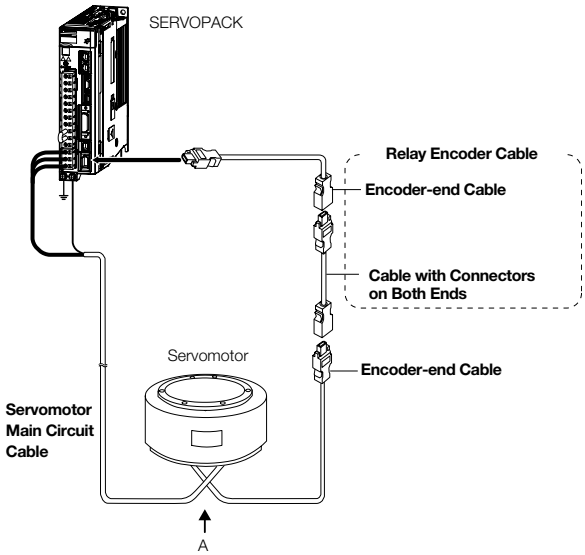
### Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

#### Encoder Cable of 20 m or less

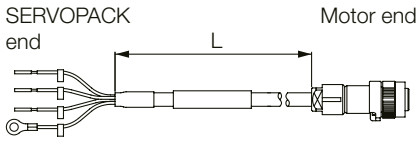
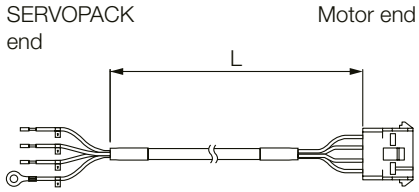



#### Encoder Cable of 30 m to 50 m (Relay Cable)

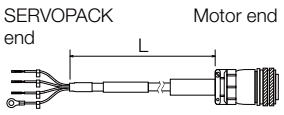
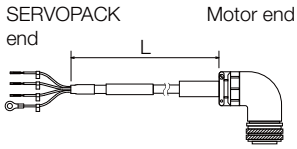
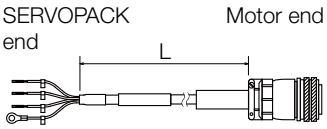
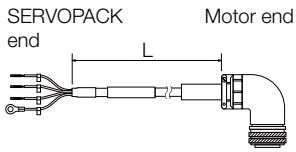
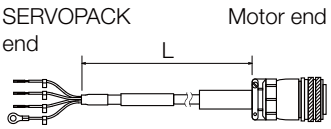
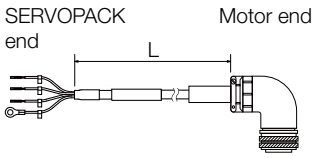



Note:
1. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
2. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials: Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

# Servomotor Main Circuit Cables

| Servomotor Model | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable*1 | |
| SGMCS-☐☐B<br>SGMCS-☐☐C<br>SGMCS-☐☐D<br>SGMCS-☐☐E<br><br>Flange Specification: 1 *2<br>Non-load side installation | 3 m | JZSP-CMM60-03-E | JZSP-CSM60-03-E |  |
| | 5 m | JZSP-CMM60-05-E | JZSP-CSM60-05-E | |
| | 10 m | JZSP-CMM60-10-E | JZSP-CSM60-10-E | |
| | 15 m | JZSP-CMM60-15-E | JZSP-CSM60-15-E | |
| | 20 m | JZSP-CMM60-20-E | JZSP-CSM60-20-E | |
| SGMCS-☐☐B<br>SGMCS-☐☐C<br>SGMCS-☐☐D<br>SGMCS-☐☐E<br><br>Flange Specification: 4 *2<br>Non-load side installation<br>(with cable on side) | 3 m | JZSP-CMM00-03-E | JZSP-CMM01-03-E |  |
| | 5 m | JZSP-CMM00-05-E | JZSP-CMM01-05-E | |
| | 10 m | JZSP-CMM00-10-E | JZSP-CMM01-10-E | |
| | 15 m | JZSP-CMM00-15-E | JZSP-CMM01-15-E | |
| | 20 m | JZSP-CMM00-20-E | JZSP-CMM01-20-E | |

Continued on next page.

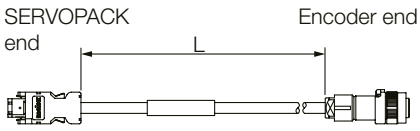
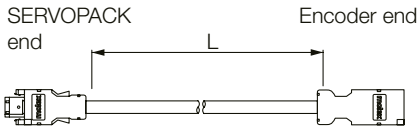
| Servomotor Model | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable*1 | |
| SGMCS-□□M<br>SGMCS-□□N<br><br>□□: 45<br>□□: 80 | 3 m | JZSP-USA101-03-E | JZSP-USA121-03-E |  |
| | 5 m | JZSP-USA101-05-E | JZSP-USA121-05-E | |
| | 10 m | JZSP-USA101-10-E | JZSP-USA121-10-E | |
| | 15 m | JZSP-USA101-15-E | JZSP-USA121-15-E | |
| | 20 m | JZSP-USA101-20-E | JZSP-USA121-20-E | |
| | 3 m | JZSP-USA102-03-E | JZSP-USA122-03-E |  |
| | 5 m | JZSP-USA102-05-E | JZSP-USA122-05-E | |
| | 10 m | JZSP-USA102-10-E | JZSP-USA122-10-E | |
| | 15 m | JZSP-USA102-15-E | JZSP-USA122-15-E | |
| | 20 m | JZSP-USA102-20-E | JZSP-USA122-20-E | |
| SGMCS-□□M<br>SGMCS-□□N<br><br>□□: 1A | 3 m | JZSP-USA301-03-E | JZSP-USA321-03-E |  |
| | 5 m | JZSP-USA301-05-E | JZSP-USA321-05-E | |
| | 10 m | JZSP-USA301-10-E | JZSP-USA321-10-E | |
| | 15 m | JZSP-USA301-15-E | JZSP-USA321-15-E | |
| | 20 m | JZSP-USA301-20-E | JZSP-USA321-20-E | |
| | 3 m | JZSP-USA302-03-E | JZSP-USA322-03-E |  |
| | 5 m | JZSP-USA302-05-E | JZSP-USA322-05-E | |
| | 10 m | JZSP-USA302-10-E | JZSP-USA322-10-E | |
| | 15 m | JZSP-USA302-15-E | JZSP-USA322-15-E | |
| | 20 m | JZSP-USA302-20-E | JZSP-USA322-20-E | |
| SGMCS-□□M<br>SGMCS-□□N<br><br>□□: 1E<br>□□: 2Z | 3 m | JZSP-USA501-03-E | JZSP-USA521-03-E |  |
| | 5 m | JZSP-USA501-05-E | JZSP-USA521-05-E | |
| | 10 m | JZSP-USA501-10-E | JZSP-USA521-10-E | |
| | 15 m | JZSP-USA501-15-E | JZSP-USA521-15-E | |
| | 20 m | JZSP-USA501-20-E | JZSP-USA521-20-E | |
| | 3 m | JZSP-USA502-03-E | JZSP-USA522-03-E |  |
| | 5 m | JZSP-USA502-05-E | JZSP-USA522-05-E | |
| | 10 m | JZSP-USA502-10-E | JZSP-USA522-10-E | |
| | 15 m | JZSP-USA502-15-E | JZSP-USA522-15-E | |
| | 20 m | JZSP-USA502-20-E | JZSP-USA522-20-E | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius of the Flexible Cables are given in the following table.

| Order Number | Recommended Bending Radius (R) | Order Number | Recommended Bending Radius (R) |
|---|---|---|---|
| JZSP-CSM60-□□-E | 55 mm min. | JZSP-USA321-□□-E | 113 mm min. |
| JZSP-CMN01-□□-E | | JZSP-USA322-□□-E | |
| JZSP-USA121-□□-E | 96 mm min. | JZSP-USA521-□□-E | 150 mm min. |
| JZSP-USA122-□□-E | | JZSP-USA522-□□-E | |

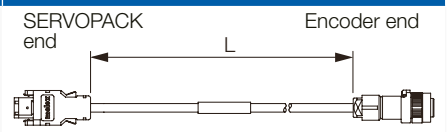
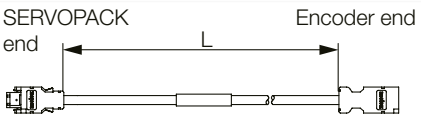
*2. Refer to Flange Specifications.
Note: Direct Drive Servomotors are not available with holding brakes.

## Encoder Cables of 20 m or less

| Servomotor Model | Description | Length | Order Number | | Appearance |
|---|---|---|---|---|---|
| | | | Standard Cable | Flexible Cable*1 | |
| SGMCS-□□<br>Flange Specification: 1 or 3 *2 | For incremental/ absolute encoder | 3 m | JZSP-CMP60-03-E | JZSP-CSP60-03-E |  |
| | | 5 m | JZSP-CMP60-05-E | JZSP-CSP60-05-E | |
| | | 10 m | JZSP-CMP60-10-E | JZSP-CSP60-10-E | |
| | | 15 m | JZSP-CMP60-15-E | JZSP-CSP60-15-E | |
| | | 20 m | JZSP-CMP60-20-E | JZSP-CSP60-20-E | |
| SGMCS-□□<br>Flange Specification: 4 *2 | | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 68 mm or larger.
*2. Refer to the Model Designations section for the flange specifications.

## Relay Encoder Cables of 30 m to 50 m

| Servomotor Model | Description | Length | Order Number*1 | Appearance |
|---|---|---|---|---|
| SGMCS-□□<br>Flange specification: 1 or 3 *2 | Encoder-end Cable (for incremental or absolute encoder) | 0.3 m | JZSP-CSP15-E |  |
| SGMCS-□□<br>Flange specification: 1, 3 or 4 *2 | Cables with Connectors on Both Ends (for incremental or absolute encoder) | 30 m | JZSP-UCMP00-30-E |  |
| | | 40 m | JZSP-UCMP00-40-E | |
| | | 50 m | JZSP-UCMP00-50-E | |

*1. Flexible Cables are not available.
*2. Refer to the Model Designations section for the flange specifications.

## Model Designations

SGMCV - 04 B E A 1 1

| Direct Drive Servomotors | 1st + 2nd | 3rd | 4th | 5th | 6th | 7th digit |
|---|---|---|---|---|---|---|

**1st + 2nd digit - Rated Output**

| Code | Specification |
|---|---|
| 04 | 4 Nm |
| 08 | 8 Nm |
| 10 | 10 Nm |
| 14 | 14 Nm |
| 17 | 17 Nm |
| 25 | 25 Nm |
| 35 | 35 Nm |

**3rd digit - Servomotor Outer Diameter**

| Code | Specification |
|---|---|
| B | 135 mm dia. |
| C | 175 mm dia. |
| D | 230 mm dia. |

**4th digit - Serial Encoder**

| Code | Specification |
|---|---|
| E | 22-bit single-turn absolute encoder |
| I | 22-bit multiturn absolute encoder |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**6th digit - Flange**

| Code | Mounting |
|---|---|
| 1 | Non-load side |
| 4 | Non-load side (with cable on side) |

**7th digit - Options**

| Code | Specification |
|---|---|
| 1 | Without options |
| 5 | High machine precision (runout at end of shaft and runout of shaft surface: 0.01 mm) |

Note:
1. Direct Drive Servomotors are not available with holding brakes.
2. This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## Manufactured Models

| Rated Torque [Nm] | Servomotor Outer Diameter | | |
|---|---|---|---|
| | B (135 mm dia.) | C (175 mm dia.) | D (230 mm dia.) |
| 4 | SGMCV-04B | — | — |
| 8 | — | SGMCV-08C | — |
| 10 | SGMCV-10B | — | — |
| 14 | SGMCV-14B | — | — |
| 16 | — | — | SGMCV-16D |
| 17 | — | SGMCV-17C | — |
| 25 | — | SGMCV-25C | — |
| 35 | — | — | SGMCV-35D |

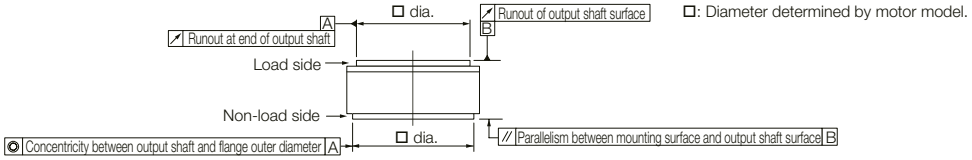
Note:
The above table shows combinations of the rated torque and outer diameter.
The fourth through seventh digits have been omitted.

# Direct Drive Servomotors SGMCV

## Specifications

| Model SGMCV- | | | 04B | 10B | 14B | 08C | 17C | 25C | 16D | 35D |
|---|---|---|---|---|---|---|---|---|---|---|
| Time Rating | | | Continuous | | | | | | | |
| Thermal Class | | | A | | | | | | | |
| Insulation Resistance | | | 500 VDC, 10 MΩ min. | | | | | | | |
| Withstand Voltage | | | 1,500 VAC for 1 minute | | | | | | | |
| Excitation | | | Permanent magnet | | | | | | | |
| Mounting | | | Flange-mounted | | | | | | | |
| Drive Method | | | Direct drive | | | | | | | |
| Rotation Direction | | | Counterclockwise (CCW) for forward run reference when viewed from the load side | | | | | | | |
| Vibration Class*1 | | | V15 | | | | | | | |
| Absolute Accuracy | | | ±15 s | | | | | | | |
| Repeatability | | | ±1.3 s | | | | | | | |
| Protective Structure*2 | | | Totally enclosed, self-cooled, IP42 | | | | | | | |
| Environmental Conditions | Ambient Air Temperature | | 0°C to 40°C (without freezing) | | | | | | | |
| | Ambient Air Humidity | | 20% to 80% relative humidity (without condensation) | | | | | | | |
| | Installation Site | | · Must be indoors and free of corrosive and explosive gases.<br>· Must be well-ventilated and free of dust and moisture.<br>· Must facilitate inspection and cleaning.<br>· Must have an altitude of 1,000 or less.<br>· Must be free of strong magnetic fields. | | | | | | | |
| | Storage Environment | | Store the Servomotor in the following environment if you store it with the power cable disconnected.<br>Storage Temperature: -20°C to 60°C (without freezing)<br>Storage Humidity: 20% to 80% relative humidity (without condensation) | | | | | | | |
| Mechanical Tolerances*3 | Runout of Output Shaft Surface | mm | 0.02 (0.01 for high machine precision option) | | | | | | | |
| | Runout at End of Output Shaft | mm | 0.04 (0.01 for high machine precision option) | | | | | | | |
| | Parallelism between Mounting Surface and Output Shaft Surface | mm | 0.07 | | | | | | | |
| | Concentricity between Output Shaft and Flange Outer Diameter | mm | 0.07 | | | | | | | |
| Shock Resistance*4 | Impact Acceleration Rate at Flange | | 490 m/s$^2$ | | | | | | | |
| | Number of Impacts | | 2 times | | | | | | | |
| Vibration Resistance*4 | Vibration Acceleration Rate at Flange | | 49 m/s$^2$ | | | | | | | |
| Applicable SERVOPACKs | | SGD7S- | 2R8A, 2R8F | | 5R5A | 2R8A, 2R8F | 5R5A | 7R6A | 5R5A | 7R6A*5, 120A |
| | | SGD7W- | 2R8A | | | 2R8A | | | | 7R6A*5 |

*1. A vibration class of V15 indicates a vibration amplitude of 15 μm maximum on the Servomotor without a load at the rated motor speed.
*2. The hollow hole section, motor mounting surface, output shaft surface, and gap around the rotating part of the shaft are excluded. Protective structure specifications apply only when the special cable is used.
*3. Refer to the following figure for the relevant locations on the Servomotor. Refer to the dimensional drawings of the individual Servomotors for more information on tolerances.




*4. The given values are for when the Servomotor shaft is mounted horizontally and shock or vibration is applied in the directions shown in the following figures. The strength of the vibration that the Servomotor can withstand depends on the application. Check the vibration acceleration rate.

*5. Use derated values for this combination. Refer to the Ratings section for information on derating values.

# Direct Drive Servomotors SGMCV

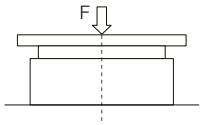
## Ratings

| Model SGMCV- | | | 04B | 10B | 14B | 08C | 17C | 25C | 16D | 35D |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated Output *1 | | W | 126 | 314 | 440 | 251 | 534 | 785 | 503 | 1,100<br>1,000*5 |
| Rated Torque *1, *2 | | Nm | 4.00 | 10.0 | 14.0 | 8.00 | 17.0 | 25.0 | 16 | 35 |
| Instantaneous Maximum Torque *1 | | Nm | 12.0 | 30.0 | 42.0 | 24.0 | 51.0 | 75.0 | 48 | 105 |
| Stall Torque *1 | | Nm | 4.00 | 10.0 | 14.0 | 8.00 | 17.0 | 25.0 | 16 | 35 |
| Rated Current *1 | | A | 1.8 | 2.8 | 4.6 | 2.3 | 4.5 | | 5 | |
| Instantaneous Maximum Current *1 | | A | 5.6 | 8.9 | 14.1 | 7.3 | 14.7 | 13.9 | 16.9 | 16 |
| Rated Motor Speed *1 | | $min^{-1}$ | | | | 300 | | | | 300<br>270*5 |
| Maximum Motor Speed *1 | | $min^{-1}$ | | | 600 | | | 500 | 600 | 400 |
| Torque Constant | | Nm/A | 2.39 | 3.81 | 3.27 | 3.81 | 4.04 | 6.04 | 3.35 | 7.33 |
| Motor Moment of Inertia | | $\times 10^{-4}$ kg·$m^2$ | 16.2 | 25.2 | 36.9 | 56.5 | 78.5 | 111 | 178 | 276 |
| Rated Power Rate *1 | | kW/s | 9.88 | 39.7 | 53.1 | 11.3 | 36.8 | 56.3 | 14.4 | 44.4 |
| Rated Angular Acceleration Rate *1 | | $rad/s^2$ | 2,470 | 3,970 | 3,790 | 1,420 | 2,170 | 2,250 | 899 | 1,270 |
| Heat Sink Size | | mm | 350 × 350 × 12 | | | 450 × 450 × 12 | | | 550 x 550 x 12 | |
| Allowable Load Moment of Inertia (Motor Moment of Inertia Ratio) | | | 25 times | 40 times | 45 times | 15 times | 25 times | 25 times | 10 times | 15 times |
| | With External Regenerative Resistor and External Dynamic Brake Resistor*3 | | 25 times | 40 times | 45 times | 15 times | 25 times | 25 times | 10 times | 15 times |
| Allowable Load *4 | Allowable Thrust Load | N | | 1,500 | | | 3,300 | | 4,000 | |
| | Allowable Moment Load | Nm | 45 | 55 | 65 | 92 | 98 | 110 | 210 | 225 |

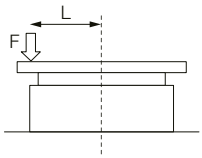
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated torques are the continuous allowable torque values at a surrounding air temperature of 40°C with a steel heat sink of the dimensions given in the table.
*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

*4. The thrust loads and moment loads that are applied while a Servomotor is operating are roughly classified into the following patterns. Design the machine so that the thrust loads or moment loads will not exceed the values given in the table.
*5. If you use an SGD7S-7R6A SERVOPACK and SGMCV-35D Servomotor together, use this value (a derated value).

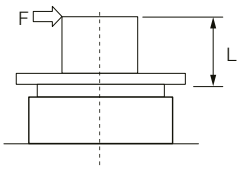
Note: For the bearings used in these Servomotors, the loss depends on the bearing temperature. The amount of heat loss is higher at low temperatures.




Where F is the external force,
Thrust load = F + Load mass
Moment load = 0



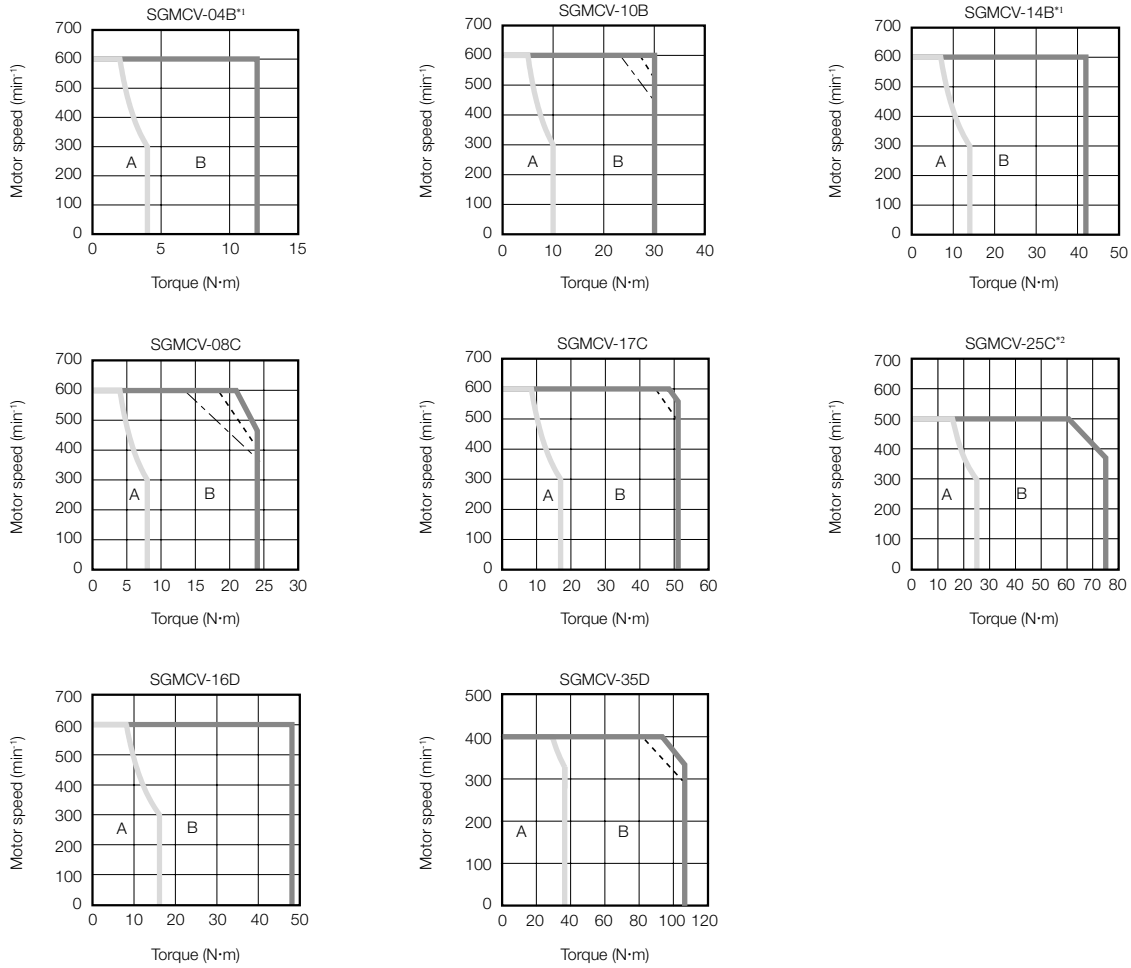

Where F is the external force,
Thrust load = F + Load mass
Moment load = F × L




Where F is the external force,
Thrust load = Load mass
Moment load = F × L

## Torque-Motor Speed Characteristics

A : Continuous duty zone ——— (solid lines): With three-phase 200-V or single-phase 230-V input
B : Intermittent duty zone - - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input



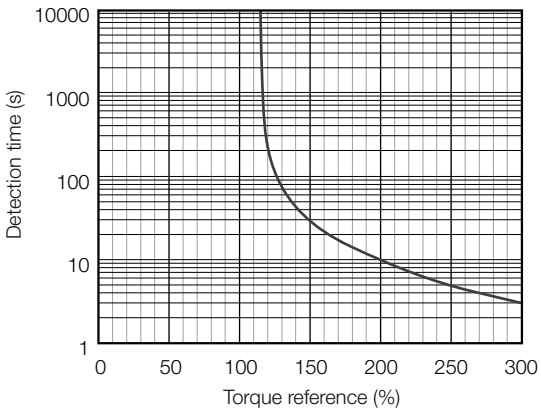

*1. The characteristics are the same for three-phase 200 V, single-phase 200 V, and single-phase 100 V.
*2. Contact your YASKAWA representative for information on the SGMCV-25C.

Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.

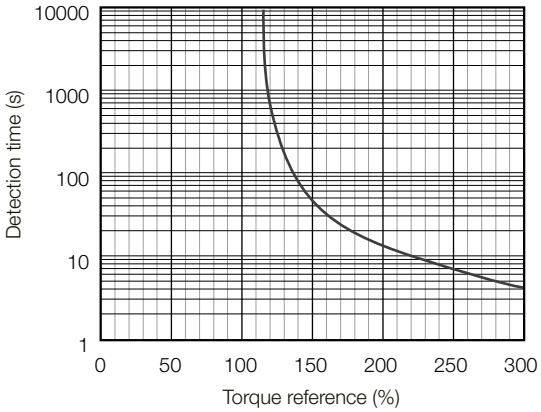
## Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

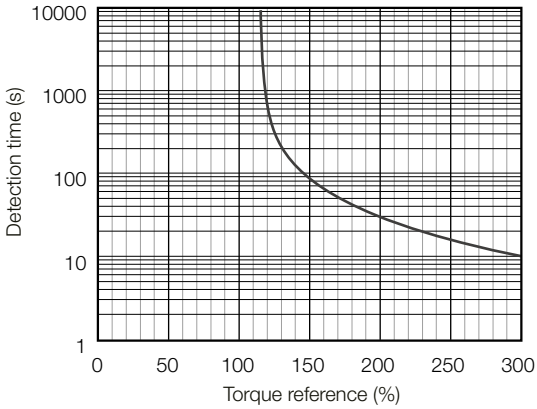
SGMCV-□□B



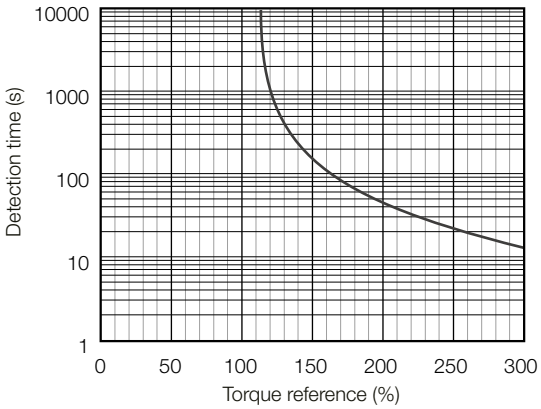

SGMCV-08C



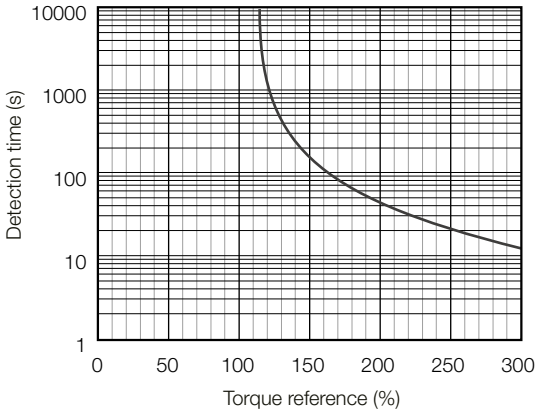

SGMCV-17C and -25C




SGMCV-16D




SGMCV-35D




Note: The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
Use the Servomotor so that the effective torque remains within the continuous duty zone given in Torque-Motor Speed Characteristics.

# Allowable Load Moment of Inertia

The allowable load moments of inertia (motor moment of inertia ratios) for the Servomotors are given in the Ratings section. The values are determined by the regenerative energy processing capacity of the SERVOPACK and are also affected by the drive conditions of the Servomotor. Perform the required Steps for each of the following cases.
Use the SigmaSize+ AC Servo Drive Capacity Selection Program to check the driving conditions. Contact your YASKAWA representative for information on this program.

## Exceeding the allowable Load Moment of Inertia

Use one of the following measures to adjust the load moment of inertia to within the allowable value.

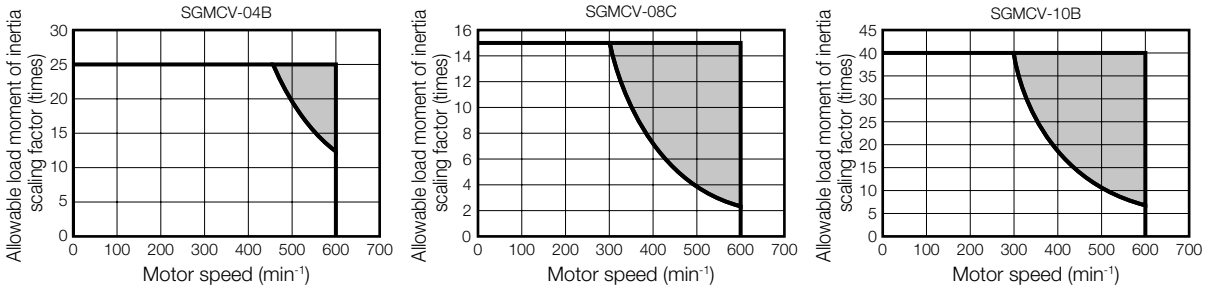
- Reduce the torque limit.
- Reduce the deceleration rate.
- Reduce the maximum motor speed.

If the above steps are not possible, install an external regenerative resistor.

Information
An Overvoltage Alarm (A.400) is likely to occur during deceleration if the load moment of inertia exceeds the allowable load moment of inertia. SERVOPACKs with a built-in regenerative resistor may generate a Regenerative Overload Alarm (A.320). Refer to "Built-In Regenerative Resistor" for the regenerative power (W) that can be processed by the SERVOPACKs.
Install an External Regenerative Resistor when the built-in regenerative resistor cannot process all of the regenerative power.

## SERVOPACKs without built-in Regenerative Resistors

The following graph shows the allowable load moment of inertia scaling factor of the motor speed (reference values for deceleration operation at or above the rated torque). Application is possible without an external regenerative resistor within the allowable value. However, an External Regenerative Resistor is required in the shaded areas of the graphs.




Note: Applicable SERVOPACK models: SGD7S-2R8A and -2R8F

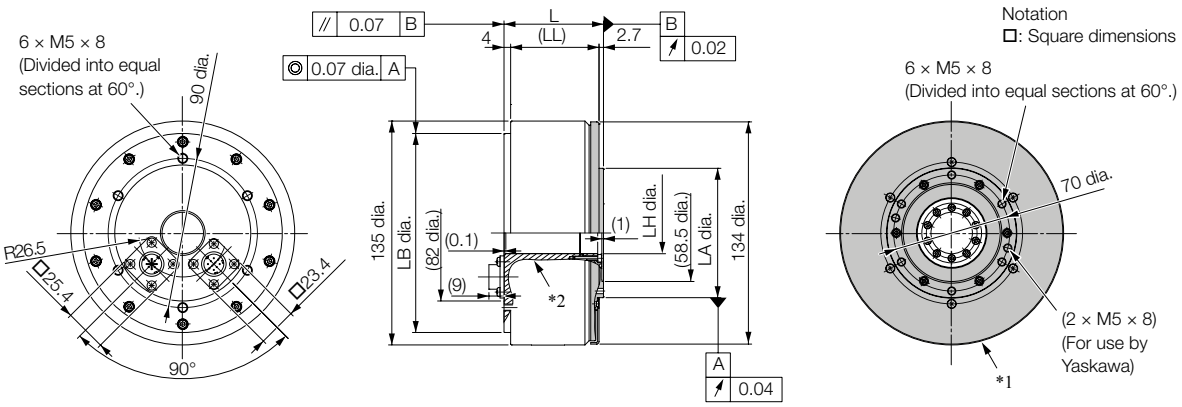
## When an External Regenerative Resistor Is Required

Install the External Regenerative Resistor. Refer to the External Regenerative Resistors section for the recommended products.

# External Dimensions

## SGMCV-□□B

### Flange Specification 1



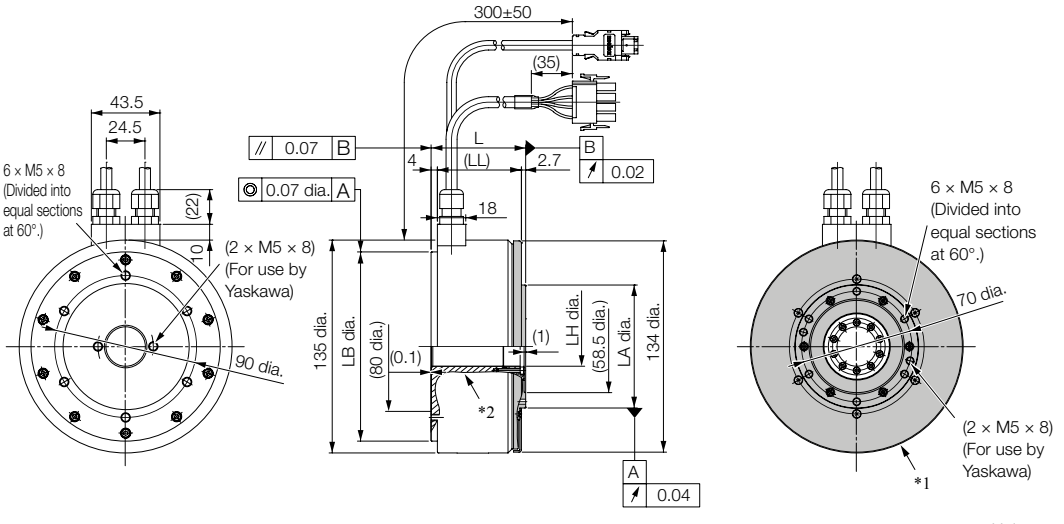

Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.

Note: Values in parentheses are reference dimensions.

| Model SGMCV- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 04B□A11 | 60 | 53.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.030}$ | 5.0 |
| 10B□A11 | 85 | 78.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.030}$ | 6.5 |
| 14B□A11 | 115 | 108.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.030}$ | 9.0 |

### Flange Specification 4




Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.

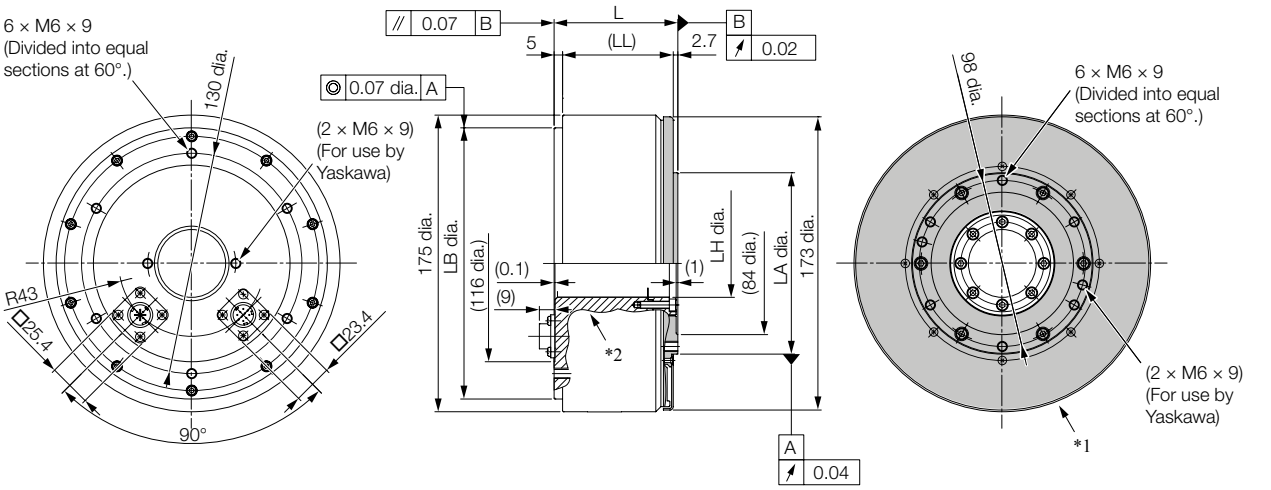
Note: Values in parentheses are reference dimensions.

| Model SGMCV- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 04B□A41 | 60 | 53.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.030}$ | 5.0 |
| 10B□A41 | 85 | 78.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.030}$ | 6.5 |
| 14B□A41 | 115 | 108.3 | $120^{0}_{-0.035}$ | $25^{+0.3}_{+0.1}$ | $78^{0}_{-0.030}$ | 9.0 |

Refer to the Connector Specifications section for information on connectors.

## SGMCV-□□C

### Flange Specification 1



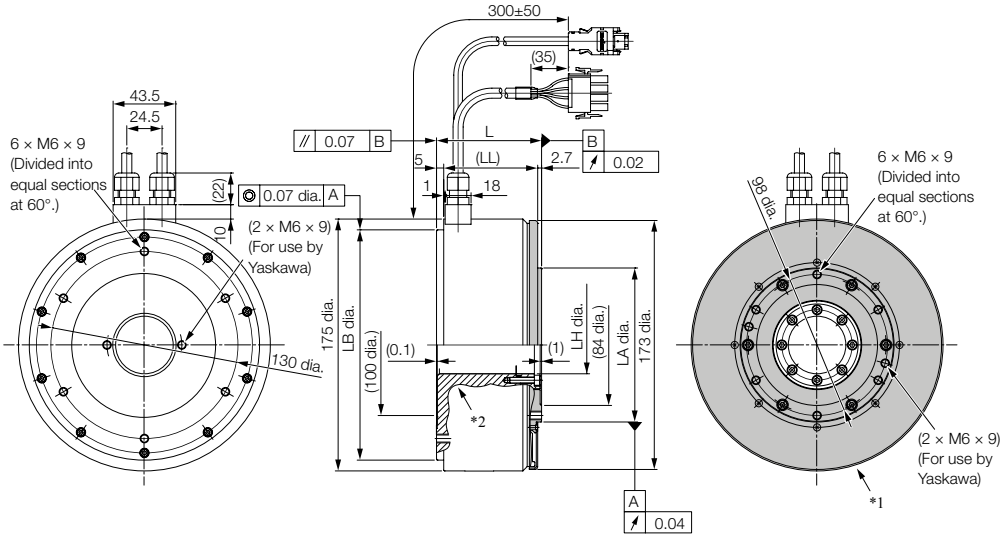

Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.

Note: Values in parentheses are reference dimensions.

| Model SGMCV- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 08C□A11 | 73 | 65.3 | $160^{0}_{-0.040}$ | $40^{+0.3}_{+0.1}$ | $107^{0}_{-0.035}$ | 9.0 |
| 17C□A11 | 87 | 79.3 | $160^{0}_{-0.040}$ | $40^{+0.3}_{+0.1}$ | $107^{0}_{-0.035}$ | 11.0 |
| 25C□A11 | 117 | 109.3 | $160^{0}_{-0.040}$ | $40^{+0.3}_{+0.1}$ | $107^{0}_{-0.035}$ | 15.0 |

### Flange Specification 4




Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.

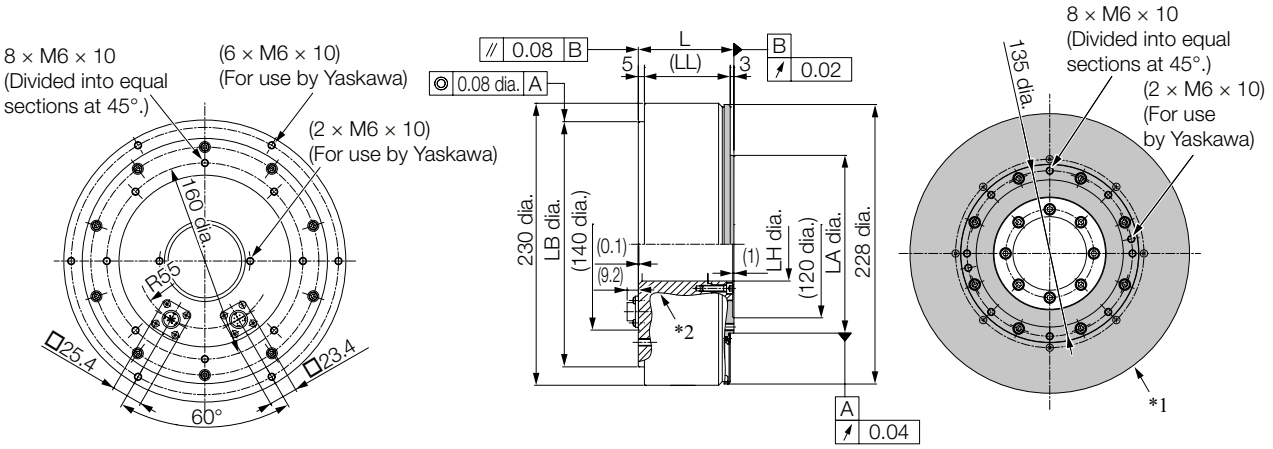
Note: Values in parentheses are reference dimensions.

| Model SGMCV- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 08C□A41 | 73 | 65.3 | $160^{0}_{-0.040}$ | $40^{+0.3}_{+0.1}$ | $107^{0}_{-0.035}$ | 9.0 |
| 17C□A41 | 87 | 79.3 | $160^{0}_{-0.040}$ | $40^{+0.3}_{+0.1}$ | $107^{0}_{-0.035}$ | 11.0 |
| 25C□A41 | 117 | 109.3 | $160^{0}_{-0.040}$ | $40^{+0.3}_{+0.1}$ | $107^{0}_{-0.035}$ | 15.0 |

Refer to the Connector Specifications section for information on connectors.

## SGMCV-□□D

### Flange Specification 1



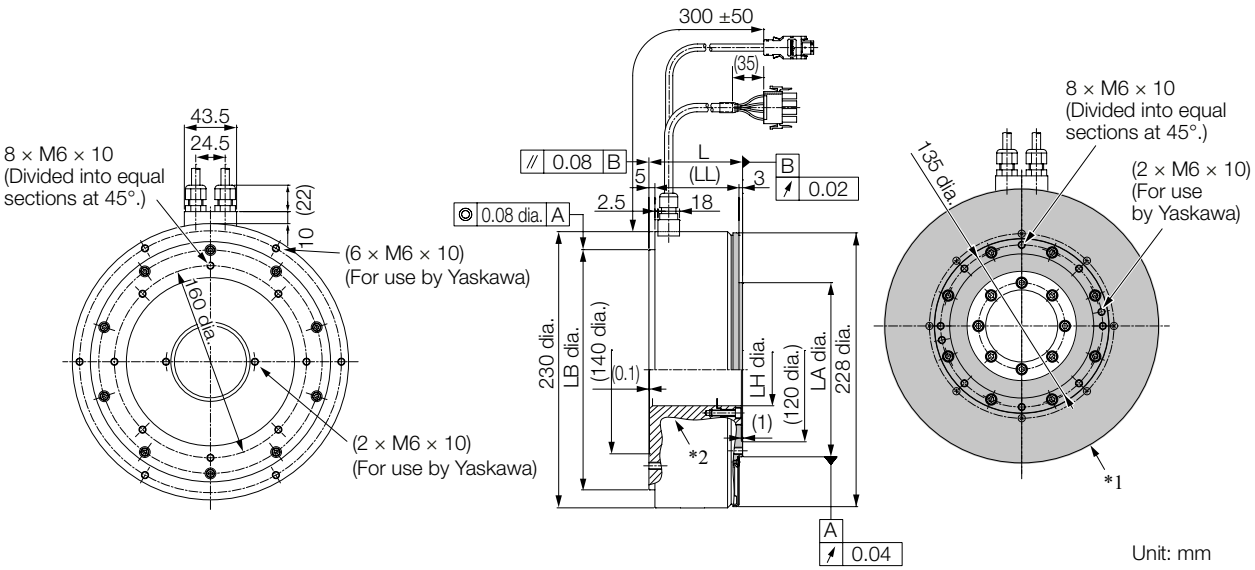

Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.

Note: Values in parentheses are reference dimensions.

| Model SGMCV- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16D□A11 | 78 | 70 | $200^{0}_{-0.046}$ | $60^{+0.4}_{0}$ | $145^{0}_{-0.04}$ | 16 |
| 35D□A11 | 107 | 99 | $200^{0}_{-0.046}$ | $60^{+0.4}_{0}$ | $145^{0}_{-0.04}$ | 25 |

### Flange Specification 4




Unit: mm

*1. The shaded section indicates the rotating parts.
*2. The hatched section indicates the non-rotating parts.

Note: Values in parentheses are reference dimensions.

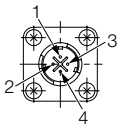
| Model SGMCV- | L | (LL) | LB | LH | LA | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 16D□A41 | 78 | 70 | $200^{0}_{-0.046}$ | $60^{+0.4}_{0}$ | $145^{0}_{-0.04}$ | 16 |
| 35D□A41 | 107 | 99 | $200^{0}_{-0.046}$ | $60^{+0.4}_{0}$ | $145^{0}_{-0.04}$ | 25 |

Refer to the Connector Specifications section for information on connectors.

# Connector Specifications SGMCV

## Flange Specification 1

### Servomotor Connector

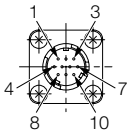



| | |
|---|---|
| 1 | Phase U |
| 2 | Phase V |
| 3 | Phase W |
| 4 | FG (frame ground) |

Model: JN1AS04MK2R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating Connector: JN1DS04FK1
(Not provided by YASKAWA)

### Encoder Connector



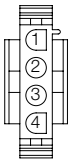

| | |
|---|---|
| 1 | PS |
| 2 | /PS |
| 3 | – |
| 4 | PG5V |
| 5* | BAT0 |
| 6 | – |
| 7 | FG (frame ground) |
| 8* | BAT |
| 9 | PG0V |
| 10 | – |

* Only absolute-value models with multiturn data.
Model: JN1AS10ML1-R
Manufacturer: Japan Aviation Electronics Industry, Ltd.

Mating connector: JN1DS10SL1
(Not provided by YASKAWA)

## Flange Specification 4

### Servomotor Connector



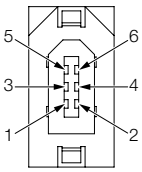

| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG (frame ground) | Green (yellow) |

Models
- Plug: 350779-1
- Pins: 350561-3 or 350690-3 (No.1 to 3)
- Ground pin: 350654-1 or 350669-1 (No. 4)

Manufacturer: Tyco Electronics Japan G.K.

Mating Connector
- Cap: 350780-1
- Socket: 350570-3 or 350689-3

### Encoder Connector




| | |
|---|---|
| 1 | PG5V |
| 2 | PG0V |
| 3* | BAT |
| 4* | BAT0 |
| 5 | PS |
| 6 | /PS |
| Connector Case | FG (frame ground) |

* Only absolute-value models with multiturn data.
Model: 55102-0600
Manufacturer: Molex Japan LLC

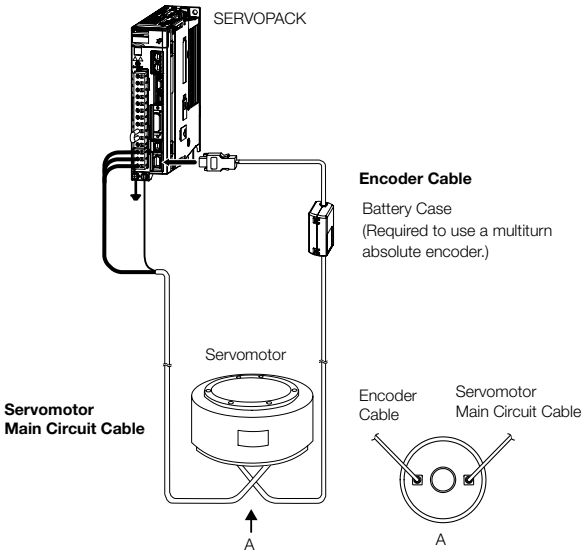
Mating Connector: 54280-0609

# Selecting Cables SGMCV

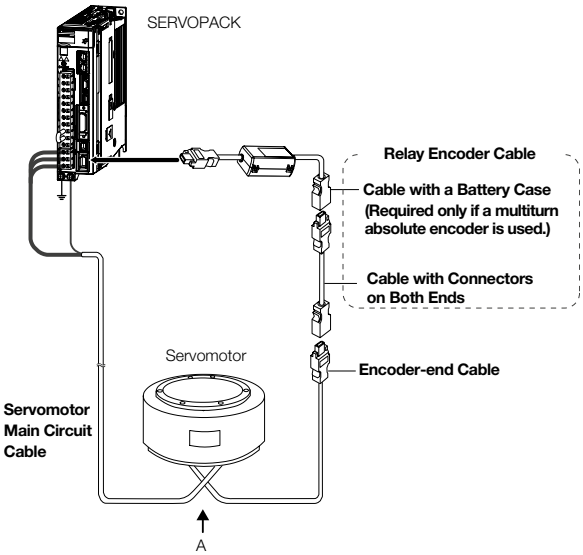
## Cable Configurations

The cables shown below are required to connect a Servomotor to a SERVOPACK.

### Encoder Cable of 20 m or less

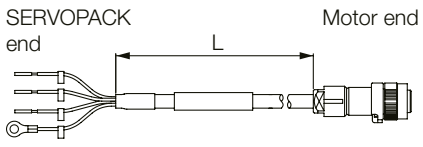
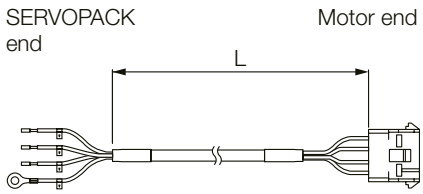



### Encoder Cable of 30 m to 50 m (Relay Cable)




Note:
1. If the Encoder Cable length exceeds 20 m, be sure to use a Relay Encoder Cable.
2. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torquemotor speed characteristics will become smaller because the voltage drop increases.
3. Refer to the following manual for the following information.
   - Cable dimensional drawings and cable connection specifications
   - Order numbers and specifications of individual connectors for cables
   - Order numbers and specifications for wiring materials: Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

# Servomotor Main Circuit Cables

| Servomotor Model | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable* | |
| SGMCV-□□□<br>Flange Specification: 1 *2<br>Non-load side installation | 3 m | JZSP-CMM60-03-E | JZSP-C7MDN23-03-E |  |
| | 5 m | JZSP-CMM60-05-E | JZSP-C7MDN23-05-E | |
| | 10 m | JZSP-CMM60-10-E | JZSP-C7MDN23-10-E | |
| | 15 m | JZSP-CMM60-15-E | JZSP-C7MDN23-15-E | |
| | 20 m | JZSP-CMM60-20-E | JZSP-C7MDN23-20-E | |
| SGMCV-□□□<br>Flange Specification: 4 *2<br>Non-load side installation (with cable on side) | 3 m | JZSP-CMM00-03-E | JZSP-C7MDS23-03-E |  |
| | 5 m | JZSP-CMM00-05-E | JZSP-C7MDS23-05-E | |
| | 10 m | JZSP-CMM00-10-E | JZSP-C7MDS23-10-E | |
| | 15 m | JZSP-CMM00-15-E | JZSP-C7MDS23-15-E | |
| | 20 m | JZSP-CMM00-20-E | JZSP-C7MDS23-20-E | |

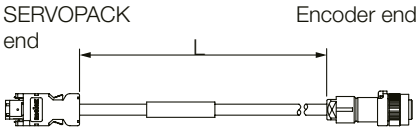
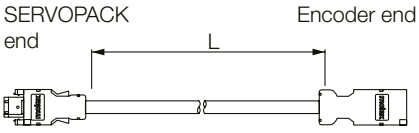
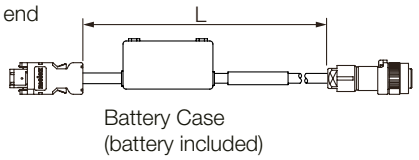
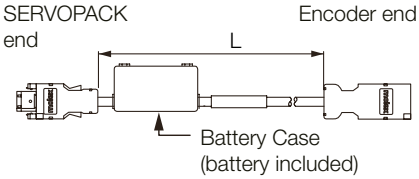




*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 90 mm or larger.
*2. Refer to the Model Designations section for the flange specifications.

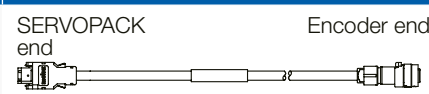
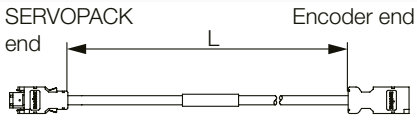
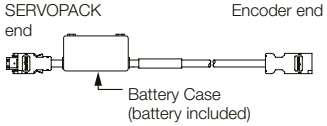
Note: Direct Drive Servomotors are not available with holding brakes.

## Encoder Cables of 20 m or less

| Servomotor Model | Description | Length | Order Number | | Appearance |
|---|---|---|---|---|---|
| | | | Standard Cable | Flexible Cable*1 | |
| SGMCV-□□□E<br>SGMCV-□□□E<br><br>Flange specification: 1 *2 | For singleturn absolute encoder (without Battery Case) | 3 m | JZSP-CMP60-03-E | JZSP-CSP60-03-E |  |
| | | 5 m | JZSP-CMP60-05-E | JZSP-CSP60-05-E | |
| | | 10 m | JZSP-CMP60-10-E | JZSP-CSP60-10-E | |
| | | 15 m | JZSP-CMP60-15-E | JZSP-CSP60-15-E | |
| | | 20 m | JZSP-CMP60-20-E | JZSP-CSP60-20-E | |
| SGMCV-□□□E<br>SGMCV-□□□E<br><br>Flange specification: 4 *2 | | 3 m | JZSP-CMP00-03-E | JZSP-CMP10-03-E |  |
| | | 5 m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | | 10 m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | | 15 m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | | 20 m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |
| SGMCV-□□□I<br>SGMCV-□□□I<br><br>Flange specification: 1 *2 | For multiturn absolute encoder (with Battery Case) | 3 m | JZSP-C7PA00-03-E | JZSP-C7PA20-03-E |  |
| | | 5 m | JZSP-C7PA00-05-E | JZSP-C7PA20-05-E | |
| | | 10 m | JZSP-C7PA00-10-E | JZSP-C7PA20-10-E | |
| | | 15 m | JZSP-C7PA00-15-E | JZSP-C7PA20-15-E | |
| | | 20 m | JZSP-C7PA00-20-E | JZSP-C7PA20-20-E | |
| SGMCV-□□□I<br>SGMCV-□□□I<br><br>Flange specification: 4 *2 | For multiturn absolute encoder (with Battery Case) | 3 m | JZSP-CSP19-03-E | JZSP-CSP29-03-E |  |
| | | 5 m | JZSP-CSP19-05-E | JZSP-CSP29-05-E | |
| | | 10 m | JZSP-CSP19-10-E | JZSP-CSP29-10-E | |
| | | 15 m | JZSP-CSP19-15-E | JZSP-CSP29-15-E | |
| | | 20 m | JZSP-CSP19-20-E | JZSP-CSP29-20-E | |

*1. Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 68 mm or larger.
*2. Refer to the Model Designations section for the flange specifications.
*3. Use one of these Cables if a battery is connected to the host controller.

## Relay Encoder Cables of 30 m to 50 m

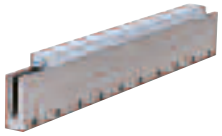
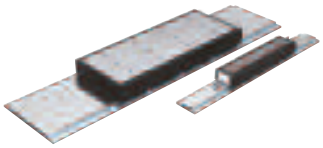
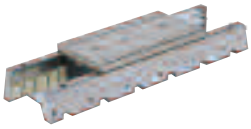
| Servomotor Model | Description | Length | Order Number*1 | Appearance |
|---|---|---|---|---|
| SGMCV-□□□□<br><br>Flange specification: 1 *2 | Encoder-end Cable (for single-turn/ multiturn absolute encoder) | 0.3 m | JZSP-C7PRC0-E |  |
| SGMCV-□□□□<br><br>Flange specification: 1 or 4 *2 | Cables with Connectors on Both Ends (for single-turn/multiturn absolute encoder) | 30 m | JZSP-UCMP00-30-E |  |
| | | 40 m | JZSP-UCMP00-40-E | |
| | | 50 m | JZSP-UCMP00-50-E | |
| SGMCV-□□□I<br><br>Flange specification: 1 or 4 *2 | Cable with a Battery Case (for multiturn absolute encoder)*3 | 0.3 m | ZSP-CSP12-E |  |

*1. Flexible Cables are not available.
*2. Refer to the Model Designations for the flange specifications.
*3. Use one of these Cables if a battery is connected to the host controller.

# Linear Servomotors


| | |
|---|---|
| SGLG (Coreless Models) | 206 |
| SGLFW / SGLFW2 (Models with F-Type Iron Cores) | 231 |
| SGLT (Models with T-Type Iron Cores) | 286 |
| Recommended Linear Encoders & Cables | 313 |

**Linear Servo Drives contribute to improved machine functionality and performance with exceptional features such as high speed, fast acceleration, long-stroke compatible, constant speed, stability, clean operation, low noise, and low maintenance.**

## Features

### Coreless Model (SGLG)

The lack of magnetic attraction force helps to extend the life of the linear motion guides and minimize operational noise in applications that require high precision with a small force.

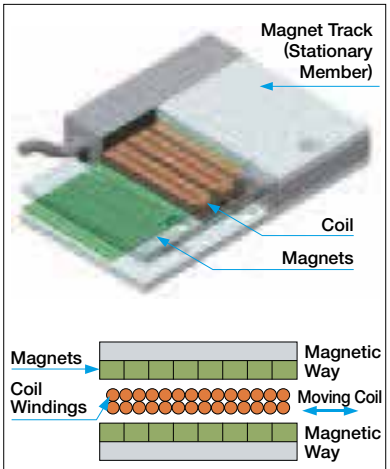
### Model with F-type Iron Cores (SGLF)

The compact profiles of the FW Linear Motors save installation space. The magnetic attraction between the Moving Coil and Magnetic Way allows the linear motion guides to be highly rigid.

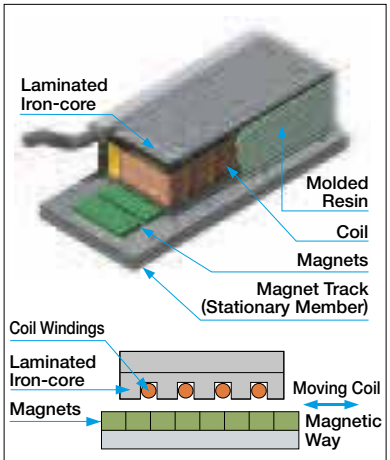
### Model with T-type Iron Cores (SGLT)

Yaskawa's unique structure negates the effects of magnetic attraction.
This reduces concerns for the structural strength of the linear motion guides and machinery.

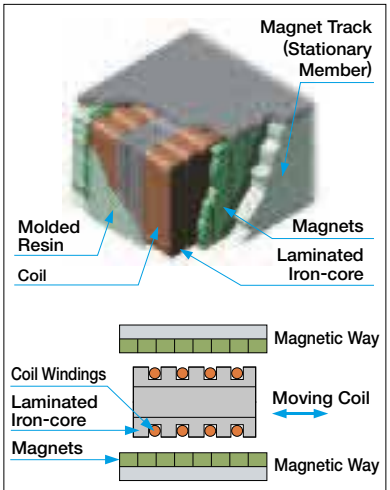
## Structures




- The Moving Coil has no core, and is made of accurately molded resin windings
- The Magnetic Way is made of two facing plates with accurately placed magnets secured on the sides.




- The Moving Coil consists of laminated core and pre-wound coil bobbins inserted into slots located in the laminated core and encapsulated in resin.
- The Magnetic Way is made of a row of magnets accurately placed on the core side of the carrier plate.



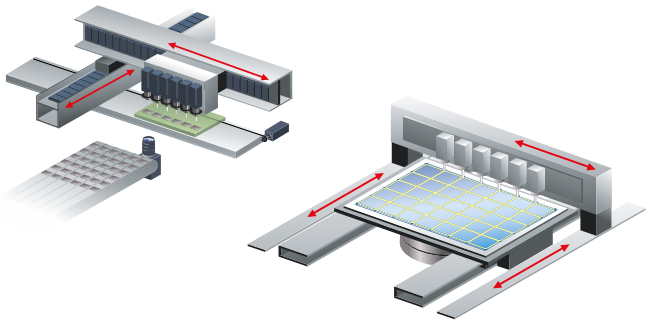

- The Moving Coil consists of laminated core and pre-wound coil bobbins inserted into slots located in the laminated core and encapsulated in resin.
- The Magnetic Way is made of a row of magnets accurately placed on carrier plates on both sides of the core.

## Applications

**Multiple heads**
Devices used in LCD and OLED manufacturing (dispensers, inspection equipment, repair equipment, etc.)

**Linear stages (X, Y, $\theta$)**
Devices used in LCD and OLED manufacturing (for G5.5 or larger glass substrates and for long strokes) and semiconductor manufacturing devices (probers, etc.)

**Gantries**
Devices for electronic parts manufacturing (high-speed chip mounters, etc.)

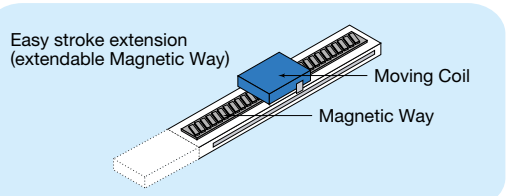


# Benefits of Linear Servomotors

## Benefits 1

- High Speed
- High Precision

### Linear Drive

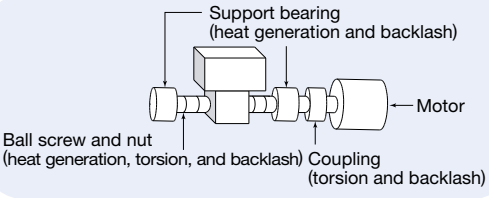



**Speed**
A load is directly driven by the Linear Servomotor without any restrictions on the speed.
**This easily enables speeds of up to 5 m/s.**

**Positioning Accuracy**
The load is directly driven in a fully-closed loop, enabling submicron positioning control at the sensor resolution.

**Stroke**
A long stroke can be achieved by coupling Magnetic Ways as required.

### Ball Screw Drive




Resonance and heat generation occur at high speeds.

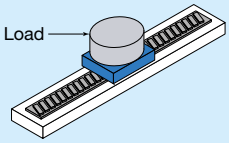
The actual position is likely to deviate from the target position due to torsion and backlash.

A ball screw must be selected according to the stroke length.

## Benefits 2

- Fast Acceleration
- Simple Structure

### Linear Drive



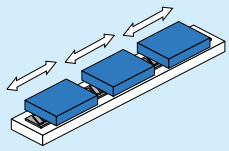

**Acceleration Rate**

$$\text{Acceleration rate} = \frac{\text{Force}}{M+m}$$

M = Load mass
m = Moving Coil mass

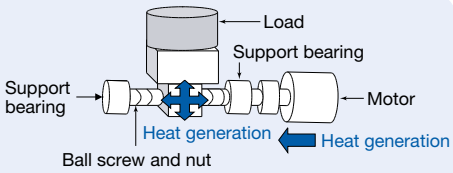
The acceleration rate can be increased just by lightening the load.

**Heat Generation**
Extremely limited heat transfer to the surroundings allows highly accurate positioning.



**Extendibility**
**Multiple Moving Coil can be mounted to one Magnetic Way.**
⇩
**・Simple structure.**
**・Versatile operations can be performed on the same axis.**

### Ball Screw Drive

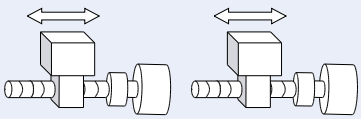



$$\text{Acceleration rate} = \frac{\text{Torque}}{J_L+J_B+J_C+J_M}$$

$J_L$ = Load inertia
$J_B$ = Ball screw inertia
$J_C$ = Coupling inertia
$J_M$ = Motor inertia

Lightening the load does not have much impact on increasing the acceleration rate.

The ball screw expands due to the heat generated at different parts, resulting in inconsistent positioning accuracy.

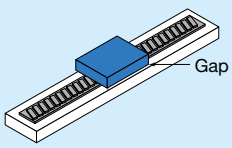


Multiple feeding units are required to perform versatile operations on the same axis.
⇩
**・Increased costs.**
**・One ball screw can be used for only one operation.**

## Benefits 3

- Easy Operation

### Linear Drive

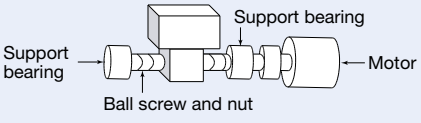



**Noise**
A table that uses a Linear Servomotor has limited mechanical contact areas and therefore **creates minimum operational noise.**

**Maintenance**
A table that uses a Linear Servomotor has limited mechanical contact areas, which greatly reduces the need for maintenance.

**Clean Environment**
The lack of any rotating parts creates a clean manufacturing environment without grease splattering.

### Ball Screw Drive




High-speed operation is likely to increase noise.

The many mechanical contact areas require periodic maintenance to be performed for lubrication and wear.

Rotating contact areas cause applied grease to splatter, making it difficult to keep a clean manufacturing environment.

# SGLG (Corless Models)

## Model Designations

### Moving Coil

SGL G W - 30 A 050 C P □ - E

Sigma-7 Series Linear Servomotors — 1st — 2nd — 3rd + 4th — 5th — 6th - 8th — 9th — 10th — 11th — 12th digit

**1st digit - Servomotor Type**

| Code | Specifications |
|---|---|
| G | Coreless model |

**2nd digit - Moving Coil/ Magnetic Way**

| Code | Specification |
|---|---|
| W | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 40 | 40 mm |
| 60 | 60 mm |
| 90 | 86 mm |

**5th digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**6th ... 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 050 | 50 mm |
| 080 | 80 mm |
| 140 | 140 mm |
| 200 | 199 mm |
| 253 | 252.5 mm |
| 365 | 365 mm |
| 370 | 367 mm |
| 535 | 535 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |

**10th digit - Sensor Specification and Cooling Method**

| Code | Specifications | | Applicable Models |
|---|---|---|---|
| | Polarity Sensor | Cooling Method | |
| None | None | Self-cooled | All models |
| C | None | Air-cooled | SGLGW-40A, -60A, -90A |
| H | Yes | Air-cooled | |
| P | Yes | Self-cooled | All models |

**11th digit - Connector for Servomotor Main Circuit Cable**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Connector from Tyco Electronics Japan G.K. | All models |
| D | Connector from Interconnectron GmbH | SGLGW-30A, -40A, -60A |

**12th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

### Magnetic Way

SGL G M - 30 108 C □ - E

Sigma-7 Series Linear Servomotors — 1st — 2nd — 3rd + 4th — 5th - 7th — 8th — 9th — 10th digit

**1st digit - Servomotor Type**

| Code | Specifications |
|---|---|
| G | Coreless model |

**2nd digit - Moving Coil/ Magnetic Way**

| Code | Specifications |
|---|---|
| M | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specifications |
|---|---|
| 30 | 30 mm |
| 40 | 40 mm |
| 60 | 60 mm |
| 90 | 86 mm |

**5rd ... 7th digit - Length of Magnetic Way**

| Code | Specifications |
|---|---|
| 090 | 90 mm |
| 108 | 108 mm |
| 216 | 216 mm |
| 225 | 225 mm |
| 252 | 252 mm |
| 360 | 360 mm |
| 405 | 405 mm |
| 432 | 432 mm |
| 450 | 450 mm |
| 504 | 504 mm |

**8th digit - Design Revision Order**

| Code | Specifications |
|---|---|
| A, B, C* | Revision |

**9th digit - Options**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Standard-force | All models |
| -M | High-force | SGLGM-40, -60 |

**10th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

*: SGLGM-40 and SGLGM-60 also have a CT Code.
C = Without mounting holes on the bottom.
CT = With mounting holes on the bottom.

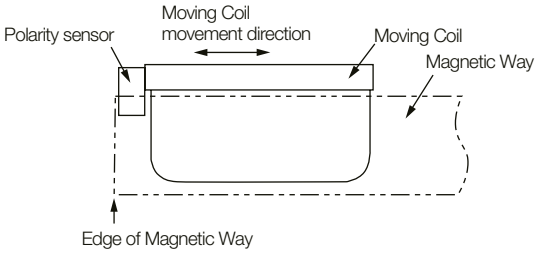
Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# Precautions on Moving Coils with Polarity Sensors

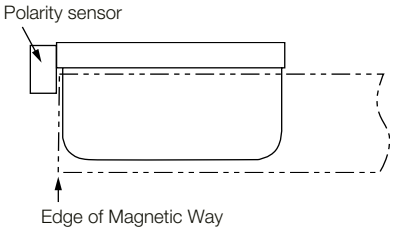
Note

When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.
When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length (L) of the Moving Coil and the polarity sensor. Refer to the following table.

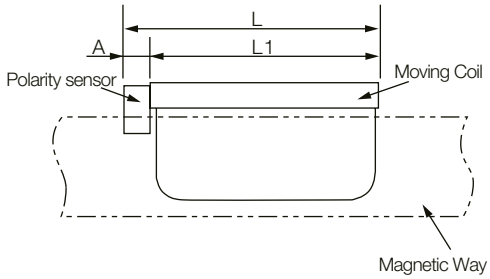
## Correct Installation




## Incorrect Installation




## Total Length of Moving Coil with Polarity Sensor




| Moving Coil Model SGLGW- | Length of Moving Coil L1 [mm] | Length of Polarity Sensor A [mm] | Total Length L [mm] |
|---|---|---|---|
| 30A050□P□ | 50 | 0 (Included in the length of Moving Coil) | 50 |
| 30A080□P□ | 80 | | 80 |
| 40A140□H□<br>40A140□P□ | 140 | 16 | 156 |
| 40A253□H□<br>40A253□P□ | 252.5 | | 268.5 |
| 40A365□H□<br>40A365□P□ | 365 | | 381 |
| 60A140□H□<br>60A140□P□ | 140 | | 156 |
| 60A253□H□<br>60A253□P□ | 252.5 | | 268.5 |
| 60A365□H□<br>60A365□P□ | 365 | | 381 |
| 90A200□H□<br>90A200□P□ | 199 | 0 (Included in the length of Moving Coil) | 199 |
| 90A370□H□<br>90A370□P□ | 367 | | 367 |
| 90A535□H□<br>90A535□P□ | 535 | | 535 |

# Ratings and Specifications

## Specifications: With Standard-Force Magnetic Way

| Linear Servomotor Moving Coil | | 30A | | 40A | | | 60A | | | 90A | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SGLGW- | | 050C | 080C | 140C | 253C | 365C | 140C | 253C | 365C | 200C | 370C | 535C |
| Time Rating | | Continuous | | | | | | | | | | |
| Thermal Class | | B | | | | | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | | | | | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | | | | | | | | | |
| Excitation | | Permanent magnet | | | | | | | | | | |
| Cooling Method | | Self-cooled or air-cooled<br>(Only self-cooled models are available for the SGLGW-30A.) | | | | | | | | | | |
| Protective Structure | | IP00 | | | | | | | | | | |
| Environmental Conditions | Ambient Temperature | 0°C to 40°C (without freezing) | | | | | | | | | | |
| | Ambient Humidity | 20% to 80% relative humidity (without condensation) | | | | | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | | | | | | |
| Shock Resistance | Impact Acceleration Rate | 196 $m/s^2$ | | | | | | | | | | |
| | Number of Impacts | 2 times | | | | | | | | | | |
| Vibration Resistance | Vibration Acceleration Rate | 49 $m/s^2$<br>(the vibration resistance in three directions, vertical, side-to-side, and front-to-back) | | | | | | | | | | |

## Ratings: With Standard-Force Magnetic Way

| Linear Servomotor Moving Coil | | 30A | | 40A | | | 60A | | | 90A | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SGLGW- | | 050C | 080C | 140C | 253C | 365C | 140C | 253C | 365C | 200C | 370C | 535C |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | m/s | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 | 2.3 | 2.3 | 2.3 | 1.8 | 1.5 | 1.5 |
| Maximum Speed*1 | m/s | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.8 | 4.8 | 4.8 | 4.0 | 4.0 | 4.0 |
| Rated Force*1, *2 | N | 12.5 | 25 | 47 | 93 | 140 | 70 | 140 | 210 | 325 | 550 | 750 |
| Maximum Force*1 | N | 40 | 80 | 140 | 280 | 420 | 220 | 440 | 660 | 1,300 | 2,200 | 3,000 |
| Rated Current*1 | A | 0.51 | 0.79 | 0.80 | 1.6 | 2.4 | 1.2 | 2.2 | 3.3 | 4.4 | 7.5 | 10.2 |
| Maximum Current*1 | A | 1.6 | 2.5 | 2.4 | 4.9 | 7.3 | 3.5 | 7.0 | 10.5 | 17.6 | 30.0 | 40.8 |
| Moving Coil Mass | kg | 0.10 | 0.15 | 0.34 | 0.60 | 0.87 | 0.42 | 0.76 | 1.1 | 2.2 | 3.6 | 4.9 |
| Force Constant | N/A | 26.4 | 33.9 | 61.5 | 61.5 | 61.5 | 66.6 | 66.6 | 66.6 | 78.0 | 78.0 | 78.0 |
| BEMF Constant | Vrms / (m/s) / phase | 8.80 | 11.3 | 20.5 | 20.5 | 20.5 | 22.2 | 22.2 | 22.2 | 26.0 | 26.0 | 26.0 |
| Motor Constant | N/√W | 3.66 | 5.63 | 7.79 | 11.0 | 13.5 | 11.1 | 15.7 | 19.2 | 26.0 | 36.8 | 45.0 |
| Electrical Time Constant | ms | 0.19 | 0.41 | 0.43 | 0.43 | 0.43 | 0.45 | 0.45 | 0.45 | 1.4 | 1.4 | 1.4 |
| Mechanical Time Constant | ms | 7.5 | 4.7 | 5.6 | 5.0 | 4.8 | 3.4 | 3.1 | 3.0 | 3.3 | 2.7 | 2.4 |
| Thermal Resistance (with Heat Sink) | K/W | 5.19 | 3.11 | 1.67 | 0.87 | 0.58 | 1.56 | 0.77 | 0.51 | 0.39 | 0.26 | 0.22 |
| Thermal Resistance (without Heat Sink) | K/W | 8.13 | 6.32 | 3.02 | 1.80 | 1.23 | 2.59 | 1.48 | 1.15 | 1.09 | 0.63 | 0.47 |
| Magnetic Attraction | N | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Maximum Allowable Payload | kg | 1.7 | 3.4 | 5.9 | 12 | 18 | 9.9 | 19 | 48 | 110 | 190 | 260 |
| Maximum Allowable Payload (with External Regenerative Resistor and External Dynamic Brake Resistor*3) | kg | 1.7 | 3.4 | 5.9 | 12 | 18 | 9.9 | 19 | 48 | 110 | 190 | 260 |
| Combined Magnetic Way, SGLGM- | | 30□□□A | | 40□□□C□ | | | 60□□□C□ | | | 90□□□A□ | | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 250 | 251 | 252 | 253 | 254 | 258 | 259 | 260 | 264 | 265 | 266 |
| Applicable SERVOPACKs | SGD7S- | R70A, R70F | R90A | R90A | 1R6A, 2R1F | 2R8A, 2R8F | 1R6A, 2R1F | 2R8A, 2R8F | 5R5A | 120A | 180A | 200A |
| | SGD7W-<br>SGD7C- | 1R6A | | | | 2R8A | 1R6A | 2R8A | 5R5A | – | | |

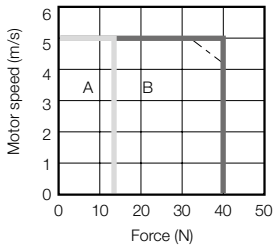
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated forces are the continuous allowable force values at a ambient air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
- Heat Sink Dimensions
  - 200 mm × 300 mm × 12 mm: SGLGW-30A050C, -30A080C, -40A140C, and -60A140C
  - 300 mm × 400 mm × 12 mm: SGLGW-40A253C and -60A253C
  - 400 mm × 500 mm × 12 mm: SGLGW-40A365C and -60A365C
  - 800 mm × 900 mm × 12 mm: SGLGW-90A200C, -90A370C, and -90A535C

*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

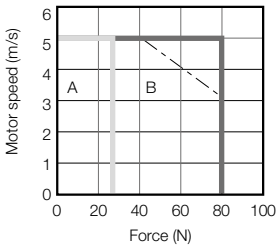
## Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input

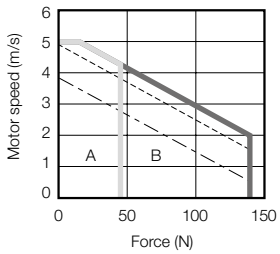
SGLGW-30A050C*



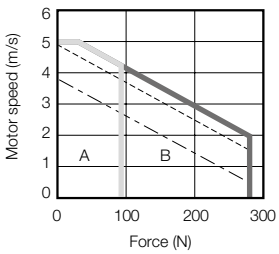

SGLGW-30A080C*



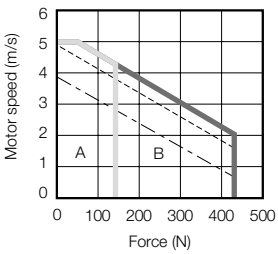

SGLGW-40A140C



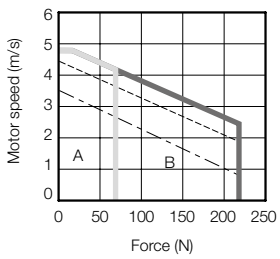

SGLGW-40A253C



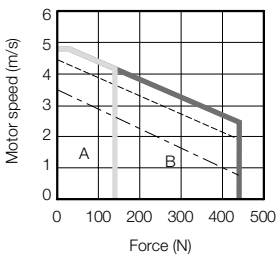

SGLGW-40A365C



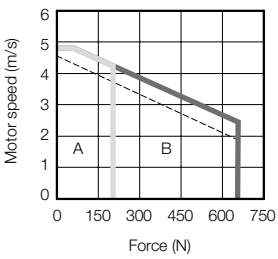

SGLGW-60A140C



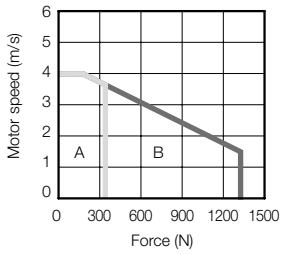

SGLGW-60A253C



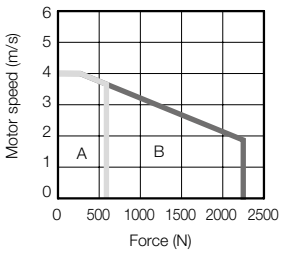

SGLGW-60A365C



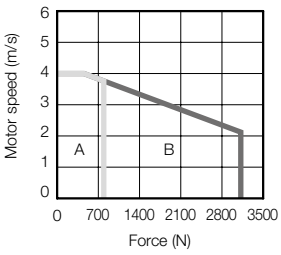

SGLGW-90A200C




SGLGW-90A370C




SGLGW-90A535C



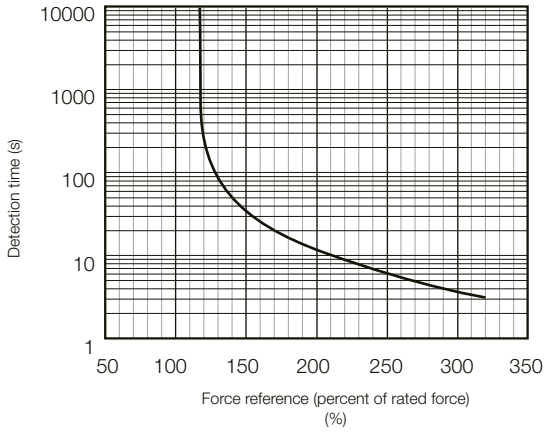

* The characteristics are the same for three-phase and single-phase.

Note:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

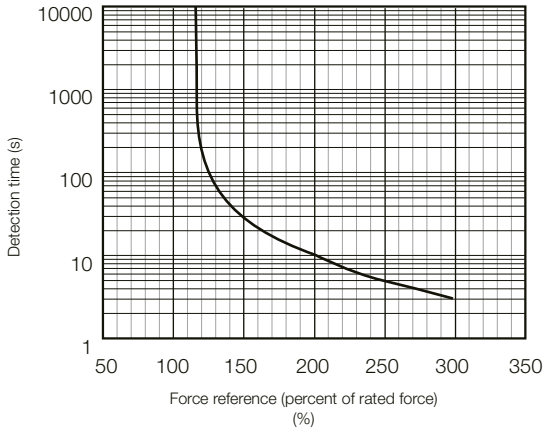
## Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

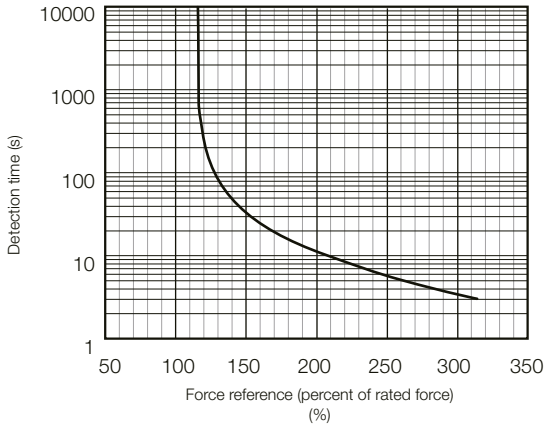
SGLGW-30A



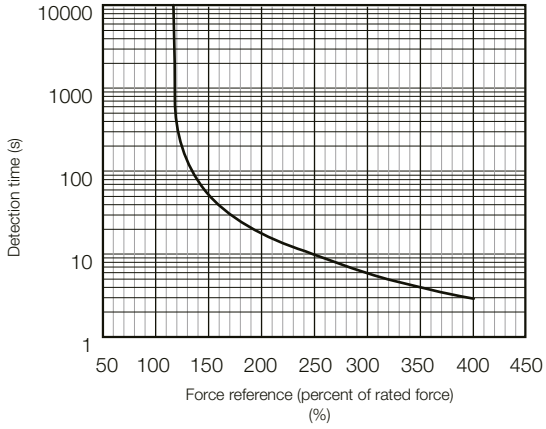

SGLGW-40A




SGLGW-60A




SGLGW-90A




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in Force-Motor Speed Characteristics.

## Specifications: With High-Force Magnetic Way

| Linear Servomotor Moving Coil | | 40A | | | 60A | | |
|---|---|---|---|---|---|---|---|
| Model SGLGW- | | 140C | 253C | 365C | 140C | 253C | 365C |
| Time Rating | | Continuous | | | | | |
| Thermal Class | | B | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | | | | |
| Excitation | | Permanent magnet | | | | | |
| Cooling Method | | Self-cooled or air-cooled | | | | | |
| Protective Structure | | IP00 | | | | | |
| Environmental Conditions | Ambient Temperature | 0°C to 40°C (without freezing) | | | | | |
| | Ambient Humidity | 20% to 80% relative humidity (without condensation) | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | |
| Shock Resistance | Impact Acceleration Rate | 196 $m/s^2$ | | | | | |
| | Number of Impacts | 2 times | | | | | |
| Vibration Resistance | Vibration Acceleration Rate | 49 $m/s^2$ (the vibration resistance in three directions, vertical, side-to-side, and front-to-back) | | | | | |

## Ratings: With High-Force Magnetic Way

| Linear Servomotor Moving Coil | | 40A | | | 60A | | |
|---|---|---|---|---|---|---|---|
| Model SGLGW- | | 140C | 253C | 365C | 140C | 253C | 365C |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | m/s | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Maximum Speed*1 | m/s | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 |
| Rated Force*1,*2 | N | 57 | 114 | 171 | 85 | 170 | 255 |
| Maximum Force*1 | N | 230 | 460 | 690 | 360 | 720 | 1080 |
| Rated Current*1 | A | 0.80 | 1.6 | 2.4 | 1.2 | 2.2 | 3.3 |
| Maximum Current*1 | A | 3.2 | 6.5 | 9.7 | 5.0 | 10.0 | 14.9 |
| Moving Coil Mass | kg | 0.34 | 0.60 | 0.87 | 0.42 | 0.76 | 1.1 |
| Force Constant | N/A | 76.0 | 76.0 | 76.0 | 77.4 | 77.4 | 77.4 |
| BEMF Constant | Vrms / (m/s) / phase | 25.3 | 25.3 | 25.3 | 25.8 | 25.8 | 25.8 |
| Motor Constant | $N/\sqrt{W}$ | 9.62 | 13.6 | 16.7 | 12.9 | 18.2 | 22.3 |
| Electrical Time Constant | ms | 0.43 | 0.43 | 0.43 | 0.45 | 0.45 | 0.45 |
| Mechanical Time Constant | ms | 3.7 | 3.2 | 3.1 | 2.5 | 2.3 | 2.2 |
| Thermal Resistance (with Heat Sink) | K/W | 1.67 | 0.87 | 0.58 | 1.56 | 0.77 | 0.51 |
| Thermal Resistance (without Heat Sink) | K/W | 3.02 | 1.80 | 1.23 | 2.59 | 1.48 | 1.15 |
| Magnetic Attraction | N | 0 | 0 | 0 | 0 | 0 | 0 |
| Maximum Allowable Payload | kg | 12 | 24 | 58 | 18 | 61 | 91 |
| Maximum Allowable Payload (With External Regenerative Resistor and External Dynamic Brake Resistor*3) | kg | 12 | 24 | 58 | 18 | 61 | 91 |
| Combined Magnetic Way, SGLGM- | | 40□□□C□-M | | | 60□□□C□-M | | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 255 | 256 | 257 | 261 | 262 | 263 |
| Applicable SERVOPACKs | SGD7S- | 1R6A, 2R1F | 2R8A, 2R8F | 3R8A | 1R6A, 2R1F | 3R8A | 7R6A |
| | SGD7W-<br>SGD7C- | 1R6A | 2R8A | 5R5A | 1R6A | 5R5A | 7R6A |

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

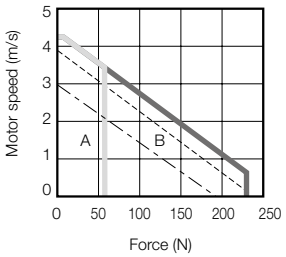
*2. The rated forces are the continuous allowable force values at a ambient air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
- Heat Sink Dimensions
  - 200 mm × 300 mm × 12 mm: SGLGW-40A140C and -60A140C
  - 300 mm × 400 mm × 12 mm: SGLGW-40A253C and -60A253C
  - 400 mm × 500 mm × 12 mm: SGLGW-40A365C and -60A365C

*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

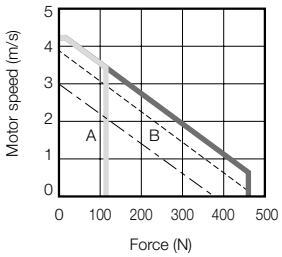
## Force-Motor Speed Characteristics

A : Continuous duty zone ——— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input

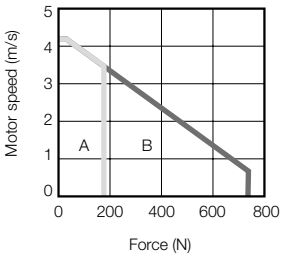
SGLGW-40A140C



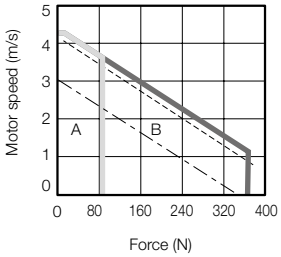

SGLGW-40A253C



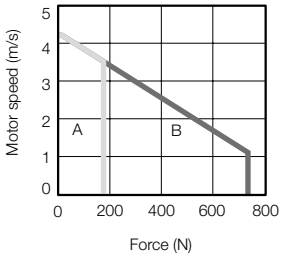

SGLGW-40A365C



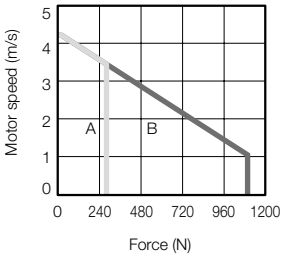

SGLGW-60A140C




SGLGW-60A253C




SGLGW-60A365C

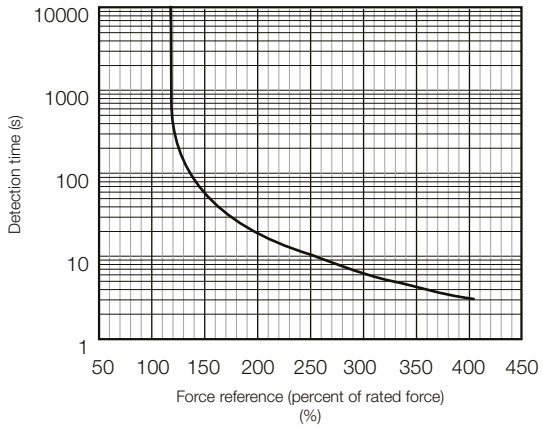



Note:
1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. These are typical values.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

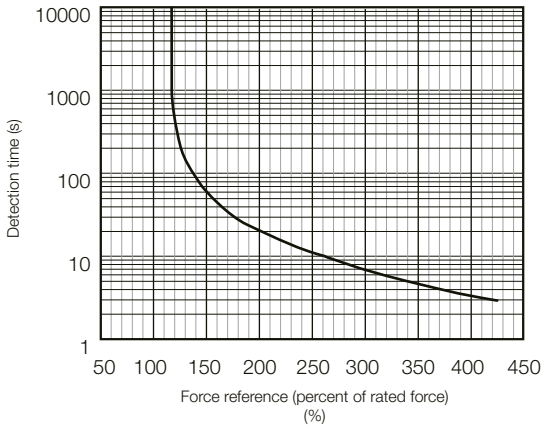
## Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient temperature of 40°C.

SGLGW-40A with High-Force Magnetic Way




SGLGW-60A with High-Force Magnetic Way

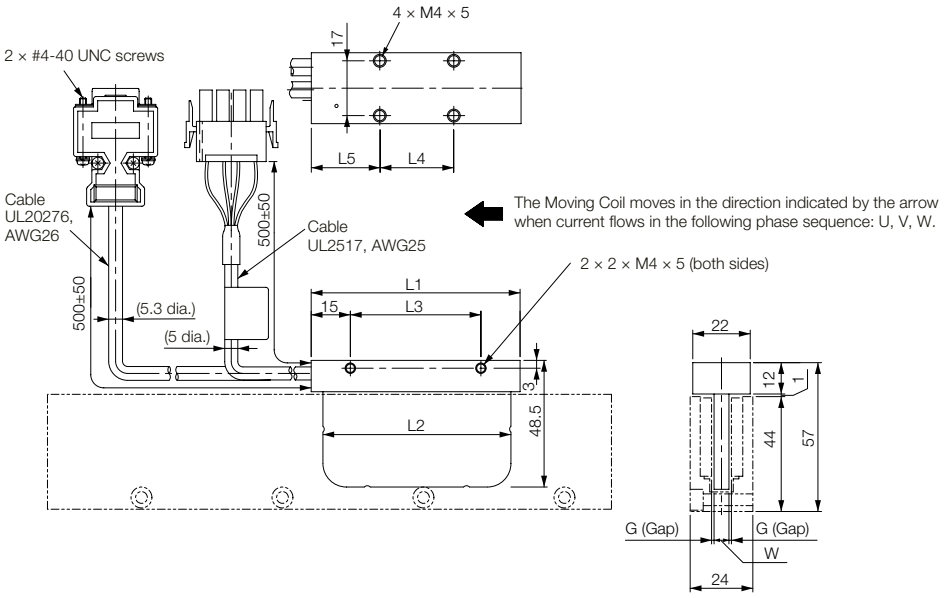



Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in Force-Motor Speed Characteristics.

# External Dimensions

## SGLGW-30

### Moving Coils: SGLGW-30A□□□C□-E



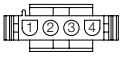

Unit: mm

| Moving Coil Model SGLGW- | L1 | L2 | L3 | L4 | L5 | W | G (Gap) | Approx. Mass* [kg] |
|---|---|---|---|---|---|---|---|---|
| 30A050C□ | 50 | 48 | 30 | 20 | 20 | 5.9 | 0.85 | 0.14 |
| 30A080C□ | 80 | 72 | 50 | 30 | 25 | 5.7 | 0.95 | 0.19 |

* The mass is for a Moving Coil with a Polarity Sensor.

## Connector Specifications

### Servomotor Connector

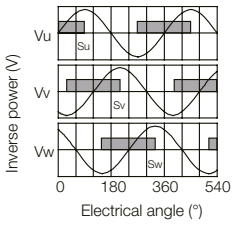



| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG | Green |

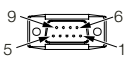
Plug: 350779-1
Pins: 350924-1 or 770672-1
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350925-1 or 770673-1

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



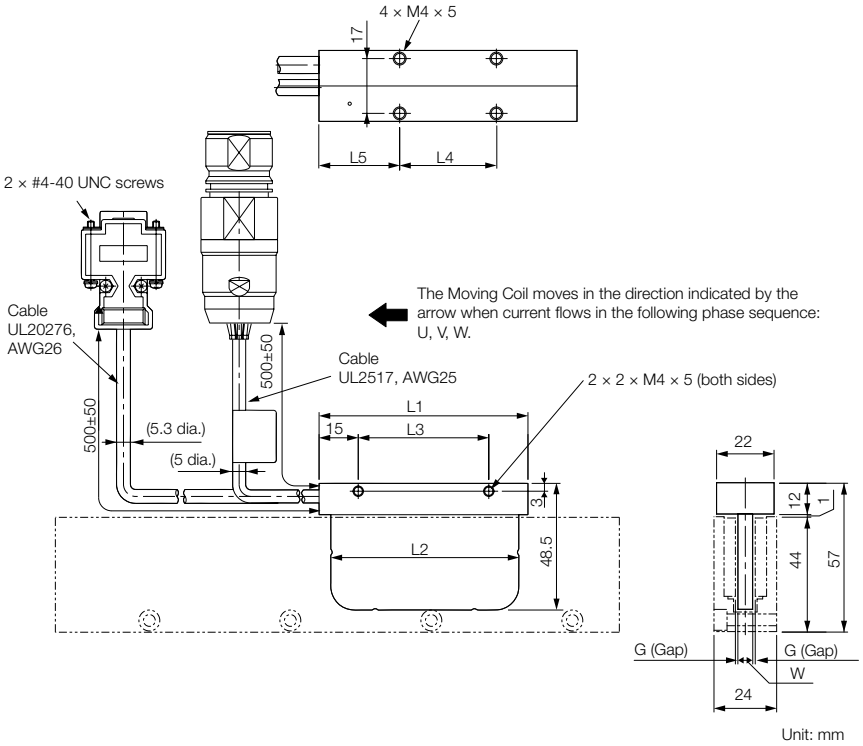

### Polarity Sensor Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Moving Coils: SGLGW-30A□□□C□D-E

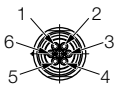



| Moving Coil Model SGLGW- | L1 | L2 | L3 | L4 | L5 | W | G (Gap) | Approx. Mass* [kg] |
|---|---|---|---|---|---|---|---|---|
| 30A050C□D | 50 | 48 | 30 | 20 | 20 | 5.9 | 0.85 | 0.14 |
| 30A080C□D | 80 | 72 | 50 | 30 | 25 | 5.7 | 0.95 | 0.19 |

* The mass is for a Moving Coil with a Polarity Sensor.

# Connector Specifications

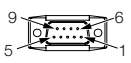
### Servomotor Connector




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | Not used | – |
| 5 | Not used | – |
| 6 | FG | Green |

Plug: 350779-1
Pins: 350924-1 or 770672-1
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350925-1 or 770673-1

### Polarity Sensor Connector

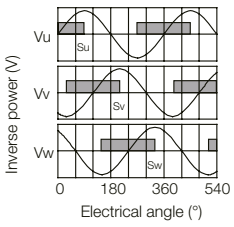



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

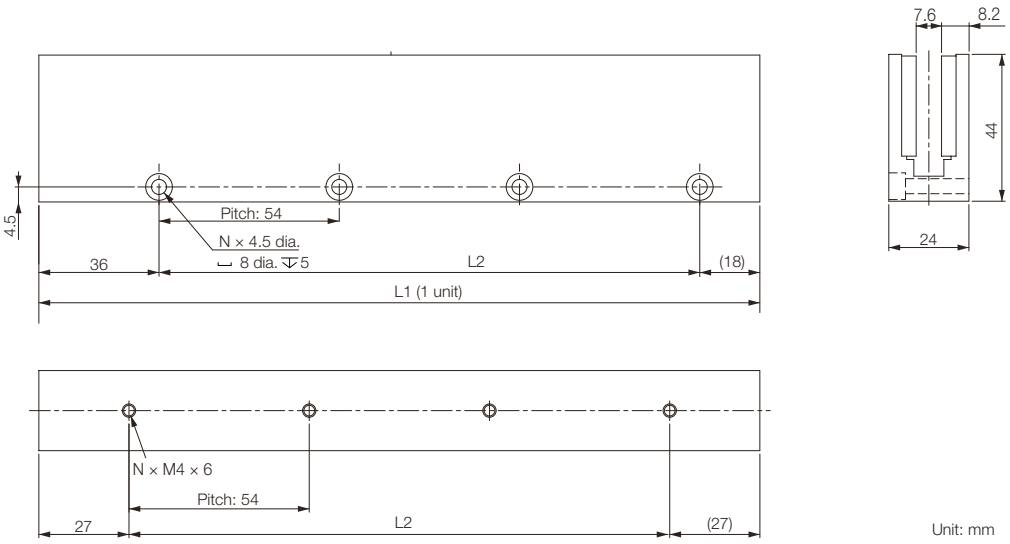
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



## Standard-Force Magnetic Ways: SGLGM-30□□□A-E

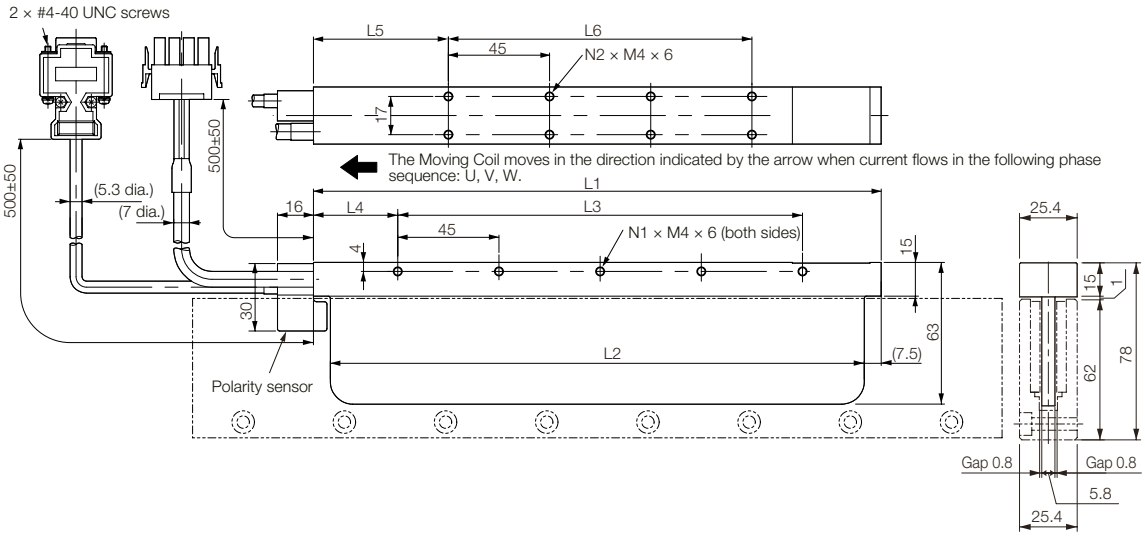



Unit: mm

| Magnetic Way Model SGLGM- | L1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| 30108A | $108^{-0.1}_{-0.1}$ | 54 | 2 | 0.6 |
| 30216A | $216^{-0.1}_{-0.1}$ | 162 | 4 | 1.1 |
| 30432A | $432^{-0.1}_{-0.1}$ | 378 | 8 | 2.3 |

# SGLGW-40

## Moving Coils: SGLGW-40A□□□C□-E



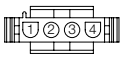

Unit: mm

| Moving Coil Model SGLGW- | L1 | L2 | L3 | L4 | L5 | L6 | N1 | N2 | Approx. Mass* [kg] |
|---|---|---|---|---|---|---|---|---|---|
| 40A140C□ | 140 | 125 | 90 | 30 | 52.5 | 45 | 3 | 4 | 0.40 |
| 40A253C□ | 252.5 | 237.5 | 180 | 37.5 | 60 | 135 | 5 | 8 | 0.66 |
| 40A365C□ | 365 | 350 | 315 | 30 | 52.5 | 270 | 8 | 14 | 0.93 |

* The mass is for a Moving Coil with a Polarity Sensor.

# Connector Specifications

## Servomotor Connector

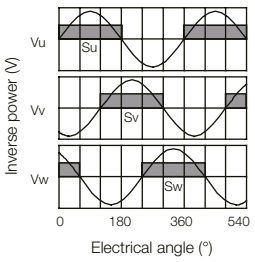



| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG | Green |

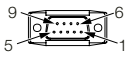
Plug: 350779-1
Pins: 350561-3 or 350690-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350570-3 or 350689-3

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



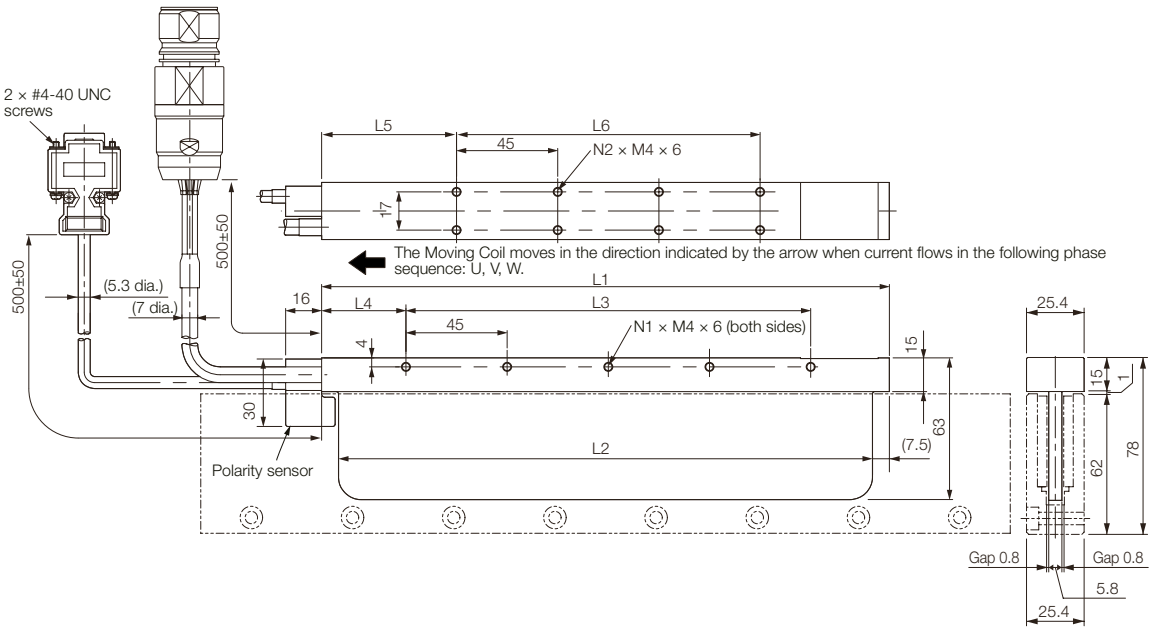

## Polarity Sensor Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Moving Coils: SGLGW-40A□□□C□D-E



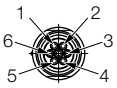

Unit: mm

| Moving Coil Model SGLGW- | L1 | L2 | L3 | L4 | L5 | L6 | N1 | N2 | Approx. Mass* [kg] |
|---|---|---|---|---|---|---|---|---|---|
| 40A140C□D | 140 | 125 | 90 | 30 | 52.5 | 45 | 3 | 4 | 0.40 |
| 40A253C□D | 252.5 | 237.5 | 180 | 37.5 | 60 | 135 | 5 | 8 | 0.66 |
| 40A365C□D | 365 | 350 | 315 | 30 | 52.5 | 270 | 8 | 14 | 0.93 |

* The mass is for a Moving Coil with a Polarity Sensor.

# Connector Specifications

## Servomotor Connector

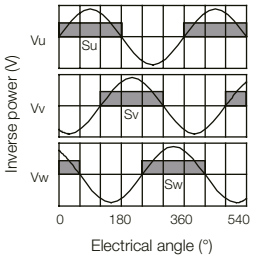



| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | Not used | – |
| 5 | Not used | – |
| 6 | FG | Green |

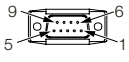
Extension: SROC06JMSCN169
Pins: 021.423.1020
From Interconnectron GmbH
**Mating Connector**
Plug: SPUC06KFSDN236
Socket: 020.030.1020

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.




## Polarity Sensor Connector

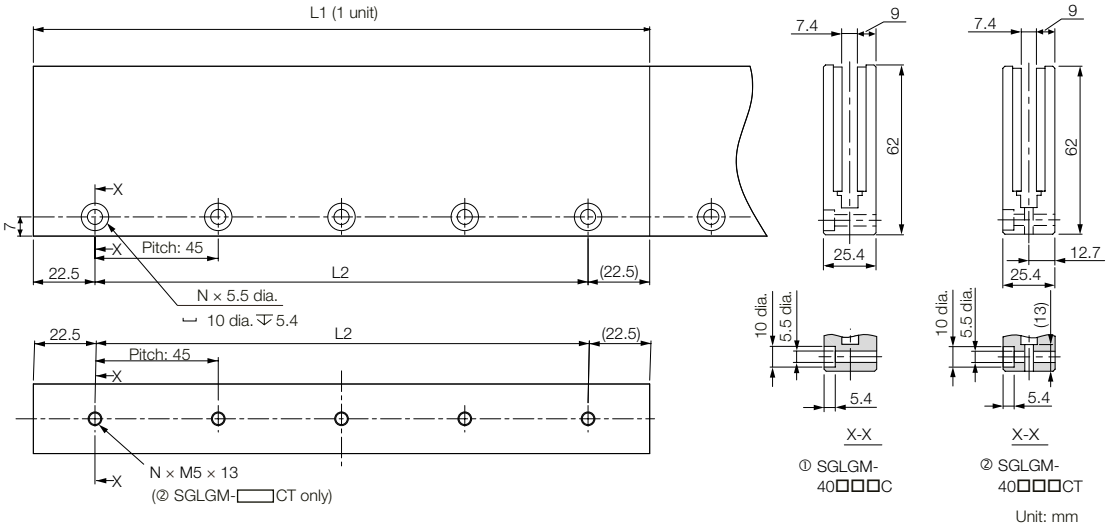



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Standard-Force Magnetic Ways:

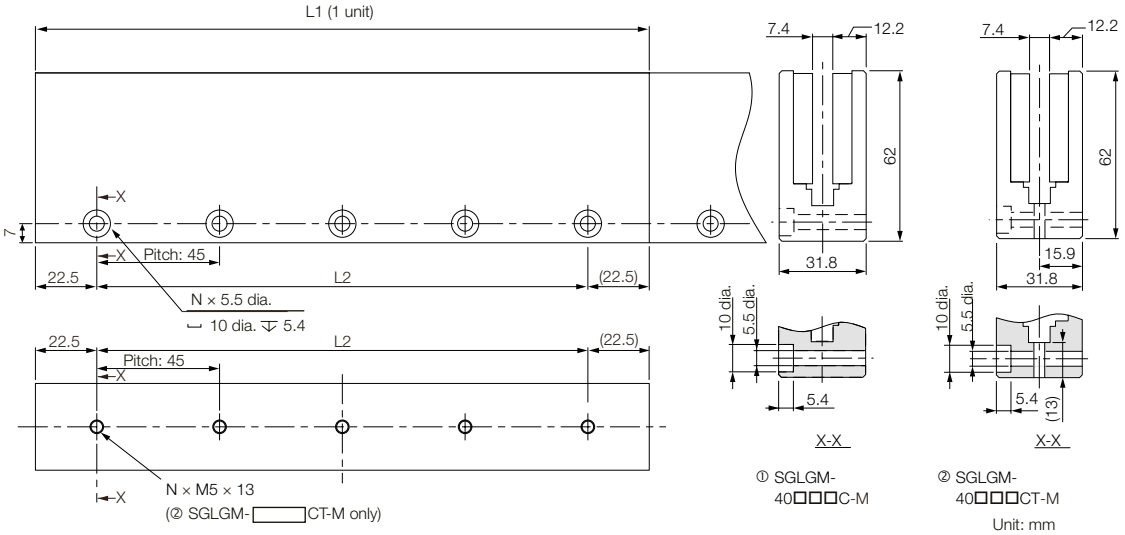
### SGLGM-40□□□C-E (without Mounting Holes on the Bottom)
### SGLGM-40□□□CT-E (with Mounting Holes on the Bottom)




| Type | Magnetic Way Model SGLGM- | L1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| Standard-Force | 40090C or 40090CT | 90 $^{-0.1}_{-0.3}$ | 45 | 2 | 0.8 |
| | 40225C or 40225CT | 225 $^{-0.1}_{-0.3}$ | 180 | 5 | 2.0 |
| | 40360C or 40360CT | 360 $^{-0.1}_{-0.3}$ | 315 | 8 | 3.1 |
| | 40405C or 40405CT | 405 $^{-0.1}_{-0.3}$ | 360 | 9 | 3.5 |
| | 40450C or 40450CT | 450 $^{-0.1}_{-0.3}$ | 405 | 10 | 3.9 |

## High-Force Magnetic Ways:

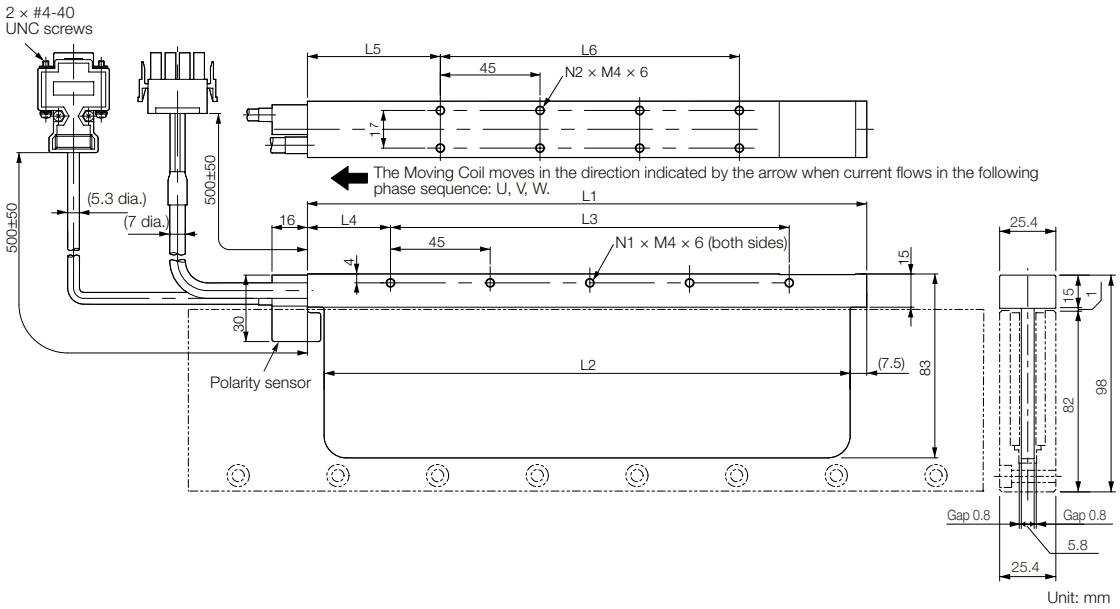
### SGLGM-40□□□C-M-E (without Mounting Holes on the Bottom)
### SGLGM-40□□□CT-M-E (with Mounting Holes on the Bottom)




| Type | Magnetic Way Model SGLGM- | L1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| High-Force | 40090C-M or 40090CT-M | $90^{-0.1}_{-0.3}$ | 45 | 2 | 1.0 |
| | 40225C-M or 40225CT-M | $225^{-0.1}_{-0.3}$ | 180 | 5 | 2.6 |
| | 40360C-M or 40360CT-M | $360^{-0.1}_{-0.3}$ | 315 | 8 | 4.1 |
| | 40405C-M or 40405CT-M | $405^{-0.1}_{-0.3}$ | 360 | 9 | 4.6 |
| | 40450C-M or 40450CT-M | $450^{-0.1}_{-0.3}$ | 405 | 10 | 5.1 |

# SGLGW-60

## Moving Coils: SGLGW-60A□□□C□-E

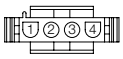



| Moving Coil Model SGLGW- | L1 | L2 | L3 | L4 | L5 | L6 | N1 | N2 | Approx. Mass* [kg] |
|---|---|---|---|---|---|---|---|---|---|
| 60A140C□ | 140 | 125 | 90 | 30 | 52.5 | 45 | 3 | 4 | 0.48 |
| 60A253C□ | 252.5 | 237.5 | 180 | 37.5 | 60 | 135 | 5 | 8 | 0.82 |
| 60A365C□ | 365 | 350 | 315 | 30 | 52.5 | 270 | 8 | 14 | 1.16 |

* The mass is for a Moving Coil with a Polarity Sensor.

# Connector Specifications

## Servomotor Connector

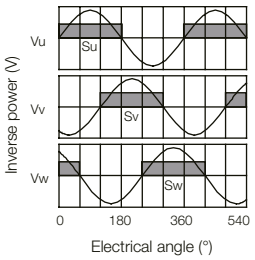



| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG | Green |

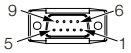
Plug: 350779-1
Pins: 350561-3 or 350690-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350570-3 or 350689-3

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



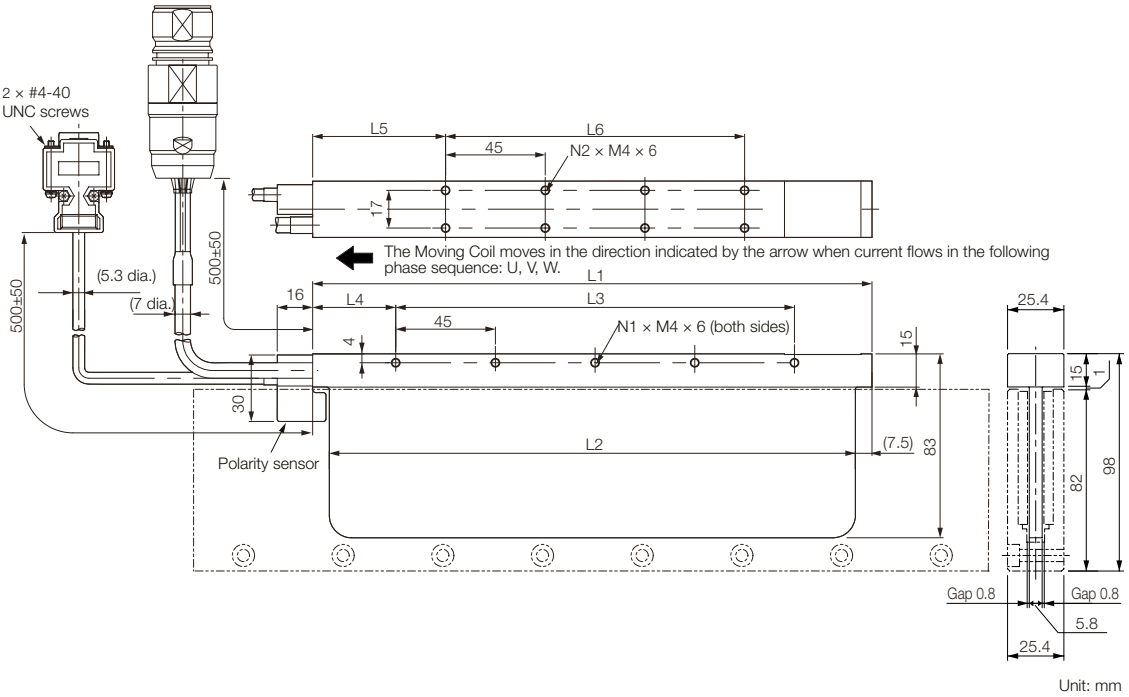

## Polarity Sensor Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Moving Coils: SGLGW-60A□□□C□D-E



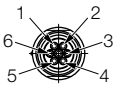

Unit: mm

| Moving Coil Model SGLGW- | L1 | L2 | L3 | L4 | L5 | L6 | N1 | N2 | Approx. Mass* [kg] |
|---|---|---|---|---|---|---|---|---|---|
| 60A140C□D | 140 | 125 | 90 | 30 | 52.5 | 45 | 3 | 4 | 0.48 |
| 60A253C□D | 252.5 | 237.5 | 180 | 37.5 | 60 | 135 | 5 | 8 | 0.82 |
| 60A365C□D | 365 | 350 | 315 | 30 | 52.5 | 270 | 8 | 14 | 1.16 |

* The mass is for a Moving Coil with a Polarity Sensor.

# Connector Specifications

## Servomotor Connector

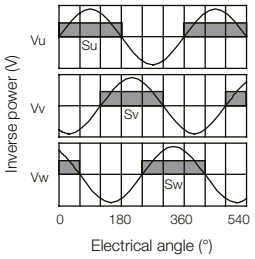



| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | Not used | – |
| 5 | Not used | – |
| 6 | FG | Green |

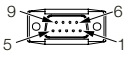
Extension: SROC06JMSCN169
Pins: 021.423.1020
From Interconnectron GmbH
**Mating Connector**
Plug: SPUC06KFSDN236
Socket: 020.030.1020

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.




## Polarity Sensor Connector

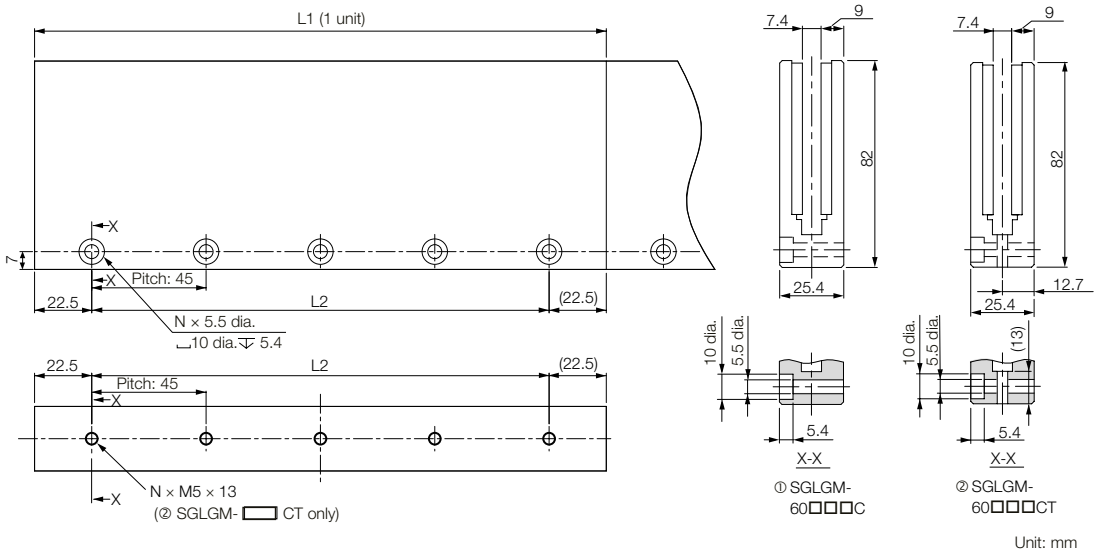



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Standard-Force Magnetic Ways:

### SGLGM-60A□□□C-E (without Mounting Holes on the Bottom)
### SGLGM-60A□□□CT-E (with Mounting Holes on the Bottom)

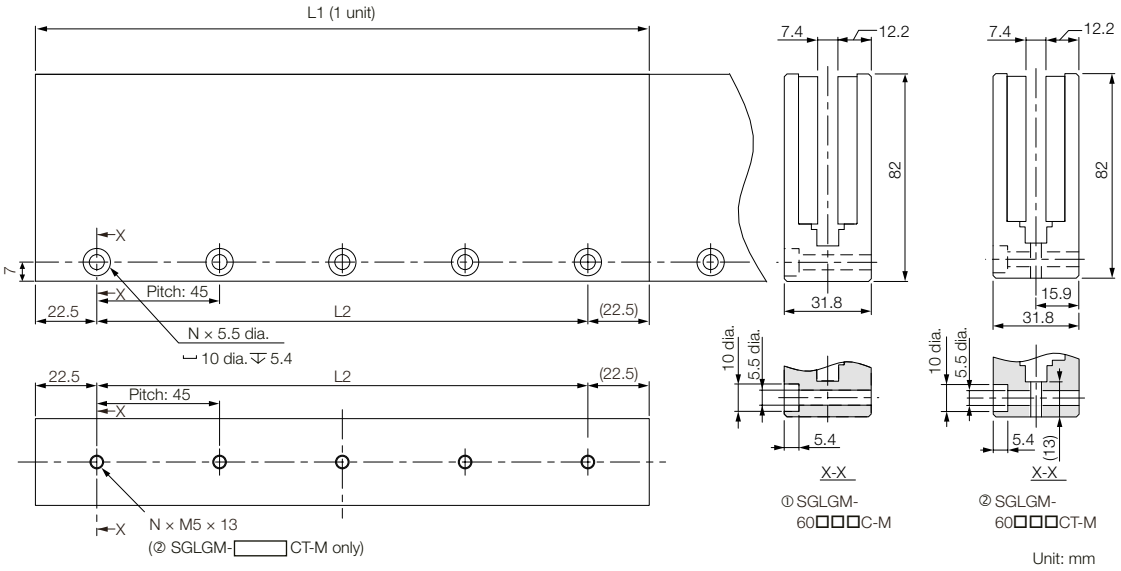



Unit: mm

| Type | Magnetic Way Model SGLGM- | L1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| Standard-Force | 60090C or 60090CT | 90 $^{-0.1}_{-0.3}$ | 45 | 2 | 1.1 |
| | 60225C or 60225CT | 225 $^{-0.1}_{-0.3}$ | 180 | 5 | 2.6 |
| | 60360C or 60360CT | 360 $^{-0.1}_{-0.3}$ | 315 | 8 | 4.1 |
| | 60405C or 60405CT | 405 $^{-0.1}_{-0.3}$ | 360 | 9 | 4.6 |
| | 60450C or 60450CT | 450 $^{-0.1}_{-0.3}$ | 405 | 10 | 5.1 |

## High-Force Magnetic Ways:

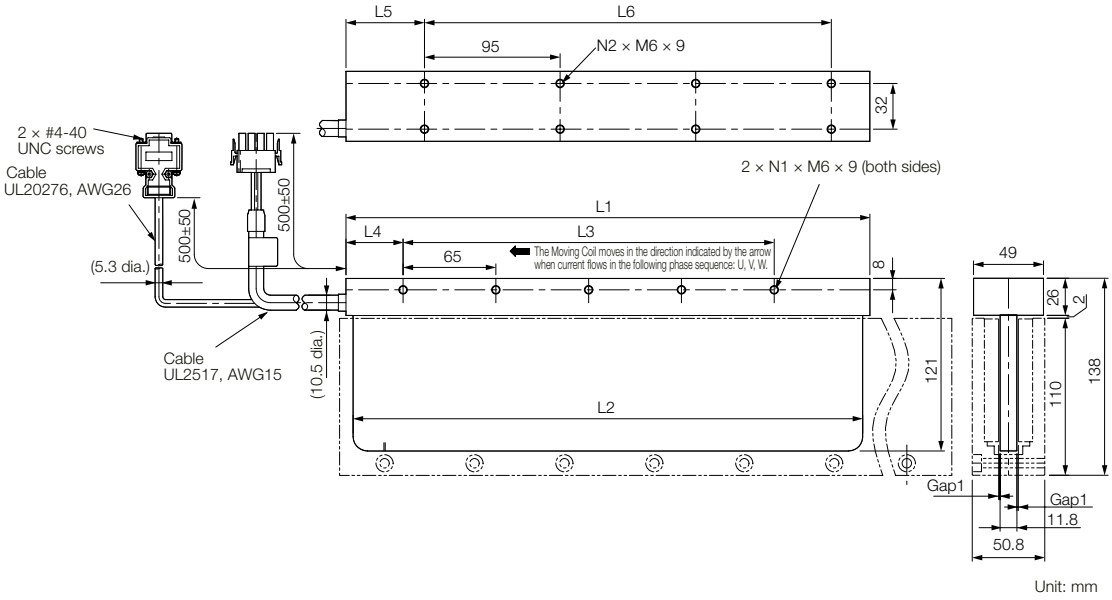
### SGLGM-60□□□C-M-E (without Mounting Holes on the Bottom)
### SGLGM-60□□□CT-M-E (with Mounting Holes on the Bottom)




| Type | Magnetic Way Model SGLGM- | L1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| High-Force | 60090C-M or 60090CT-M | $90^{-0.1}_{-0.3}$ | 45 | 2 | 1.3 |
| | 60225C-M or 60225CT-M | $225^{-0.1}_{-0.3}$ | 180 | 5 | 3.3 |
| | 60360C-M or 60360CT-M | $360^{-0.1}_{-0.3}$ | 315 | 8 | 5.2 |
| | 60405C-M or 60405CT-M | $405^{-0.1}_{-0.3}$ | 360 | 9 | 5.9 |
| | 60450C-M or 60450CT-M | $450^{-0.1}_{-0.3}$ | 405 | 10 | 6.6 |

# SGLGW-90

## Moving Coils: SGLGW-90A□□□C□-E

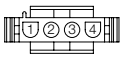



| Moving Coil Model SGLGW- | L1 | L2 | L3 | L4 | L5 | L6 | N1 | N2 | Approx. Mass* [kg] |
|---|---|---|---|---|---|---|---|---|---|
| 90A200C□ | 199 | 189 | 130 | 40 | 60 | 95 | 3 | 4 | 2.20 |
| 90A370C□ | 367 | 357 | 260 | 40 | 55 | 285 | 5 | 8 | 3.65 |
| 90A535C□ | 535 | 525 | 455 | 40 | 60 | 380 | 8 | 10 | 4.95 |

* The mass is for a Moving Coil with a Polarity Sensor.

# Connector Specifications

## Servomotor Connector

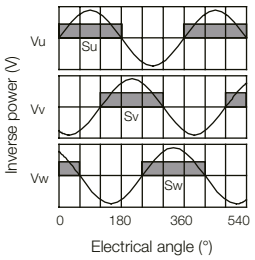



| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Blue |
| 4 | FG | Green |

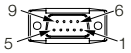
Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350537-3 or 350550-3

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.




## Polarity Sensor Connector

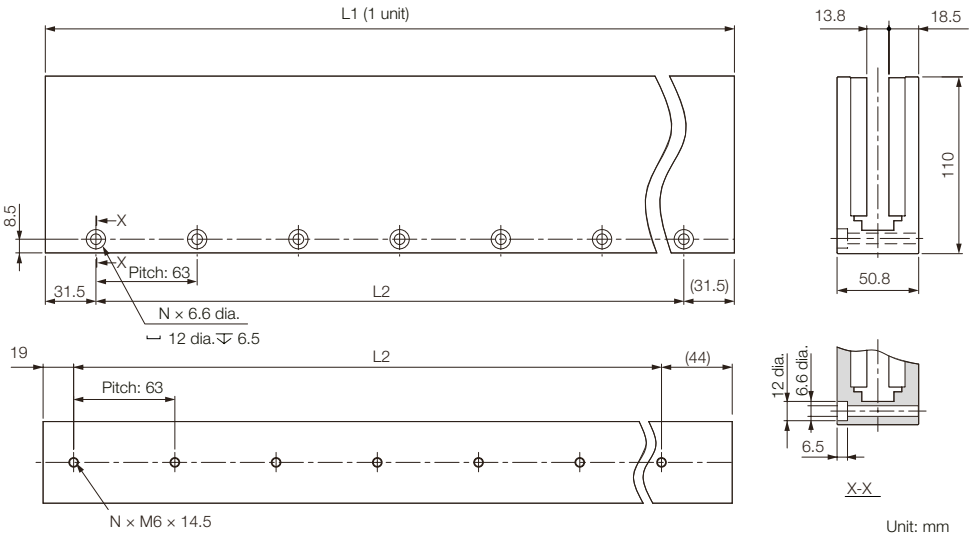



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Standard-Force Magnetic Ways:

### SGLGM-90□□□A-E

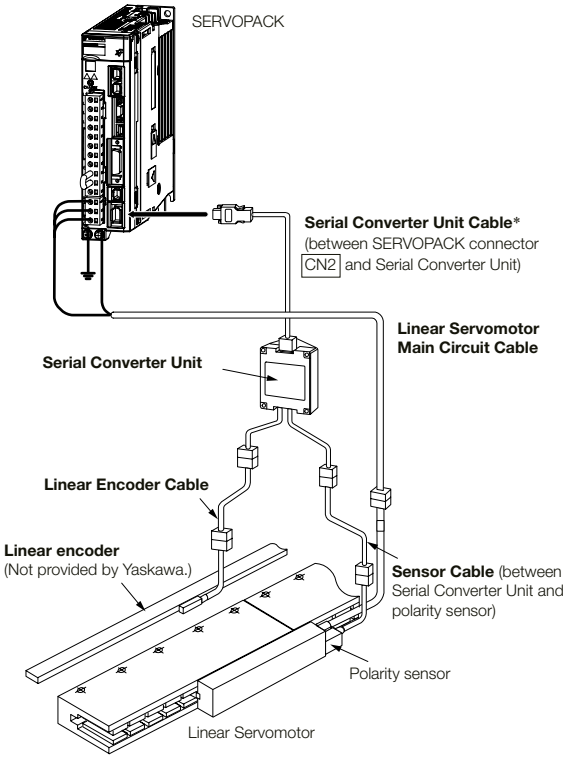



| Magnetic Way Model SGLGM- | L1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| 90252A | $252^{-0.1}_{-0.3}$ | 189 | 4 | 7.3 |
| 90504A | $504^{-0.1}_{-0.3}$ | 441 | 8 | 14.7 |

# Selecting Cables SGLG

## Cable Configurations

To select a Linear Encoder, use Recommended Linear Encoders. Prepare the cable required for the encoder.




* You can connect directly to an absolute linear encoder.

Note:
Refer to the following manual for the following information.

- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables
- Order numbers and specifications for wiring materials
  Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

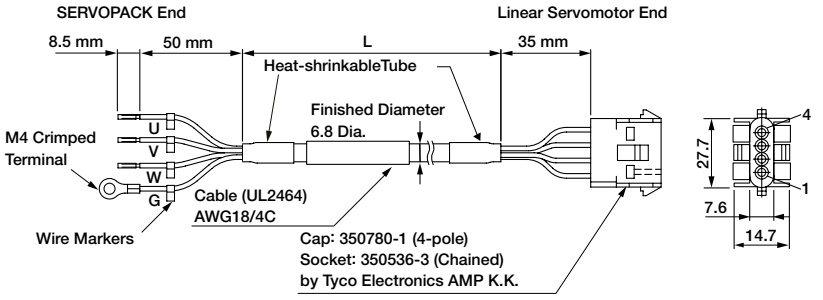
# Linear Servomotor Main Circuit Cables SGLG

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| SGLGW-30A, -40A, -60A | 1 m | JZSP-CLN11-01-E | SERVOPACK end / Linear Servomotor end, L, *1 |
| | 3 m | JZSP-CLN11-03-E | |
| | 5 m | JZSP-CLN11-04-E | |
| | 10 m | JZSP-CLN11-10-E | |
| | 15 m | JZSP-CLN11-15-E | |
| | 20 m | JZSP-CLN11-20-E | |
| SGLGW-90A | 1 m | JZSP-CLN21-01-E | SERVOPACK end / Linear Servomotor end, L, *1 |
| | 3 m | JZSP-CLN21-03-E | |
| | 5 m | JZSP-CLN21-04-E | |
| | 10 m | JZSP-CLN21-10-E | |
| | 15 m | JZSP-CLN21-15-E | |
| | 20 m | JZSP-CLN21-20-E | |
| SGLGW-30A□□□□□D<br>-40A□□□□□D<br>-60A□□□□□D | 3 m | DP9325252-03G | SERVOPACK end / Linear Servomotor end, L, *2 |
| | 5 m | DP9325252-05G | |
| | 10 m | DP9325252-10G | |
| | 15 m | DP9325252-15G | |
| | 20 m | DP9325252-20G | |

*1. Connector from Tyco Electronics Japan G.K.
*2. Connector from Interconnectron GmbH

# Connector Specifications for Main Circuit Cables

## JZSP-CLN11-01-E



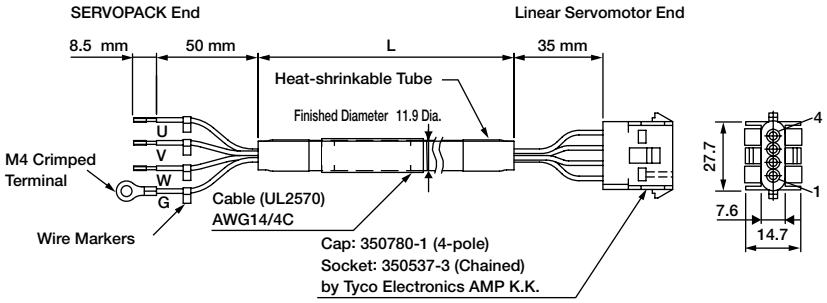

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Red | Phase U |
| White | Phase V |
| Blue | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin. No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| FG | 4 |

## JZSP-CLN21-01-E



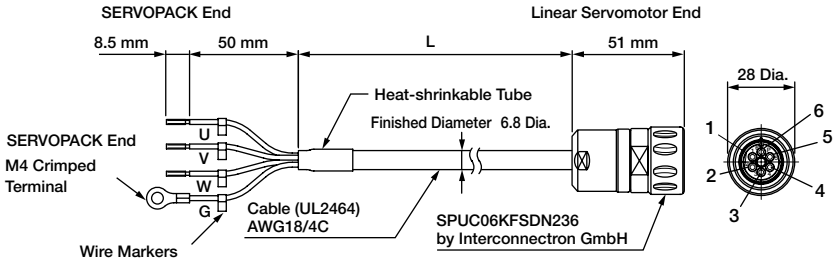

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Red | Phase U |
| White | Phase V |
| Blue | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin. No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| FG | 4 |

## DP9325252-□□G



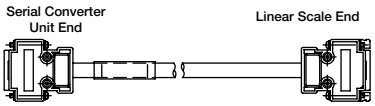

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Black 1 | Phase U |
| Black 2 | Phase V |
| Black 3 | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| — | 4 |
| — | 5 |
| FG | 6 |

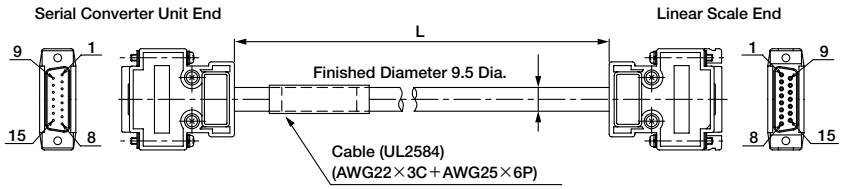
# Cables for connecting Linear Scales

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLL00-01-E-G# |  |
| | 3 m | JZSP-CLL00-03-E-G# | |
| | 5 m | JZSP-CLL00-05-E-G# | |
| | 10 m | JZSP-CLL00-10-E-G# | |
| | 15 m | JZSP-CLL00-15-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

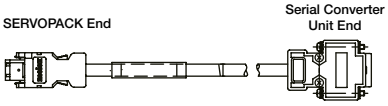
Connector:
17JE-23150-02 (D8C)
(15-pin, soldered)
by DDK Ltd.




Connector:
17JE-13150-02 (D8C)
(With stud)
(15-pin, soldered)
by DDK Ltd.

| Serial Converter Unit End | | Linear Scale End | |
|---|---|---|---|
| Pin No. | Signal | Pin No. | Signal |
| 1 | /Cos (V1-) | 1 | /Cos (V1-) |
| 2 | /Sin (V2-) | 2 | /Sin (V2-) |
| 3 | Ref (V0+) | 3 | Ref (V0+) |
| 4 | +5V | 4 | +5V |
| 5 | 5Vs | 5 | 5Vs |
| 6 | BID | 6 | BID |
| 7 | Vx | 7 | Vx |
| 8 | Vq | 8 | Vq |
| 9 | Cos (V1+) | 9 | Cos (V1+) |
| 10 | Sin (V2+) | 10 | Sin (V2+) |
| 11 | /Ref (V0+) | 11 | /Ref (V0-) |
| 12 | 0V | 12 | 0V |
| 13 | 0Vs | 13 | 0Vs |
| 14 | DIR | 14 | DIR |
| 15 | Inner | 15 | Inner |
| Case | Shield | Case | Shield |

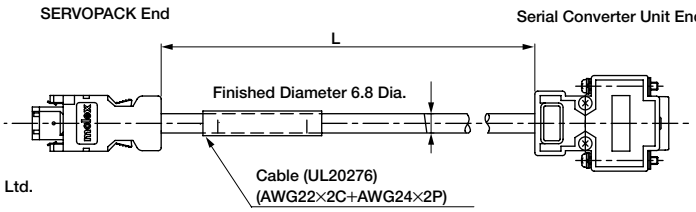
# Cables for connecting Serial Converter Units

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLP70-01-E-G# |  |
| | 3 m | JZSP-CLP70-03-E-G# | |
| | 5 m | JZSP-CLP70-05-E-G# | |
| | 10 m | JZSP-CLP70-10-E-G# | |
| | 15 m | JZSP-CLP70-15-E-G# | |
| | 20 m | JZSP-CLP70-20-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

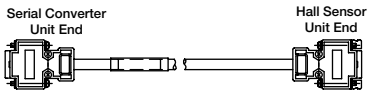
Connector:
55100-0670
(6-pin, soldered)
by Molex Japan Co., Ltd.




Connector:
17JE-23090-02 (D8C)
(9-pin, soldered)
by DDK Ltd.

| SERVOPACK End | | | Serial Converter Unit End | | |
|---|---|---|---|---|---|
| Pin No. | Signal | Wire Color | Pin No. | Signal | Wire Color |
| 1 | PG5V | Red | 1 | +5V | Red |
| 2 | PG0V | Black | 5 | 0V | Black |
| 3 | - | - | 3 | - | - |
| 4 | - | - | 4 | - | - |
| 5 | PS | Light blue | 2 | Phase S output | Light blue |
| 6 | /PS | Light blue/white | 6 | Phase /S output | Light blue/white |
| Shell | Shield | - | Case | Shield | - |
| | | | 7 | - | - |
| | | | 8 | - | - |
| | | | 9 | - | - |

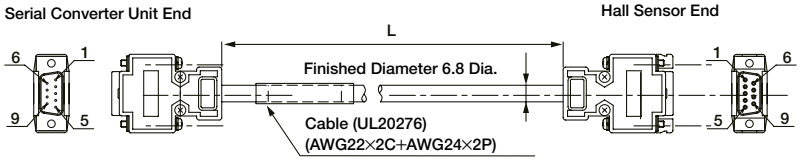
# Cables for connecting Hall Sensors

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLL10-01-E-G# |  |
| | 3 m | JZSP-CLL10-03-E-G# | |
| | 5 m | JZSP-CLL10-05-E-G# | |
| | 10 m | JZSP-CLL10-10-E-G# | |
| | 15 m | JZSP-CLL10-15-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

Connector:
17JE-23090-02 (D8C)
(9-pin, soldered)
by DDK Ltd.




Connector:
17JE-13090-02 (D8C)
(With stud)
(9-pin, soldered)
by DDK Ltd.

Serial Converter Unit End

| Pin No. | Signal |
|---|---|
| 1 | +5V |
| 2 | Phase U input |
| 3 | Phase V input |
| 4 | Phase W input |
| 5 | 0V |
| 6 | - |
| 7 | - |
| 8 | - |
| 9 | - |
| Case | Shield |

Hall Sensor End

| Pin No. | Signal |
|---|---|
| 1 | +5V |
| 2 | Phase U input |
| 3 | Phase V input |
| 4 | Phase W input |
| 5 | 0V |
| 6 | - |
| 7 | - |
| 8 | - |
| 9 | - |
| Case | Shield |

# SGLFW /SGLFW2 (Models with F-Type Iron Cores)



## Model Designations

### Linear Servomotors (Models with F-type Iron Cores)

### Moving Coil

S G L F W2 - 30 A 070 A T 1 E

| Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th | 6th - 8th | 9th | 10th | 11th | 12th | digit |
|---|---|---|---|---|---|---|---|---|---|---|

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| W2 | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

**5th digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**6th ... 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 070 | 70 mm |
| 120 | 125 mm |
| 200 | 205 mm |
| 230 | 230 mm |
| 380 | 384 mm |
| 560 | 563 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**10th digit - Sensor Specification**

| Code | Specification |
|---|---|
| S | With polarity sensor and Thermal Protector |
| T | Without polarity sensor, with thermal protector |

**11th digit - Options**

| Code | Cooling Method |
|---|---|
| 1 | Self-cooled |
| L | Water-cooled* |

**12th digit - Options**

| Code | Connection |
|---|---|
| E | Metal round connector (Phoenix) |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.
* Contact your YASKAWA representative for information on water-cooled model.

### Magnetic Way

S G L F M2 - 30 270 A

| Sigma-7 Series Linear Servomotors | 1st | 2nd | 3rd + 4th | 5th - 7th | 8th | digit |
|---|---|---|---|---|---|---|

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| F | With F-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| M2 | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 30 | 30 mm |
| 45 | 45 mm |
| 90 | 90 mm |
| 1D | 135 mm |

**5th ... 7th digit - Length of Magnetic Way**

| Code | Specification |
|---|---|
| 270 | 270 mm |
| 306 | 306 mm |
| 450 | 450 mm |
| 510 | 510 mm |
| 630 | 630 mm |
| 714 | 714 mm |

**8th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# SGLFW (Models with F-type Iron Cores)

## Moving Coil

S G L F W - 20 A 090 A P □ - E

Sigma-7 Series Linear Servomotors — 1st — 2nd — 3rd + 4th — 5th — 6th - 8th — 9th — 10th — 11th — 12th digit

| 1st digit - Specification | |
|---|---|
| Code | Servomotor Type |
| F | With F-type iron core |

| 2nd digit - Moving Coil/ Magnetic Way | |
|---|---|
| Code | Specification |
| W | Moving Coil |

| 3rd + 4th digit - Magnet Height | |
|---|---|
| Code | Specification |
| 20 | 20 mm |
| 35 | 36 mm |
| 50 | 47.5 mm |
| 1Z | 95 mm |

| 5th digit - Voltage | |
|---|---|
| Code | Specification |
| A | 200 VAC |

| 6th - 8th digit - Length of Moving Coil | |
|---|---|
| Code | Specification |
| 090 | 91 mm |
| 120 | 127 mm |
| 200 | 215 mm |
| 230 | 235 mm |
| 380 | 395 mm |

| 9th digit - Design Revision Order | |
|---|---|
| Code | Specification |
| A, B, ... | Revision |

| 10th digit - Sensor Specification | |
|---|---|
| Code | Specification |
| P | With polarity sensor |
| None | Without polarity sensor |

| 11th digit - Connector for Servomotor Main Circuit Cable | | |
|---|---|---|
| Code | Specification | Applicable Models |
| None | Connector from Tyco Electronics Japan G.K. | All models |
| D | Connector from Interconnectron GmbH | SGLFW-35, -50, -1Z□200B |

| 12th digit | |
|---|---|
| Code | Specifications |
| E | RoHS II Suffix |

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

## Magnetic Way

S G L F M - 20 324 A □ - E

Sigma-7 Series Linear Servomotors — 1st — 2nd — 3rd + 4th — 5th - 7th — 8th — 9th — 10th digit

| 1st digit - Servomotor Type | |
|---|---|
| Code | Specification |
| F | With F-type iron core |

| 2nd digit - Moving Coil/Magnetic Way | |
|---|---|
| Code | Specification |
| M | Magnetic Way |

| 3rd + 4th digit - Magnet Height | |
|---|---|
| Code | Specification |
| 20 | 20 mm |
| 35 | 36 mm |
| 50 | 47.5 mm |
| 1Z | 95 mm |

| 5rd ... 7th digit - Length of Magnetic Way | |
|---|---|
| Code | Specification |
| 324 | 324 mm |
| 405 | 405 mm |
| 540 | 540 mm |
| 675 | 675 mm |
| 756 | 756 mm |
| 945 | 945 mm |

| 8th digit - Design Revision Order | |
|---|---|
| Code | Specification |
| A, B, ... | Revision |

| 9th digit - Options | |
|---|---|
| Code | Specification |
| None | Without options |
| C | With magnet cover |

| 10th digit | |
|---|---|
| Code | Specifications |
| E | RoHS II Suffix |

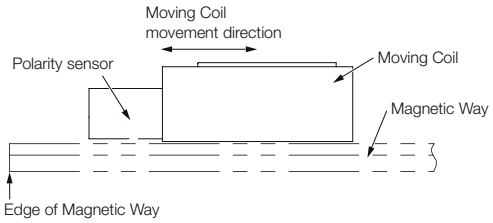
Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combinations of codes.

# Precautions on Moving Coils with Polarity Sensors

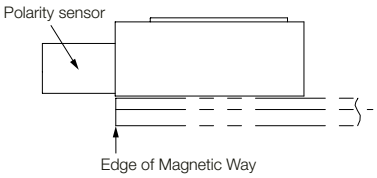
Note

When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.
When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length (L) of the Moving Coil and the polarity sensor. Refer to the following table.

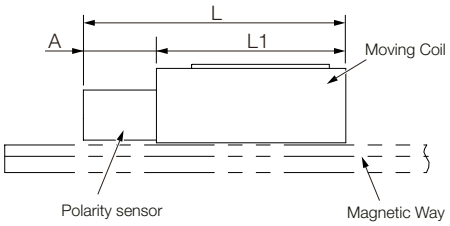
## Correct Installation




## Incorrect Installation




## Total Length of Moving Coil with Polarity Sensor




| Moving Coil Model SGLFW2- | Length of Moving Coil, L1 [mm] | Length of Polarity Sensor, A [mm] | Total Length, L [mm] |
|---|---|---|---|
| 30A070AS | 70 | 27 | 97 |
| 30A120AS | 125 | | 152 |
| 30A230AS | 230 | | 257 |
| 45A200AS | 205 | 32 | 237 |
| 45A380AS | 384 | | 416 |
| 90A200AS | 205 | 32 | 237 |
| 90A380AS | 384 | | 416 |
| 90A560AS | 563 | | 595 |
| 1DA380AS | 384 | 32 | 416 |
| 1DA560AS | 563 | | 595 |

| Moving Coil Model SGLFW- | Length of Moving Coil, L1 [mm] | Length of Polarity Sensor, A [mm] | Total Length, L [mm] |
|---|---|---|---|
| 20A090AP | 91 | 22 | 113 |
| 20A120AP | 127 | | 149 |
| 35A120AP□ | 127 | 22 | 149 |
| 35A230AP□ | 235 | | 257 |
| 50A200BP□ | 215 | 22 | 237 |
| 50A380BP□ | 395 | | 417 |
| 1ZA200BP□ | 215 | 22 | 237 |
| 1ZA380BP | 395 | | 417 |

# Ratings and Specifications: SGLFW2 Models

## Specifications

| Linear Servomotor Moving Coil | | 30A | | | 45A | | 90A | | | 1DA | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SGLFW2- | | 070A□ | 120A□ | 230A□ | 200A□ | 380A□ | 200A□ | 380A□ | 560A□ | 380A□ | 560A□ |
| Time Rating | | Continuous | | | | | | | | | |
| Thermal Class | | B | | | | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | | | | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | | | | | | | | |
| Excitation | | Permanent magnet | | | | | | | | | |
| Cooling Method | | Self-cooled or water-cooled* | | | | | | | | | |
| Protective Structure | | IP00 | | | | | | | | | |
| Environmental Conditions | Ambient Temperature | 0°C to 40°C (without freezing) | | | | | | | | | |
| | Ambient Humidity | 20% to 80% relative humidity (without condensation) | | | | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | | | | | |
| Shock Resistance | Impact Acceleration Rate | 196 $m/s^2$ | | | | | | | | | |
| | Number of Impacts | 2 times | | | | | | | | | |
| Vibration Resistance | Vibration Acceleration Rate | 49 $m/s^2$<br>(the vibration resistance in three directions, vertical, side-to-side, and front-to-back) | | | | | | | | | |

* Contact your YASKAWA representative for information on water-cooled models.

# Ratings

| Linear Servomotor Moving Coil | | 30A | | | | 45A | | |
|---|---|---|---|---|---|---|---|---|
| Model SGLFW2- | | 070A□ | 120A□ | 230A□ | | 200A□ | 380A□ | |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | m/s | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Maximum Speed*1 | m/s | 5.0 | 5.0 | 5.0 | | 4.5 | 4.5 | |
| Rated Force*1, *2 | N | 45 | 90 | 180 | 170 | 280 | 560 | |
| Maximum Force*1 | N | 135 | 270 | 540 | 500 | 840 | 1,680 | 1,500 |
| Rated Current*1 | A | 1.4 | 1.5 | 2.9 | 2.8 | 4.4 | 8.7 | |
| Maximum Current*1 | A | 5.3 | 5.2 | 10.5 | 9.3 | 16.4 | 32.7 | 27.5 |
| Moving Coil Mass | kg | 0.50 | 0.90 | 1.7 | | 2.9 | 5.5 | |
| Force Constant | N/A | 33.3 | 64.5 | 64.5 | | 67.5 | 67.5 | |
| BEMF Constant | Vrms / (m/s) / phase | 11.1 | 21.5 | 21.5 | | 22.5 | 22.5 | |
| Motor Constant | N/√W | 11.3 | 17.3 | 24.4 | | 36.9 | 52.2 | |
| Electrical Time Constant | ms | 7.6 | 7.3 | 7.3 | | 19 | 19 | |
| Mechanical Time Constant | ms | 3.9 | 3.0 | 2.9 | | 2.1 | 2.0 | |
| Thermal Resistance (with Heat Sink) | K/W | 2.62 | 1.17 | 0.79 | | 0.60 | 0.44 | |
| Thermal Resistance (without Heat Sink) | K/W | 11.3 | 4.43 | 2.55 | | 2.64 | 1.49 | |
| Magnetic Attraction | N | 200 | 630 | 1260 | | 2120 | 4240 | |
| Maximum Allowable Payload | kg | 5.6 | 9.4 | 34 | 10 | 58 | 110 | 95 |
| Maximum Allowable Payload (With External Regenerative Resistor and External Dynamic Brake Resistor*3) | kg | 5.6 | 11 | 34 | 20 | 64 | 110 | 110 |
| Combined Magnetic Way, SGLFM2- | | 30□□□A | | | | 45□□□A | | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 628 | 629 | 630 | | 631 | 632 | |
| Applicable SERVOPACKs | SGD7S- | 1R6A, 2R1F | | 3R8A | 2R8A, 2R8F | 5R5A | 180A | 120A |
| | SGD7W-<br>SGD7C- | 1R6A | | – | 2R8A | 5R5A | – | |

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

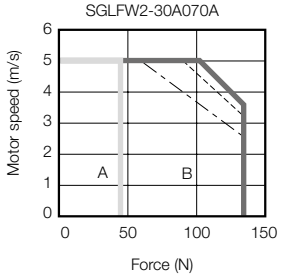
*2. The rated forces are the continuous allowable force values at a surrounding air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
- Heat Sink Dimensions
  - 150 mm × 100 mm × 10 mm: SGLFW2-30A070A
  - 254 mm × 254 mm × 25 mm: SGLFW2-30A120A and -30A230A
  - 400 mm × 500 mm × 25 mm: SGLFW2-45A200A and -45A380A

*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

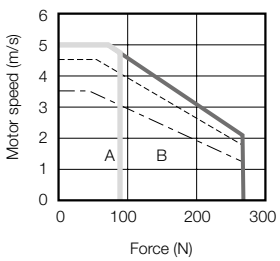
## Force-Motor Speed Characteristics

A : Continuous duty zone ——— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input
— – — (dashed-dotted lines): With single-phase 100-V input

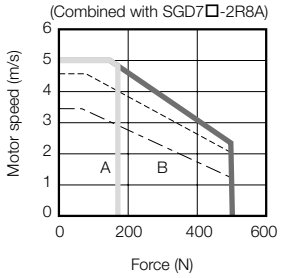
SGLFW2-30A070A



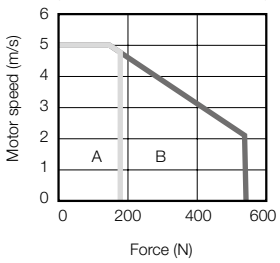

SGLFW2-30A120A



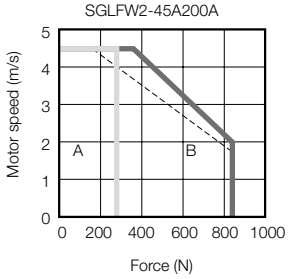

SGLFW2-30A230A
(Combined with SGD7□-2R8A)



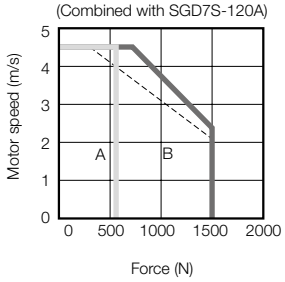

SGLFW2-30A230A
(Combined with SGD7S-3R8A)



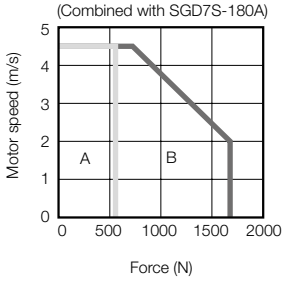

SGLFW2-45A200A




SGLFW2-45A380A
(Combined with SGD7S-120A)




SGLFW2-45A380A
(Combined with SGD7S-180A)




Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

# Ratings

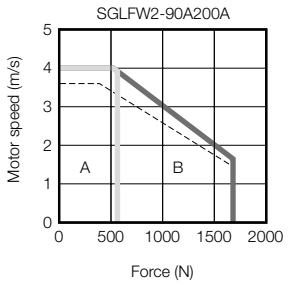
| Linear Servomotor Moving Coil | | 90A | | | 1DA | |
|---|---|---|---|---|---|---|
| Model SGLFW2- | | 200A□ | 380A□ | 560A□ | 380A□ | 560A□ |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | m/s | 4.0 | 4.0 | 4.0 | 2.0 | 2.0 |
| Maximum Speed*1 | m/s | 4.0 | 4.0 | 4.0 | 2.5 | 2.5 |
| Rated Force*1, *2 | N | 560 | 1,120 | 1,680 | 1,680 | 2,520 |
| Maximum Force*1 | N | 1,680 | 3,360 | 5,040 | 5,040 | 7,560 |
| Rated Current*1 | A | 7.2 | 14.4 | 21.6 | 14.4 | 21.6 |
| Maximum Current*1 | A | 26.9 | 53.9 | 80.8 | 53.9 | 80.8 |
| Moving Coil Mass | kg | 5.3 | 10.1 | 14.9 | 14.6 | 21.5 |
| Force Constant | N/A | 82.0 | 82.0 | 82.0 | 123 | 123 |
| BEMF Constant | Vrms / (m/s) / phase | 27.3 | 27.3 | 27.3 | 41.0 | 41.0 |
| Motor Constant | N/√W | 58.1 | 82.2 | 101 | 105 | 129 |
| Electrical Time Constant | ms | 24 | 23 | 24 | 25 | 25 |
| Mechanical Time Constant | ms | 1.6 | 1.5 | 1.5 | 1.3 | 1.3 |
| Thermal Resistance (with Heat Sink) | K/W | 0.45 | 0.21 | 0.18 | 0.18 | 0.12 |
| Thermal Resistance (without Heat Sink) | K/W | 1.81 | 1.03 | 0.72 | 0.79 | 0.55 |
| Magnetic Attraction | N | 4,240 | 8,480 | 12,700 | 12,700 | 19,100 |
| Maximum Allowable Payload | kg | 130 | 160 | 360 | 690 | 1,000 |
| Maximum Allowable Payload (With External Regenerative Resistor and External Dynamic Brake Resistor) | kg | 140 | 290 | 440 | 710 | 1,000 |
| Combined Magnetic Way, SGLFM2- | | | 90□□□A | | 1D□□□A | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 633 | 634 | 648 | 649 | 650 |
| Applicable SERVOPACKs | SGD7S- | 120A | 200A | 330A | 200A | 330A |
| | SGD7W-<br>SGD7C- | – | – | – | – | – |

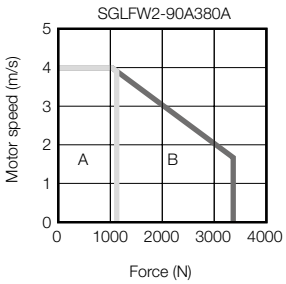
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated forces are the continuous allowable force values at a ambient air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
- Heat Sink Dimensions
  - 400 mm × 500 mm × 25 mm: SGLFW2-90A200A
  - 609 mm × 762 mm × 40 mm: SGLFW2-90A380A
  - 900 mm × 762 mm × 40 mm: SGLFW2-90A560A and -1DA380A
  - 1,400mm x 900 mm x 40 mm: SGLFW2-1DA560A

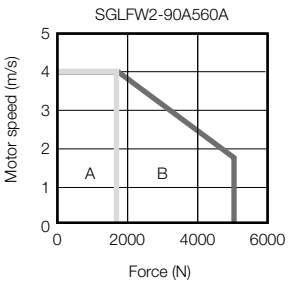
*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK.
However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).
- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

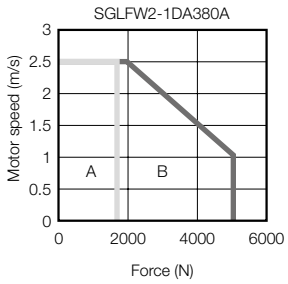
## Force-Motor Speed Characteristics

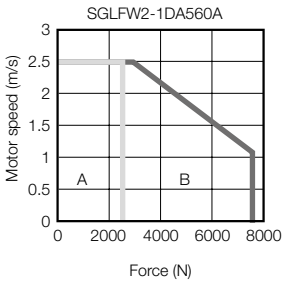
A : Continuous duty zone ——— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input



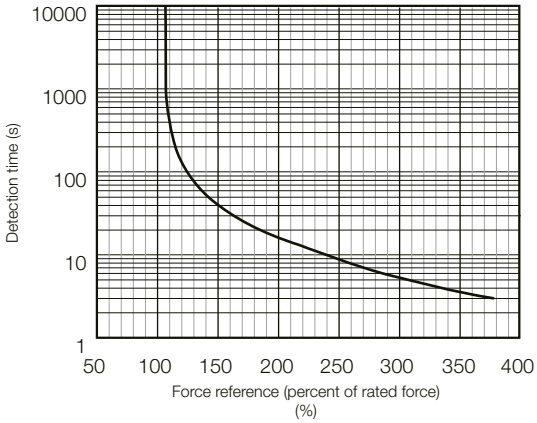




Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

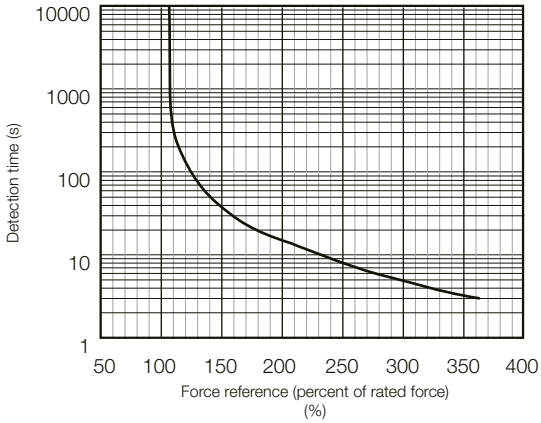
## Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

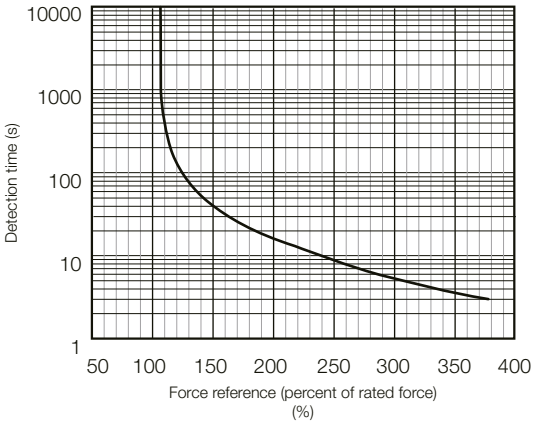
SGLFW2-30A070A




SGLFW2-30A120A and -230A




SGLFW2-45A, -90A, and -1DA




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in Force-Motor Speed Characteristics.

# Ratings and Specifications: SGLFW Models

## Specifications

| Linear Servomotor Moving Coil | | 20A | | 35A | | 50A | | 1ZA | |
|---|---|---|---|---|---|---|---|---|---|
| Model SGLFW- | | 090A | 120A | 120A | 230A | 200B | 380B | 200B | 380B |
| Time Rating | | Continuous | | | | | | | |
| Thermal Class | | B | | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | | | | | | |
| Excitation | | Permanent magnet | | | | | | | |
| Cooling Method | | Self-cooled | | | | | | | |
| Protective Structure | | IP00 | | | | | | | |
| Environmental Conditions | Ambient Temperature | 0°C to 40°C (without freezing) | | | | | | | |
| | Ambient Humidity | 20% to 80% relative humidity (without condensation) | | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | | | |
| Shock Resistance | Impact Acceleration Rate | 196 $m/s^2$ | | | | | | | |
| | Number of Impacts | 2 times | | | | | | | |
| Vibration Resistance | Vibration Acceleration Rate | 49 $m/s^2$<br>(the vibration resistance in three directions, vertical, side-to-side, and front-to-back) | | | | | | | |

# Ratings

| Linear Servomotor Moving Coil | | 20A | | 35A | | 50A | | 1ZA | |
|---|---|---|---|---|---|---|---|---|---|
| Model SGLFW- | | 090A | 120A | 120A | 230A | 200B | 380B | 200B | 380B |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | m/s | 5.0 | 3.5 | 2.5 | 3.0 | 1.5 | 1.5 | 1.5 | 1.5 |
| Maximum Speed*1 | m/s | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.9 | 4.9 |
| Rated Force*1, *2 | N | 25 | 40 | 80 | 160 | 280 | 560 | 560 | 1,120 |
| Maximum Force*1 | N | 86 | 125 | 220 | 440 | 600 | 1,200 | 1,200 | 2,400 |
| Rated Current*1 | A | 0.70 | 0.80 | 1.4 | 2.8 | 5.0 | 10.0 | 8.7 | 17.5 |
| Maximum Current*1 | A | 3.0 | 2.9 | 4.4 | 8.8 | 12.4 | 25.0 | 21.6 | 43.6 |
| Moving Coil Mass | kg | 0.70 | 0.90 | 1.3 | 2.3 | 3.5 | 6.9 | 6.4 | 12 |
| Force Constant | N/A | 36.0 | 54.0 | 62.4 | 62.4 | 60.2 | 60.2 | 69.0 | 69.0 |
| BEMF Constant | Vrms / (m/s) / phase | 12.0 | 18.0 | 20.8 | 20.8 | 20.1 | 20.1 | 23.0 | 23.0 |
| Motor Constant | N/√W | 7.95 | 9.81 | 14.4 | 20.4 | 34.3 | 48.5 | 52.4 | 74.0 |
| Electrical Time Constant | ms | 3.2 | 3.3 | 3.6 | 3.6 | 16 | 16 | 18 | 18 |
| Mechanical Time Constant | ms | 11 | 9.4 | 6.3 | 5.5 | 3.0 | 2.9 | 2.3 | 2.1 |
| Thermal Resistance (with Heat Sink) | K/W | 4.35 | 3.19 | 1.57 | 0.96 | 0.56 | 0.38 | 0.47 | 0.20 |
| Thermal Resistance (without Heat Sink) | K/W | 7.69 | 5.02 | 4.10 | 1.94 | 1.65 | 0.95 | 1.30 | 0.73 |
| Magnetic Attraction | N | 310 | 460 | 810 | 1,590 | 1,650 | 3,260 | 3,300 | 6,520 |
| Maximum Allowable Payload | kg | 3.2 | 4.8 | 8.7 | 29 | 33 | 67 | 66 | 78 |
| Maximum Allowable Payload (With External Regenerative Resistor and External Dynamic Brake Resistor*3) | kg | 3.2 | 4.8 | 8.7 | 29 | 40 | 80 | 82 | 160 |
| Combined Magnetic Way, SGLFM- | | 20□□□A | | 35□□□A | | 50□□□A | | 1Z□□□A□ | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 017 | 018 | 019 | 020 | 181 | 182 | 183 | 184 |
| Applicable SERVOPACKs | SGD7S- | 1R6A, 2R1F | | 3R8A | 5R5A | 120A | | 200A | |
| | SGD7W-<br>SGD7C- | 1R6A | | 5R5A | | – | | | |

*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.

*2. The rated forces are the continuous allowable force values at a ambient air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.

- Heat Sink Dimensions
  - 125 mm × 125 mm × 13 mm: SGLFW-20A090A and -20A120A
  - 254 mm × 254 mm × 25 mm: SGLFW-35A120A and -35A230A
  - 400 mm × 500 mm × 40 mm: SGLFW-50A200B, 50A380B, and -1ZA200B
  - 600 mm × 762 mm × 50 mm: SGLFW-1ZA380B

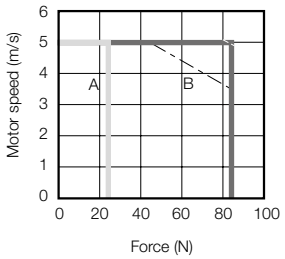
*3. To externally connect dynamic brake resistor, select hardware option specification 020 for the SERVOPACK. However, you cannot externally connect dynamic brake resistor if you use the following SERVOPACKs (maximum applicable motor capacity: 400 W).

- SGD7S-R70□□□A020 to -2R8□□□A020
- SGD7W-1R6A20A020 to -2R8A20A020
- SGD7C-1R6AMAA020 to -2R8AMAA020

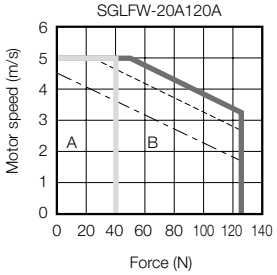
## Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input
—— – —— (dashed-dotted lines): With single-phase 100-V input

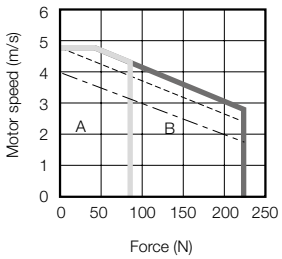
SGLFW-20A090A



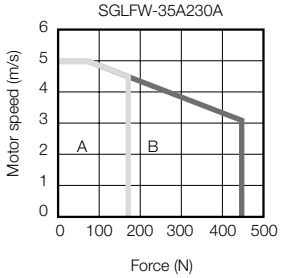

SGLFW-20A120A



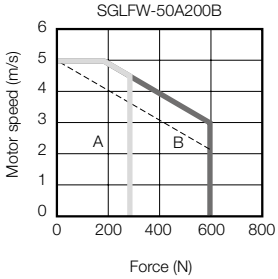

SGLFW-35A120A



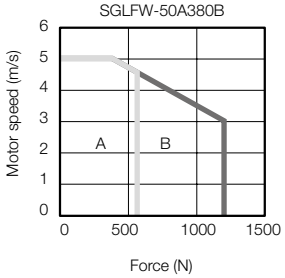

SGLFW-35A230A



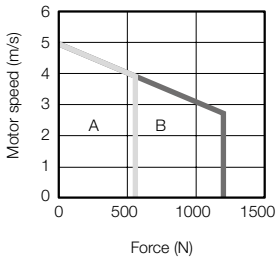

SGLFW-50A200B



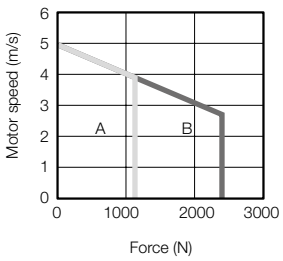

SGLFW-50A380B




SGLFW-1ZA200B




SGLFW-1ZA380B

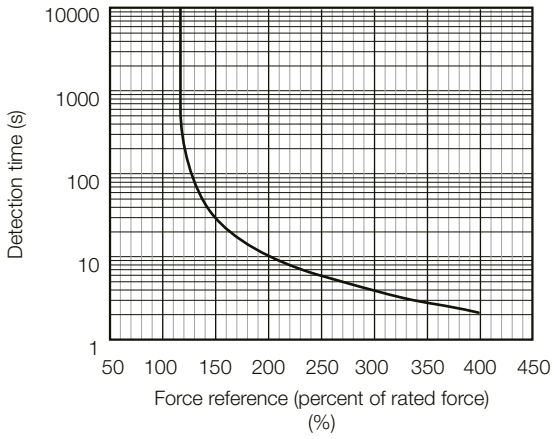



Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a Servomotor Main Circuit Cable that exceeds 20 m, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

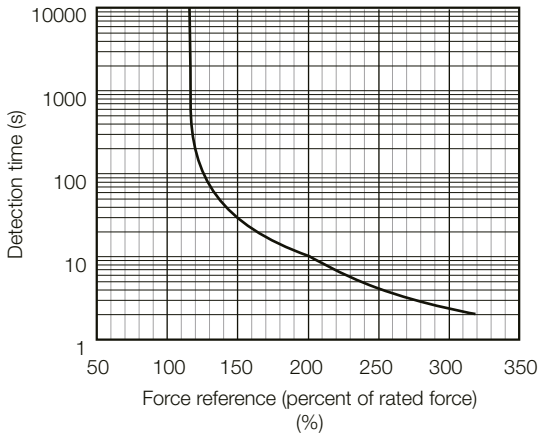
## Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

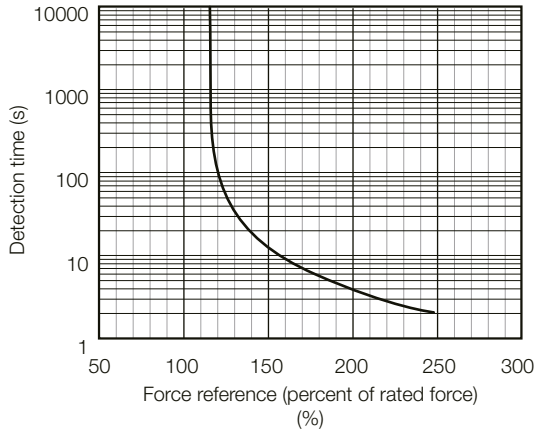
SGLFW-20A




SGLFW-35A




SGLFW-50A and -1ZA

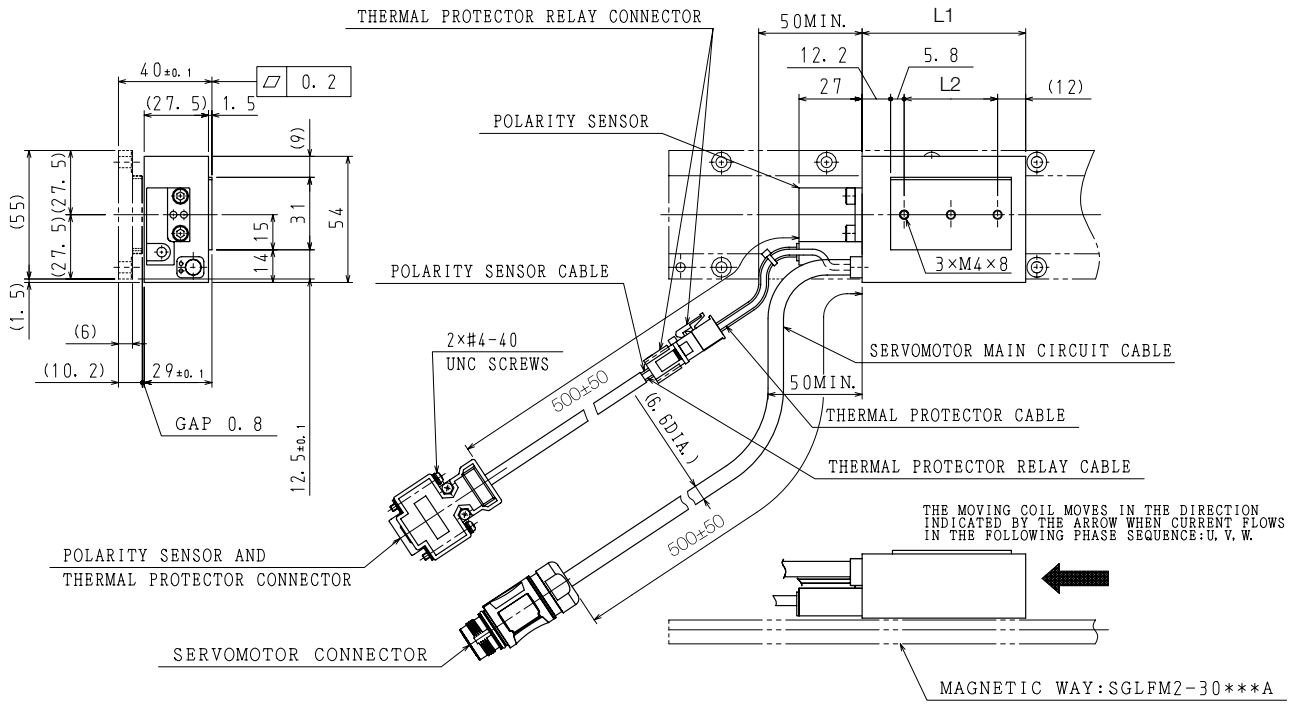



Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher. Use the Servomotor so that the effective force remains within the continuous duty zone given in Force-Motor Speed Characteristics.

# External Dimensions

## SGLFW2-30

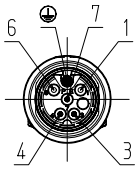
### Moving Coil with Polarity Sensor: SGLFW2-30A070AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|
| 30A070AS | 70 | 40 | 0.5 |

# Connector Specifications

### Servomotor Connector

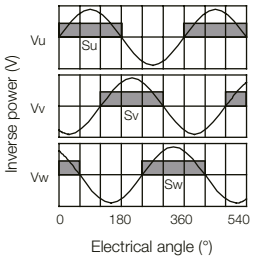



| | |
|---|---|
| 1 | – |
| 3 | Phase U |
| 4 | Phase V |
| 6 | – |
| 7 | Phase W |
| Ground | FG |
| Case | Shield |

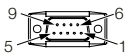
Connector: ST-5EP1N8A9003S (1607706)
Contact: ST-10KP030 (1618261)
From Phoenix Contact GmbH & Co. KG

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



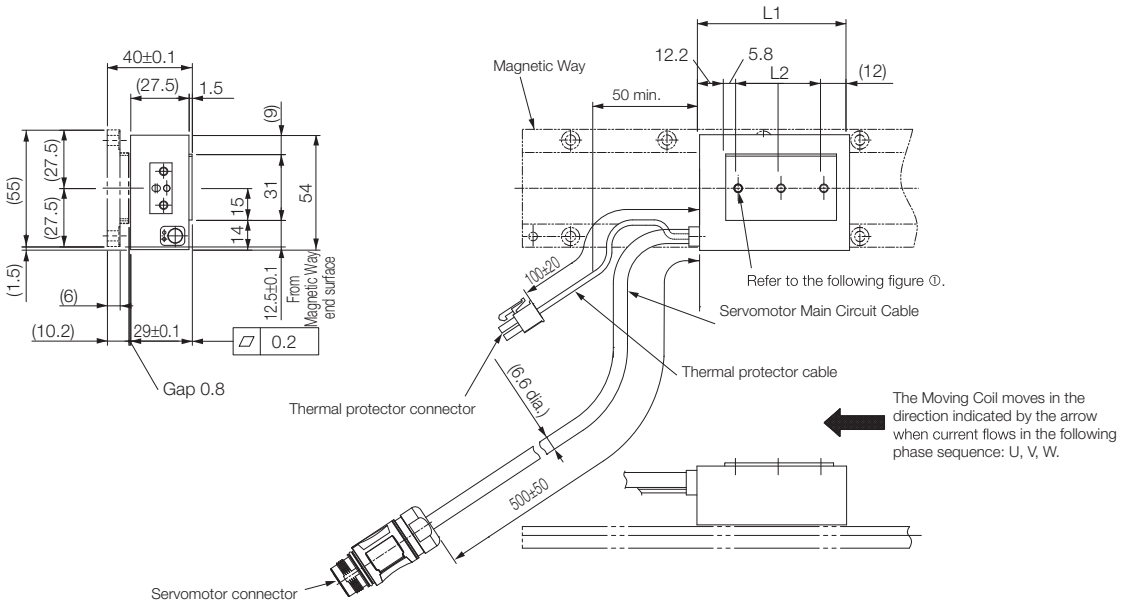

### Polarity Sensor and Thermostat Connector



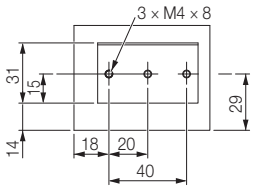

| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Moving Coil without Polarity Sensors: SGLFW2-30A070AT1E



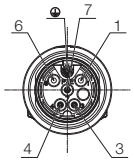

①SGLFW2-30A070AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | Approx. Mass [kg] |
|---|---|---|---|
| 30A070AT | 70 | 40 | 0.5 |

## Connector Specifications

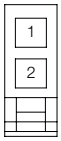
### Servomotor Connector




| | | | |
|---|---|---|---|
| 1 | – | 7 | Phase W |
| 3 | Phase U | Ground | FG |
| 4 | Phase V | Case | Shield |
| 6 | – | | |

Connector: ST-5EP1N8A9003S (1607706)
Contacts: ST-10KP030 (1618261)
From Phoenix Contact

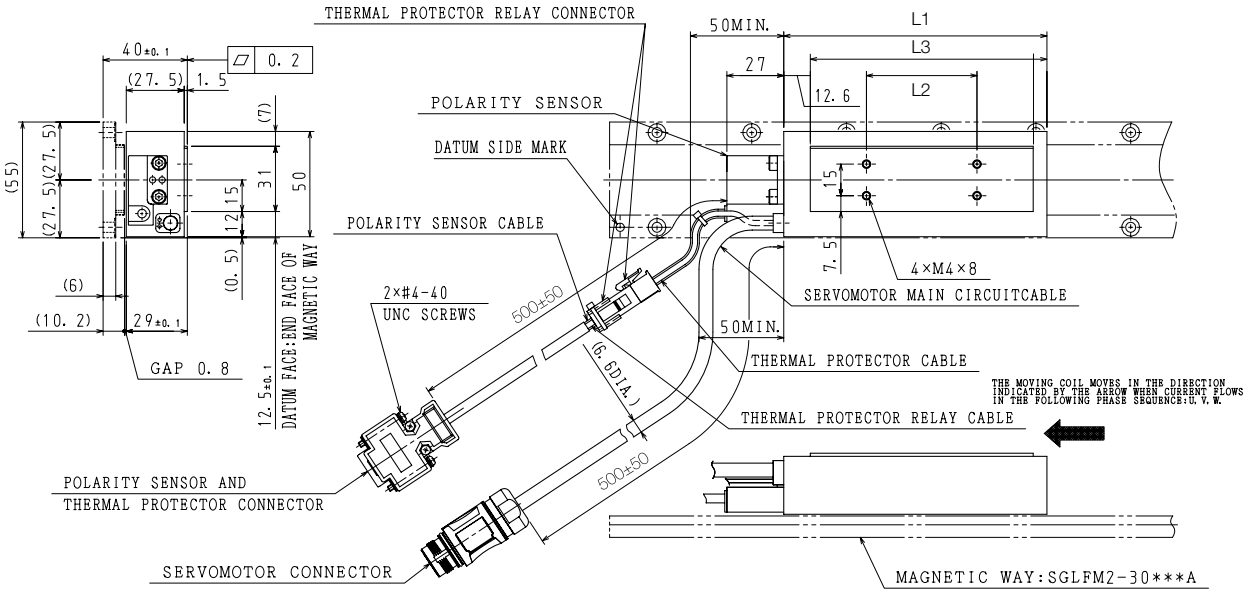
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

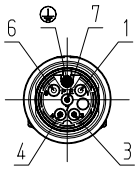
### Moving Coils with Polarity Sensors: SGLFW2-30A120AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 30A120AS | 125 | 52.5 | 105.9 | 0.9 |

## Connector Specifications

### Servomotor Connector

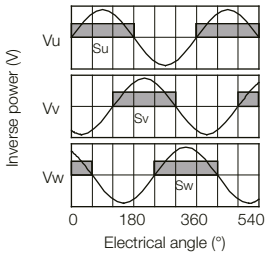



| | |
|---|---|
| 1 | – |
| 3 | Phase U |
| 4 | Phase V |
| 6 | – |
| 7 | Phase W |
| Ground | FG |
| Case | Shield |

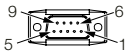
Connector: ST-5EP1N8A9003S (1607706)
Contact: ST-10KP030 (1618261)
From Phoenix Contact GmbH & Co. KG

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



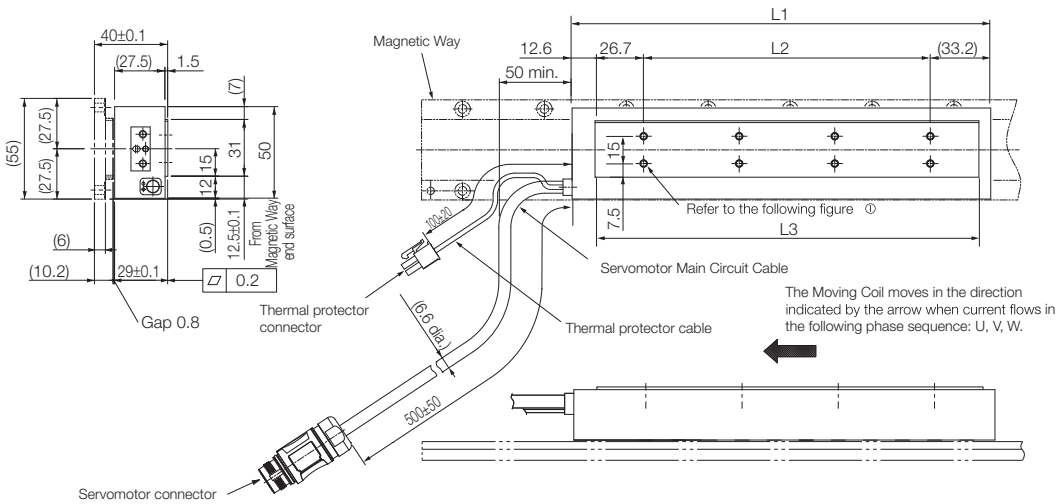

### Polarity Sensor and Thermostat Connector



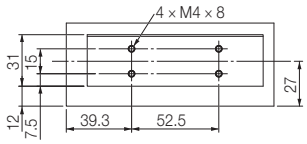

| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Moving Coils with Polarity Sensors: SGLFW2-30A120AT1E



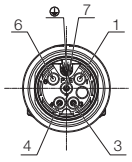

①SGLFW2-30A120AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 30A120AT | 125 | 52.5 | 105.9 | 0.9 |

## Connector Specifications

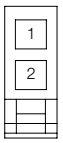
### Servomotor Connector




| | | | |
|---|---|---|---|
| 1 | – | 7 | Phase W |
| 3 | Phase U | Ground | FG |
| 4 | Phase V | Case | Shield |
| 6 | – | | |

Connector: ST-5EP1N8A9003S (1607706)
Contacts: ST-10KP030 (1618261)
From Phoenix Contact

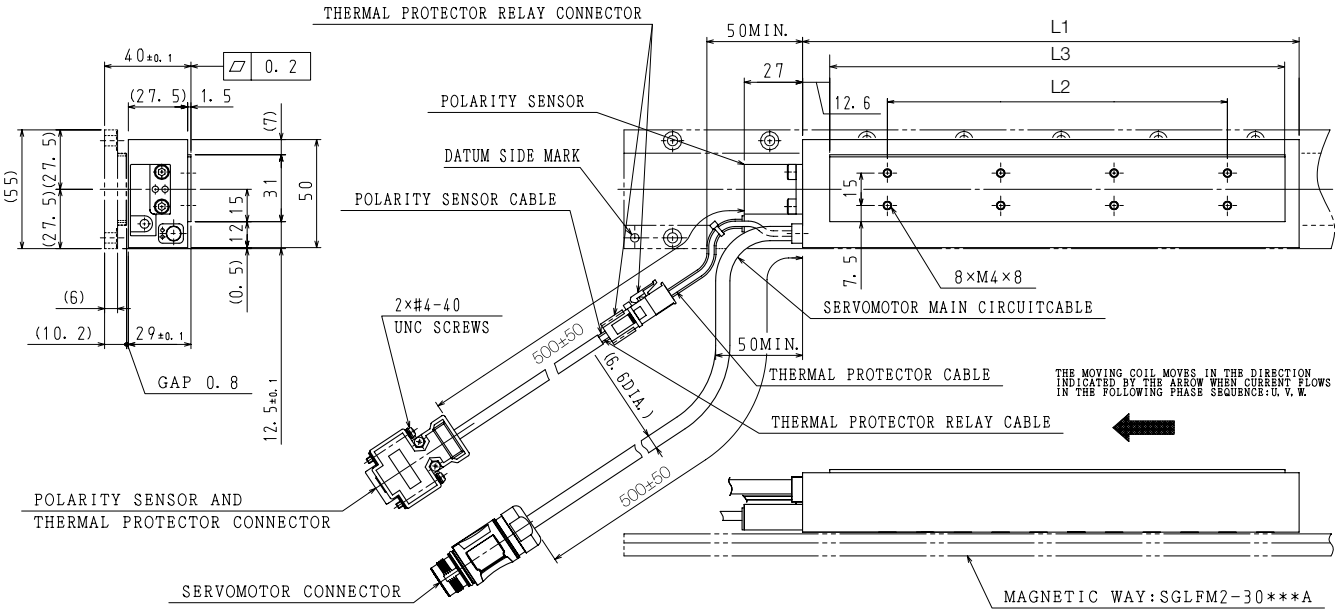
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

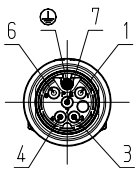
### Moving Coils with Polarity Sensors: SGLFW2-30A230AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 30A230AS | 230 | 157.5 | 210.9 | 1.7 |

## Connector Specifications

### Servomotor Connector

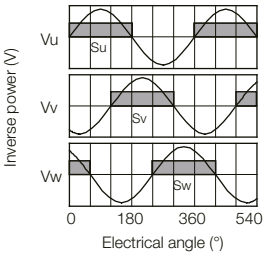



| | |
|---|---|
| 1 | – |
| 3 | Phase U |
| 4 | Phase V |
| 6 | – |
| 7 | Phase W |
| Ground | FG |
| Case | Shield |

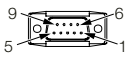
Connector: ST-5EP1N8A9003S (1607706)
Contact: ST-10KP030 (1618261)
From Phoenix Contact GmbH & Co. KG

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



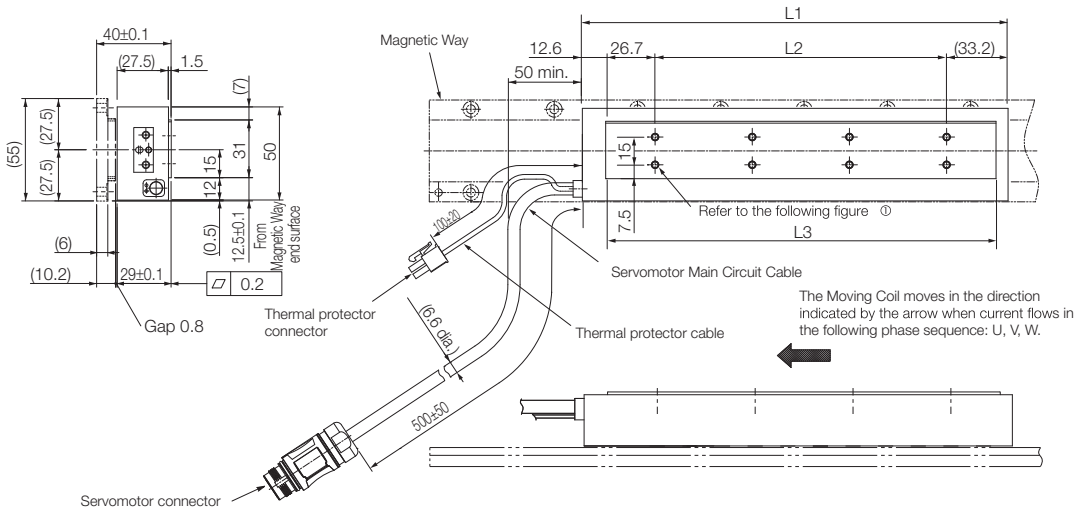

### Polarity Sensor and Thermostat Connector

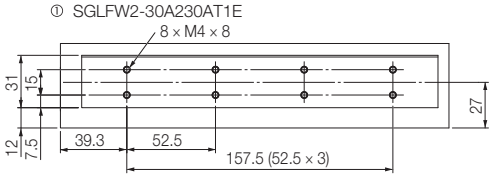



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Moving Coils with Polarity Sensors: SGLFW2-30A230AT1E

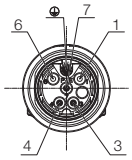



| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 30A230AT | 230 | 157.5 | 210.9 | 1.7 |

## Connector Specifications

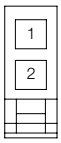
### Servomotor Connector




| | | | |
|---|---|---|---|
| 1 | – | 7 | Phase W |
| 3 | Phase U | Ground | FG |
| 4 | Phase V | Case | Shield |
| 6 | – | | |

Connector: ST-5EP1N8A9003S (1607706)
Contacts: ST-10KP030 (1618261)
From Phoenix Contact

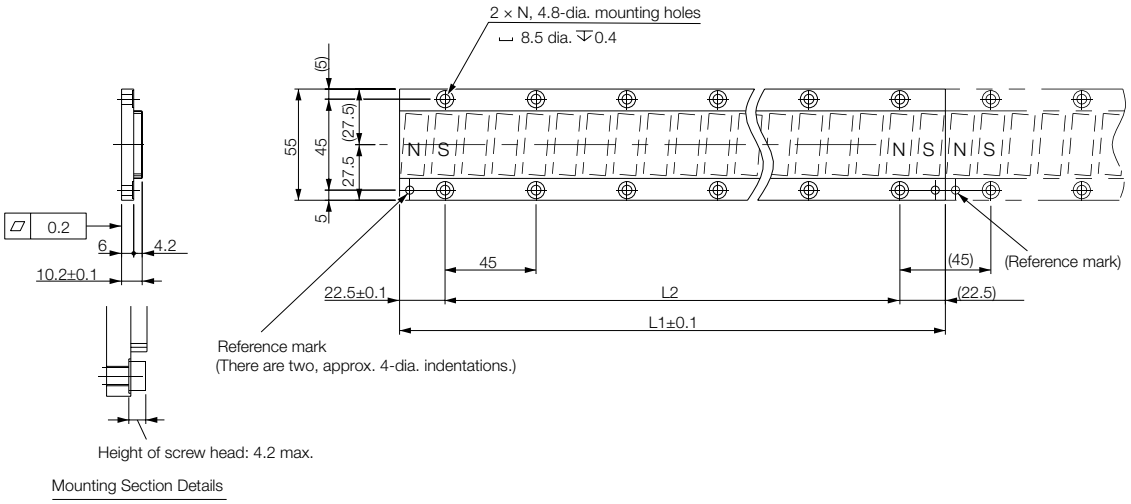
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

## Magnetic Ways: SGLFM2-30□□□A



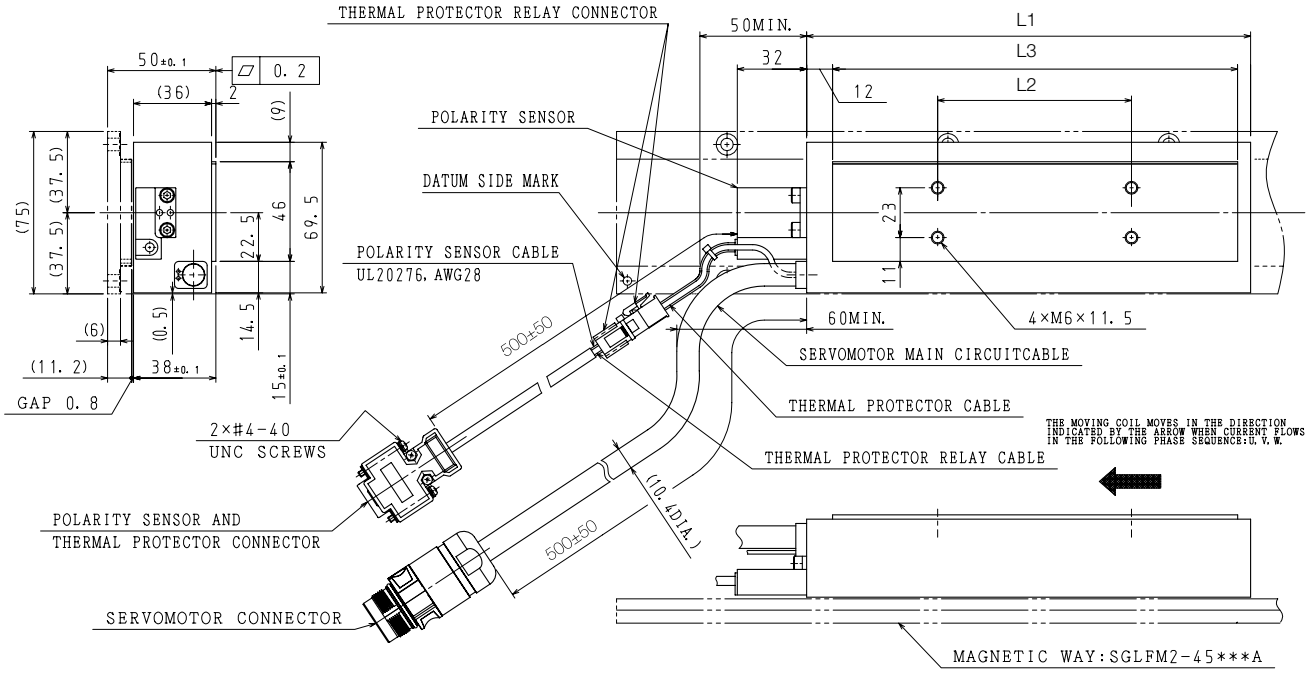

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Mgnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| 30270A | 270 | 225 (45 × 5) | 6 | 0.9 |
| 30450A | 450 | 405 (45 × 9) | 10 | 1.5 |
| 30630A | 630 | 585 (45 × 13) | 14 | 2.0 |

# SGLFW2-45

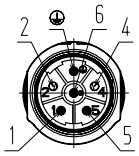
## Moving Coils with Polarity Sensors: SGLFW2-45A200AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 45A200AS | 205 | 89.5 | 187 | 0.2 | 2.9 |

# Connector Specifications

## Servomotor Connector

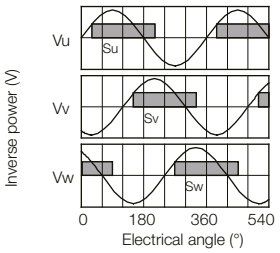



| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

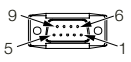
Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



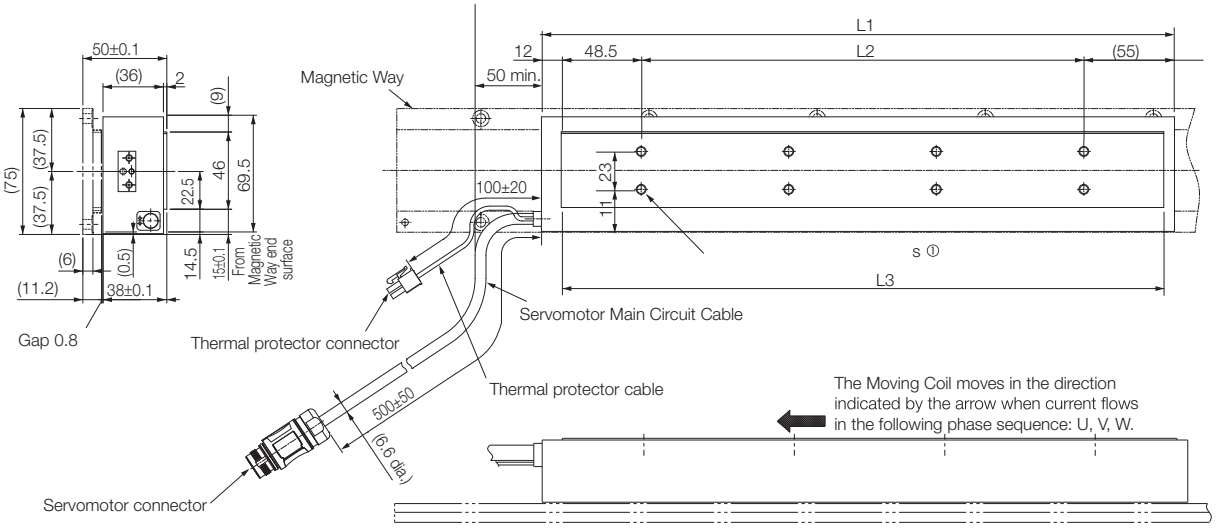

## Polarity Sensor and Thermostat Connector



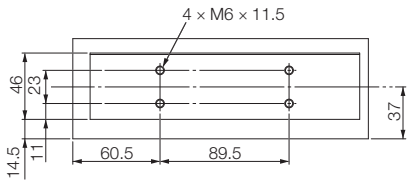

| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Moving Coils without Polarity Sensors: SGLFW2-45A200AT1E



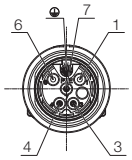

①SGLFW2-45D200AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 45A200AT | 205 | 89.5 | 187 | 0.2 | 2.9 |

## Connector Specifications

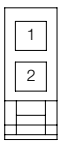
### Servomotor Connector




| | | | |
|---|---|---|---|
| 1 | – | 7 | Phase W |
| 3 | Phase U | Ground | FG |
| 4 | Phase V | Case | Shield |
| 6 | – | | |

Connector: ST-5EP1N8A9003S (1607706)
Contacts: ST-10KP030 (1618261)
From Phoenix Contact

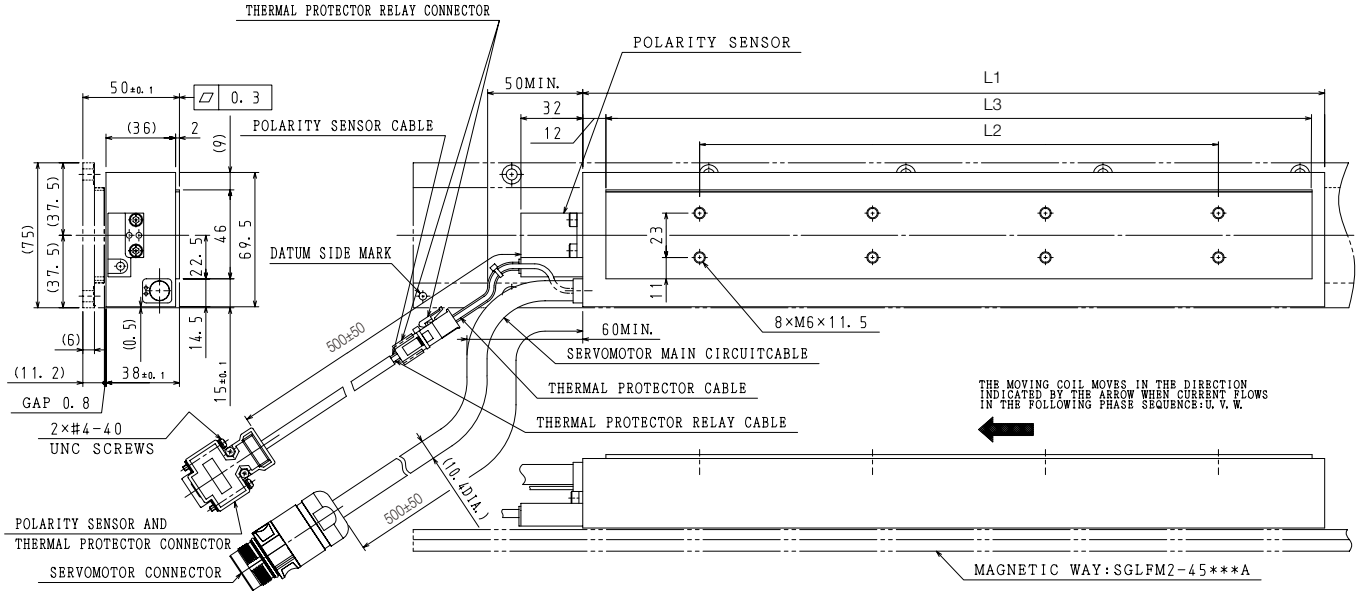
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

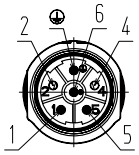
### Moving Coils with Polarity Sensors: SGLFW2-45A380AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 45A380AS | 384 | 268.5 | 365.5 | 0.3 | 5.5 |

## Connector Specifications

### Servomotor Connector

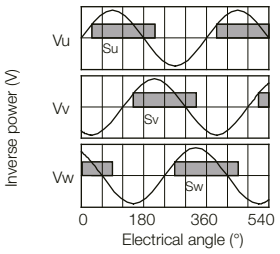



| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

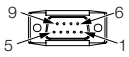
Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



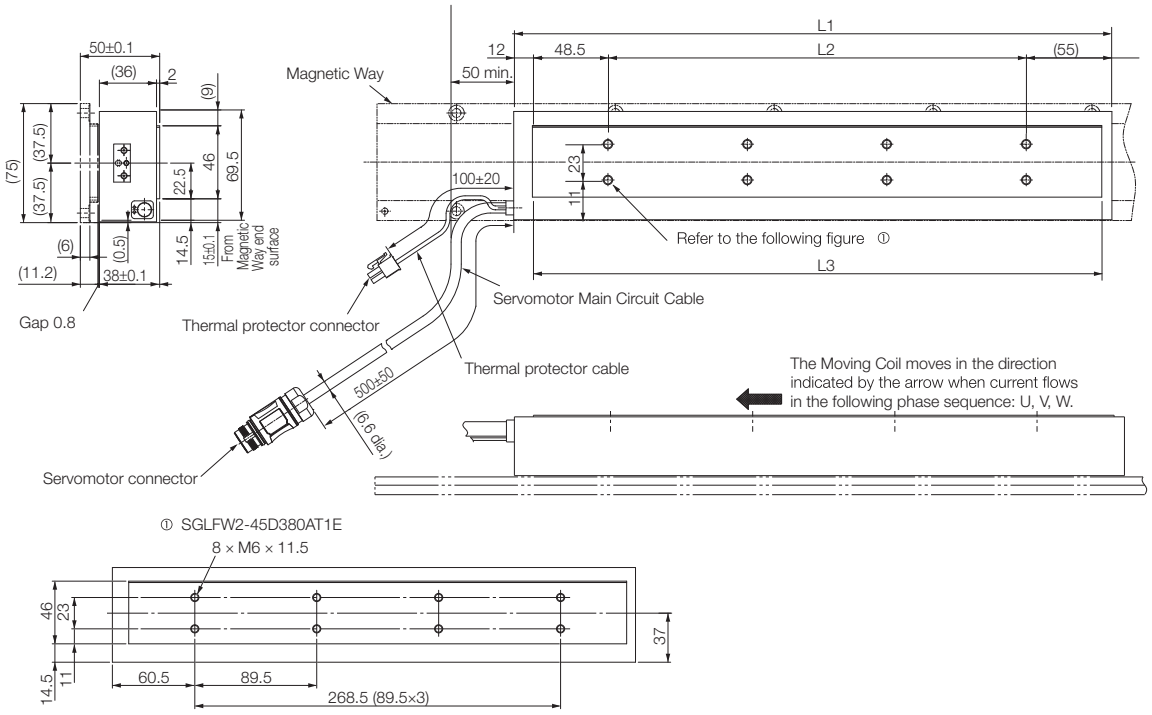

### Polarity Sensor and Thermostat Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Moving Coils without Polarity Sensors: SGLFW2-45A380AT1E



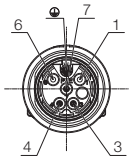

① SGLFW2-45D380AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 45A380AT | 384 | 268.5 | 365.5 | 0.3 | 5.5 |

## Connector Specifications

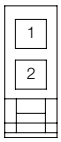
### Servomotor Connector




| | | | |
|---|---|---|---|
| 1 | – | 7 | Phase W |
| 3 | Phase U | Ground | FG |
| 4 | Phase V | Case | Shield |
| 6 | – | | |

Connector: ST-5EP1N8A9003S (1607706)
Contacts: ST-10KP030 (1618261)
From Phoenix Contact

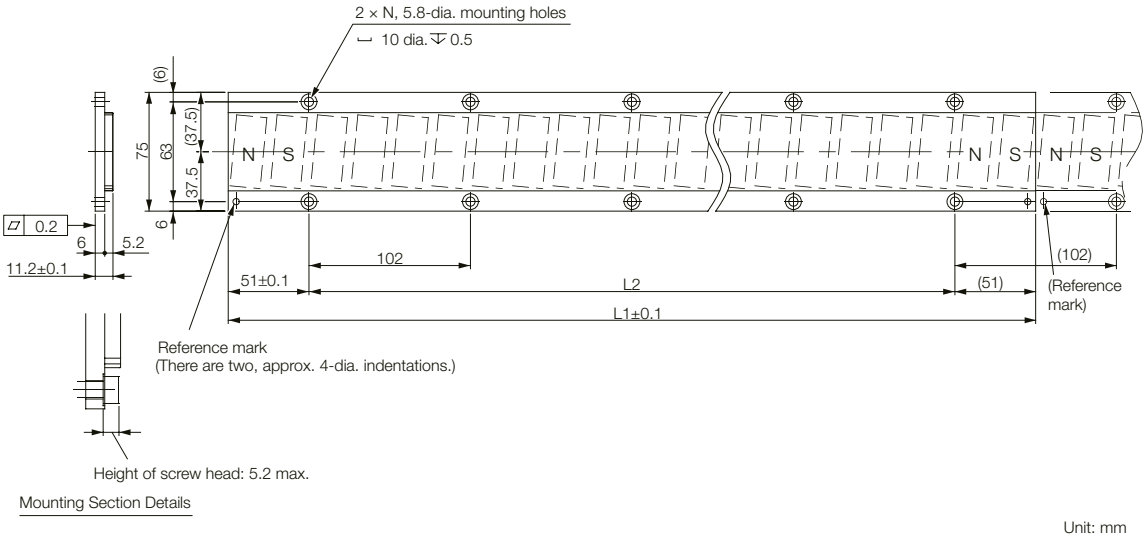
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

## Magnetic Ways: SGLFM2-45□□□A



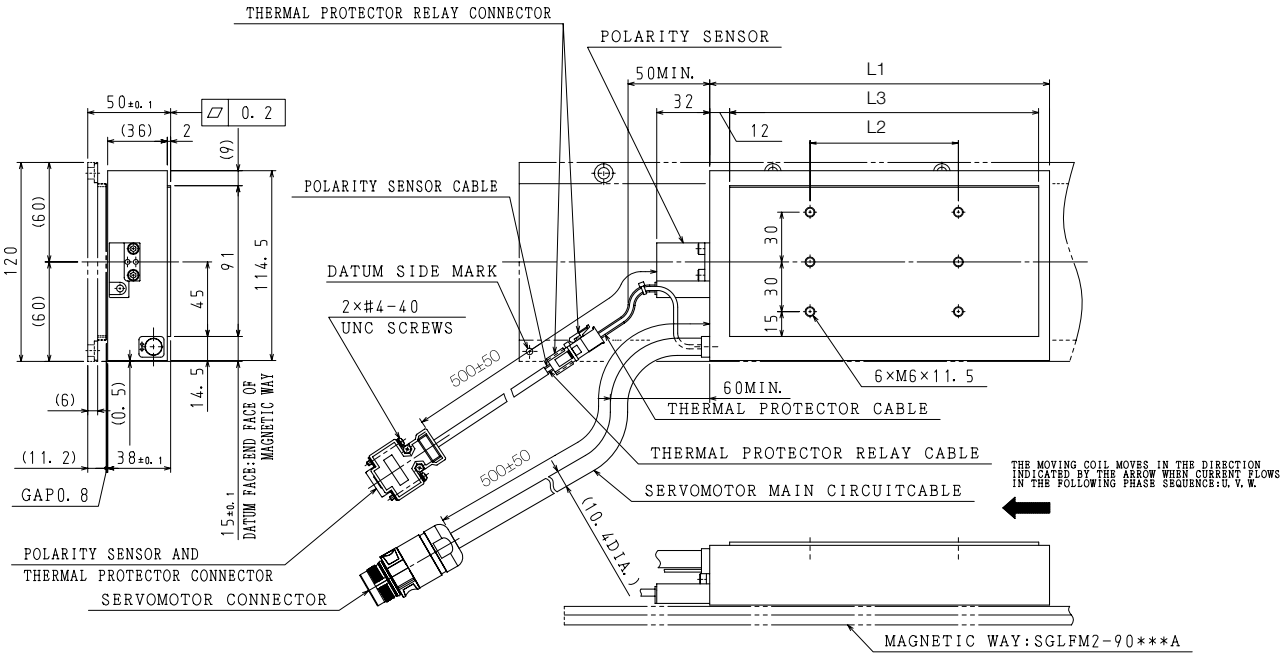

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Magnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| 45306A | 306 | 204 (102 × 2) | 3 | 1.5 |
| 45510A | 510 | 408 (102 × 4) | 5 | 2.5 |
| 45714A | 714 | 612 (102 × 6) | 7 | 3.4 |

# SGLFW2-90

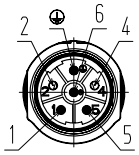
## Moving Coils with Polarity Sensors: SGLFW2-90A200AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90A200AS | 205 | 89.5 | 187 | 0.2 | 2.9 |

# Connector Specifications

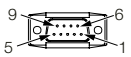
## Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

## Polarity Sensor and Thermostat Connector

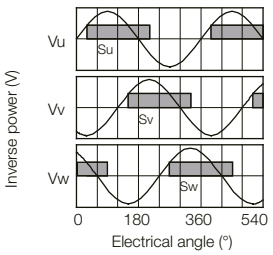



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

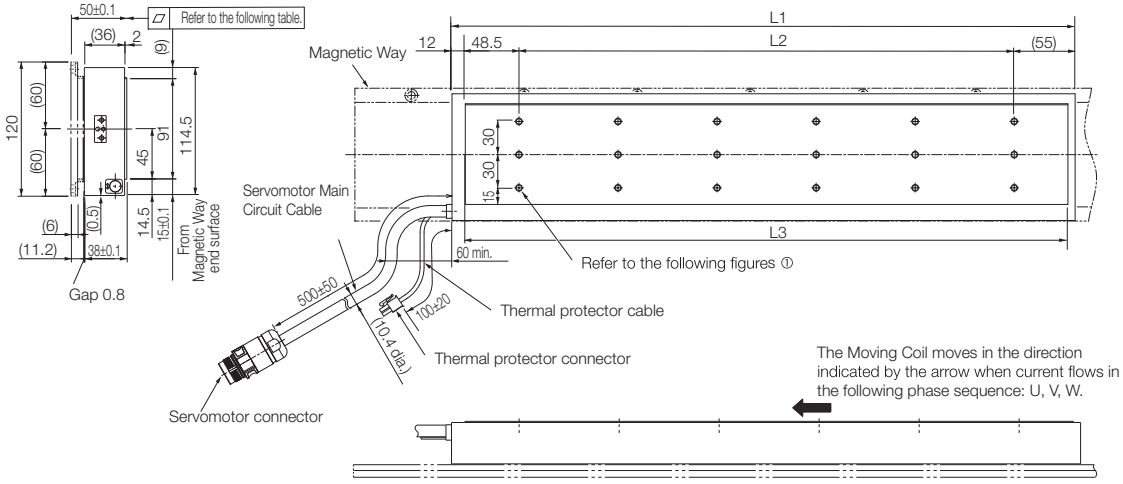
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

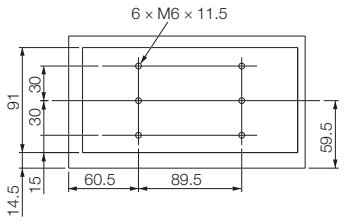
The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



### Moving Coils without Polarity Sensors: SGLFW2-90A200AT1E



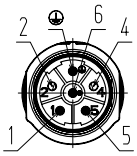

①SGLFW2-90D200AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90A200AT | 205 | 89.5 | 187 | 0.2 | 2.9 |

## Connector Specifications

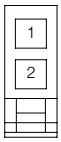
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact

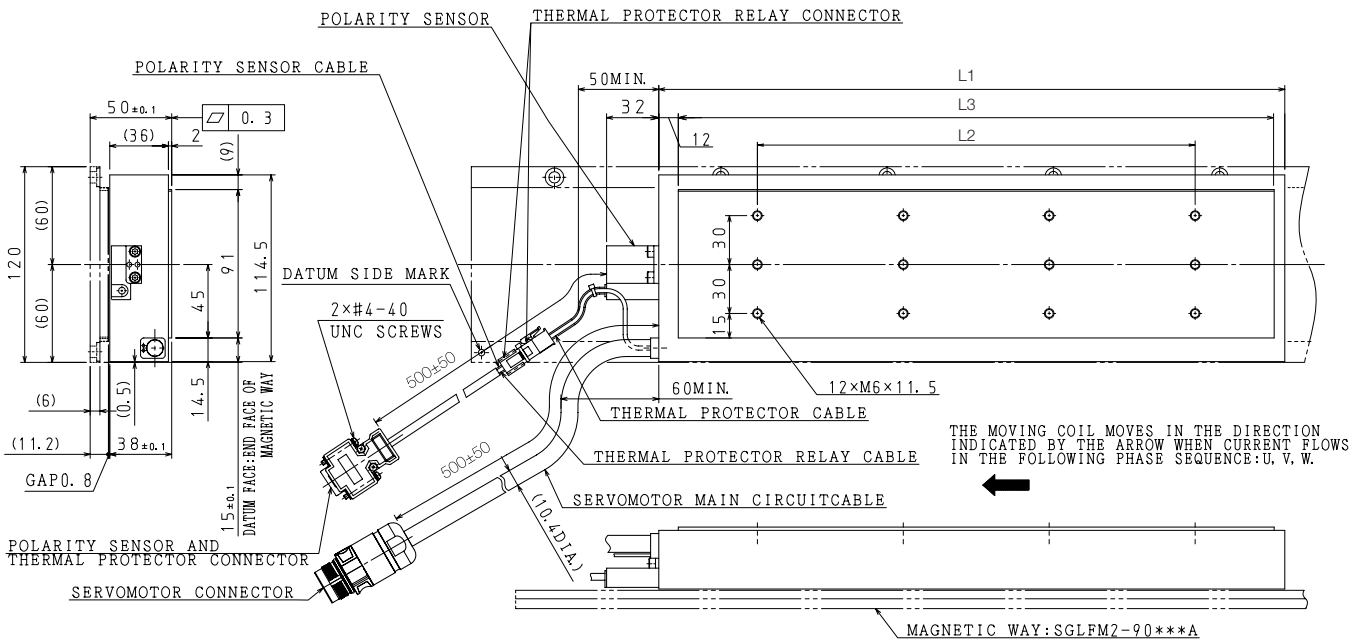
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

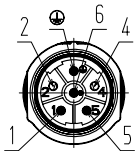
### Moving Coils with Polarity Sensors: SGLFW2-90A380AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90A380AS | 384 | 268.5 | 365.5 | 0.3 | 10.1 |

## Connector Specifications

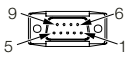
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

### Polarity Sensor and Thermostat Connector

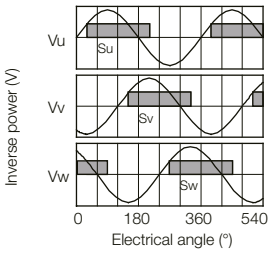



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

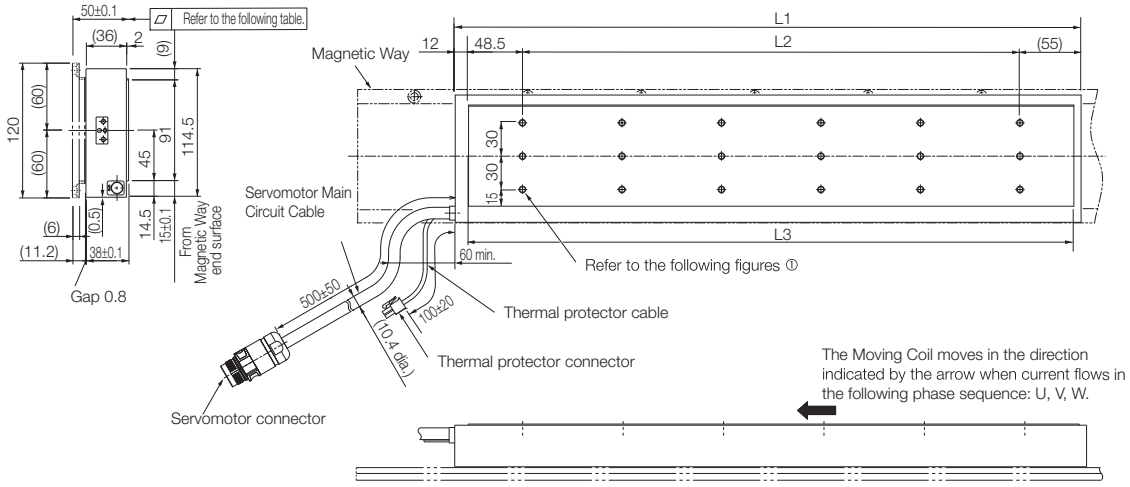
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Polarity Sensor Output Signal

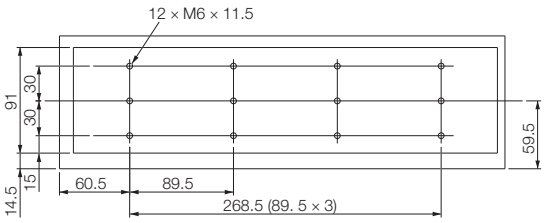
The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



### Moving Coils without Polarity Sensors: SGLFW2-90A380AT1E



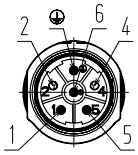

① SGLFW2-90D380AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90A380AT | 384 | 268.5 | 365.5 | 0.3 | 10.1 |

## Connector Specifications

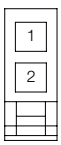
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact

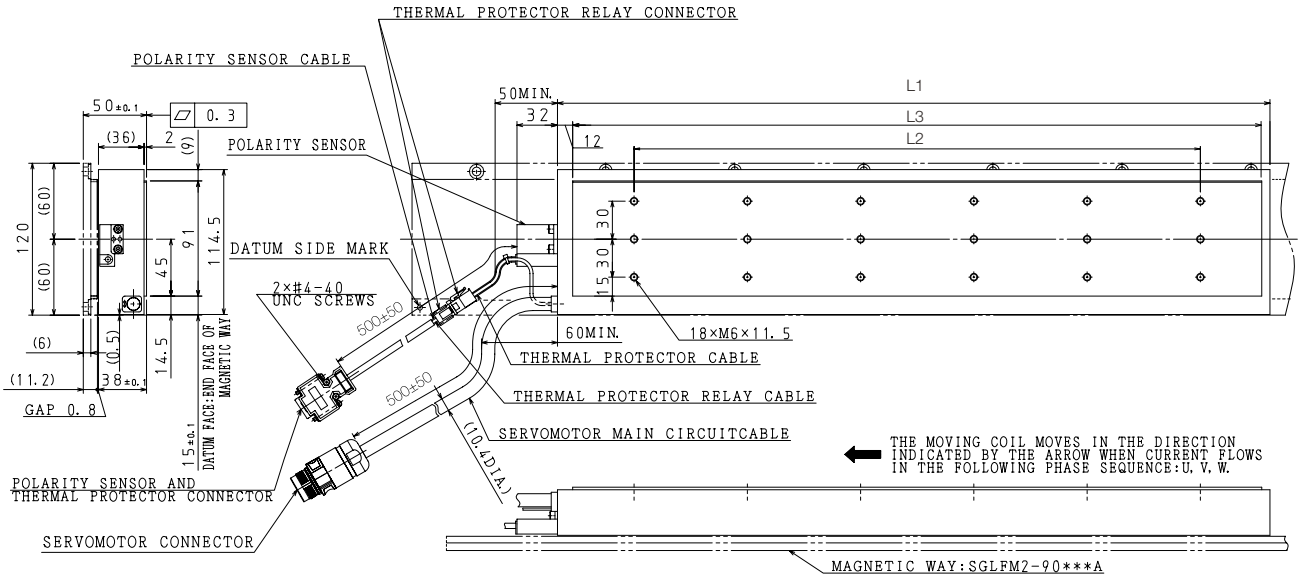
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

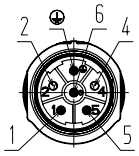
### Moving Coils with Polarity Sensors: SGLFW2-90A560AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90A560AS | 563 | 447.5 | 544 | 0.3 | 14.9 |

## Connector Specifications

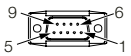
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

### Polarity Sensor and Thermostat Connector

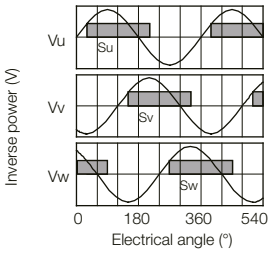



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

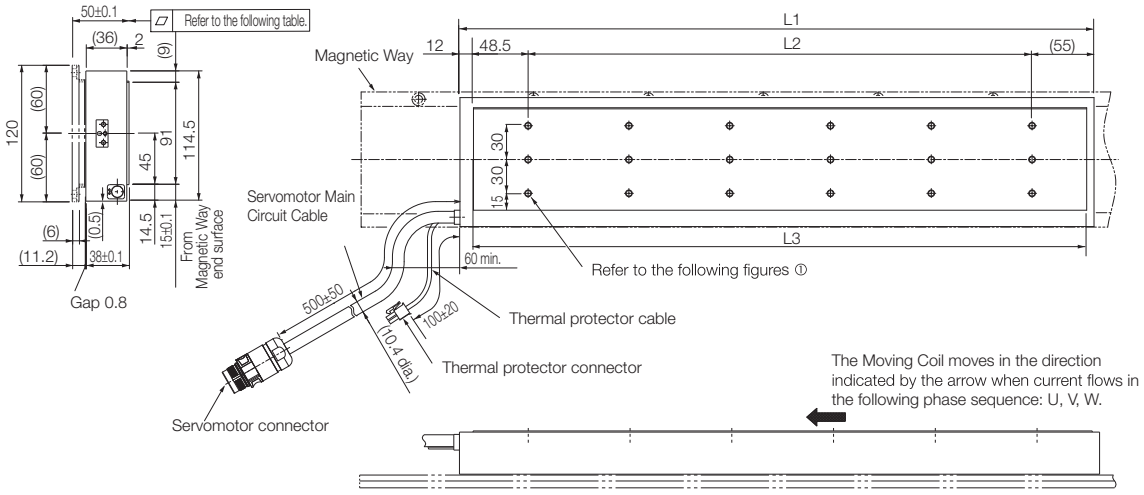
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Polarity Sensor Output Signal

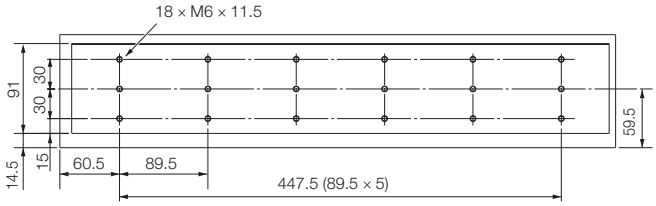
The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



### Moving Coils without Polarity Sensors: SGLFW2-90A560AT1E



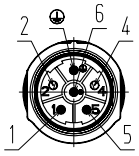

①SGLFW2-90D560AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 90A560AT | 563 | 447.5 | 544 | 0.3 | 14.9 |

## Connector Specifications

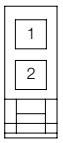
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact

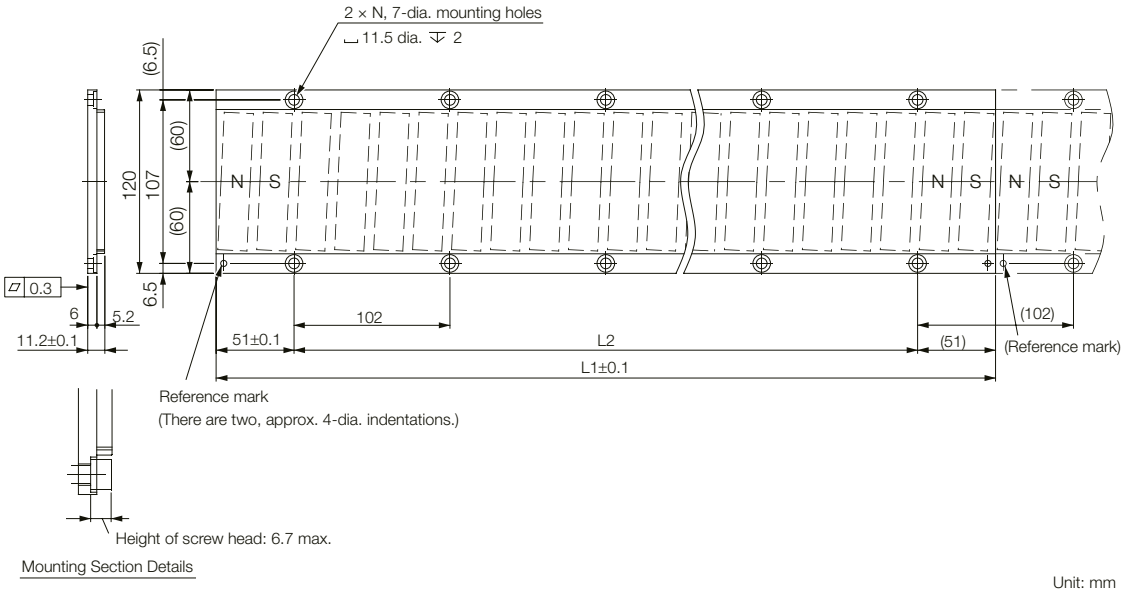
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

## Magnetic Ways: SGLFM2-90□□□A



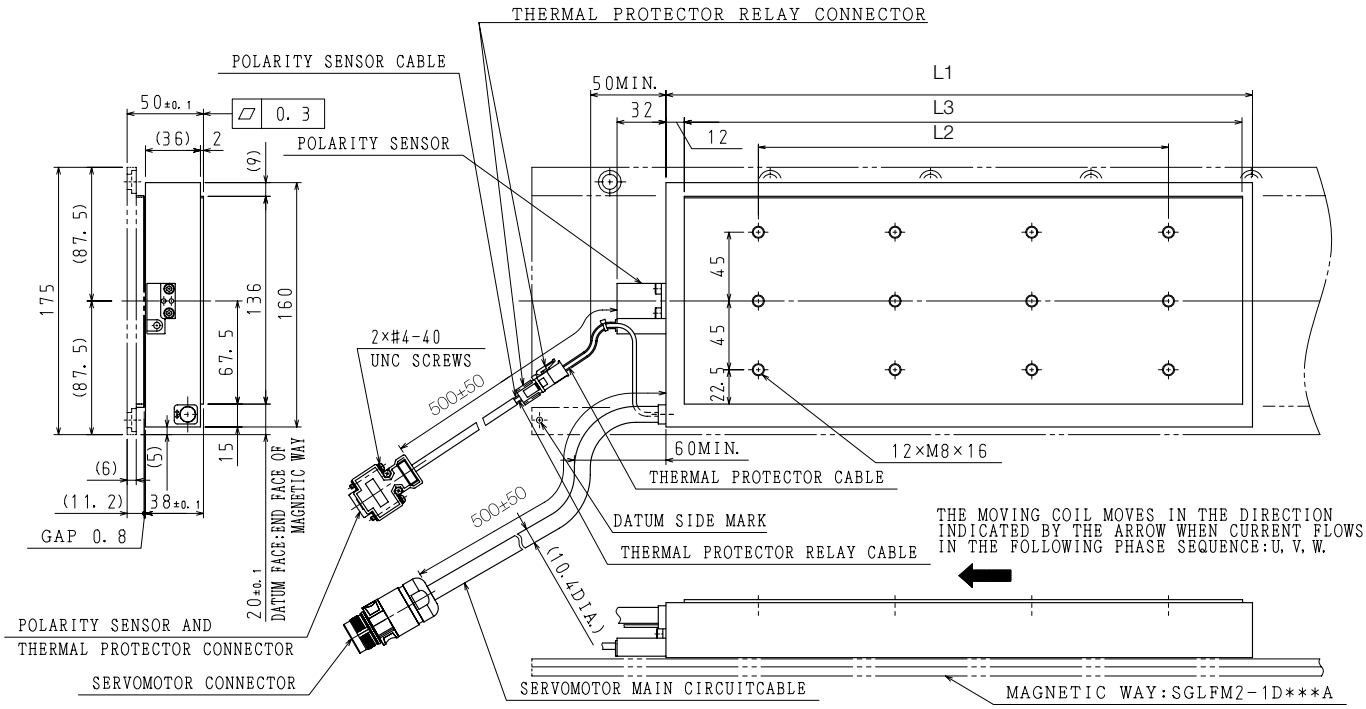

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Magnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| 90306A | 306 | 204 (102 × 2) | 3 | 2.6 |
| 90510A | 510 | 408 (102 × 4) | 5 | 4.2 |
| 90714A | 714 | 612 (102 × 6) | 7 | 5.9 |

# SGLFW2-1D

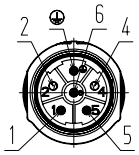
## Moving Coils with Polarity Sensors: SGLFW2-1DA380AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 1DA380AS | 384 | 268.5 | 365.5 | 0.3 | 14.6 |

# Connector Specifications

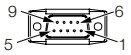
## Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

## Polarity Sensor and Thermostat Connector

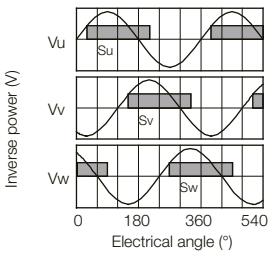



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

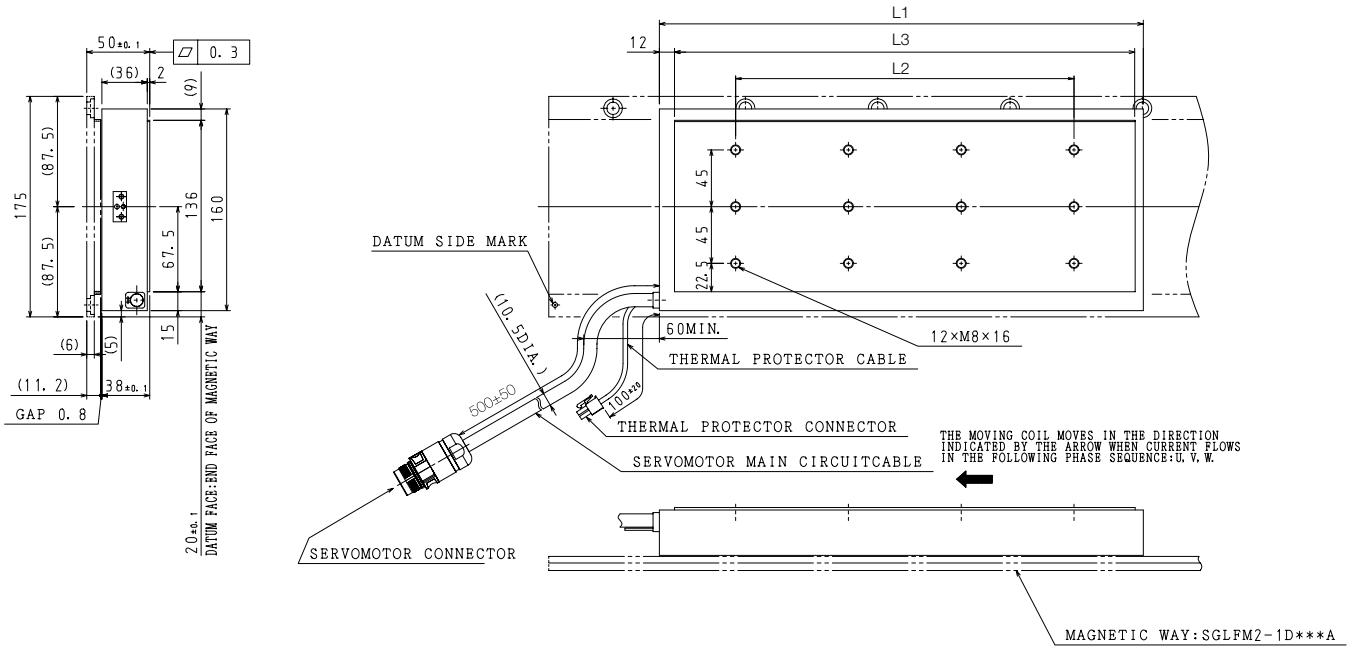
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



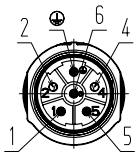
### Moving Coils without Polarity Sensor: SGLFW2-1DA380AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 1DA380AT | 384 | 268.5 | 365.5 | 0.3 | 14.6 |

## Connector Specifications

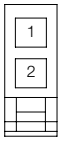
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

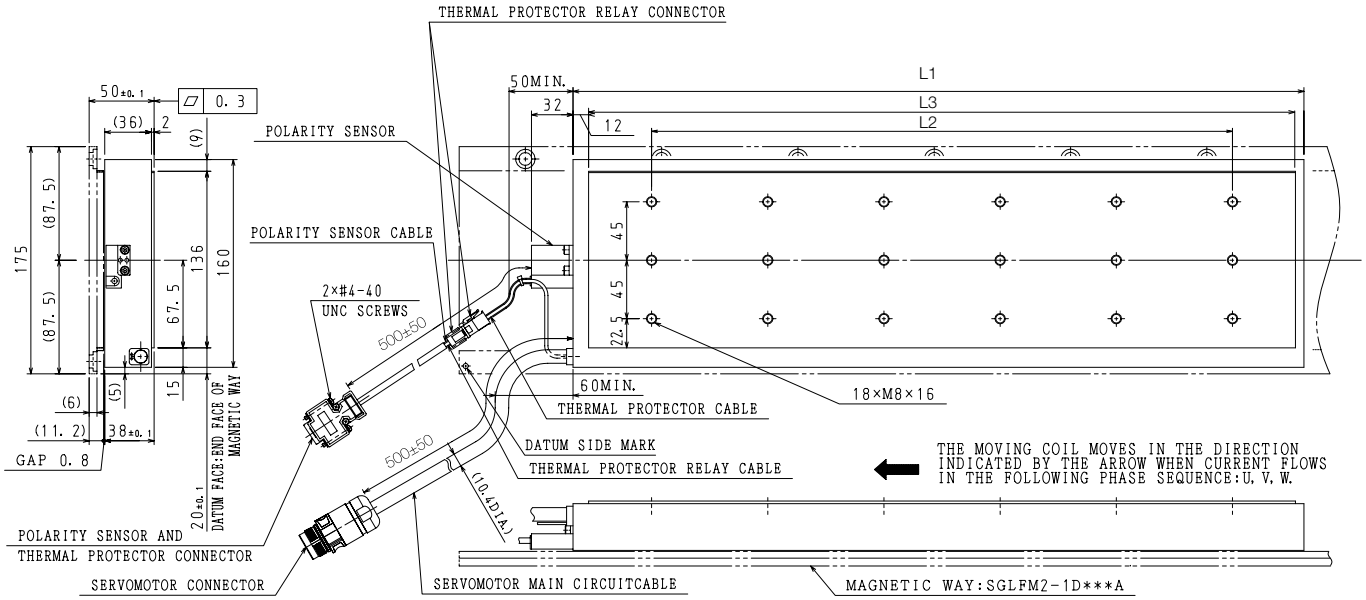
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

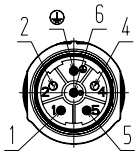
### Moving Coils with Polarity Sensors: SGLFW2-1DA560AS1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 1DA560AS | 563 | 447.5 | 554 | 0.3 | 21.5 |

## Connector Specifications

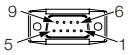
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

### Polarity Sensor and Thermostat Connector

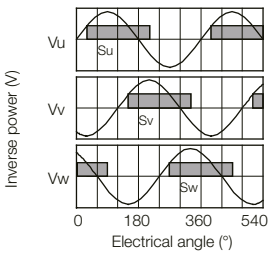



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

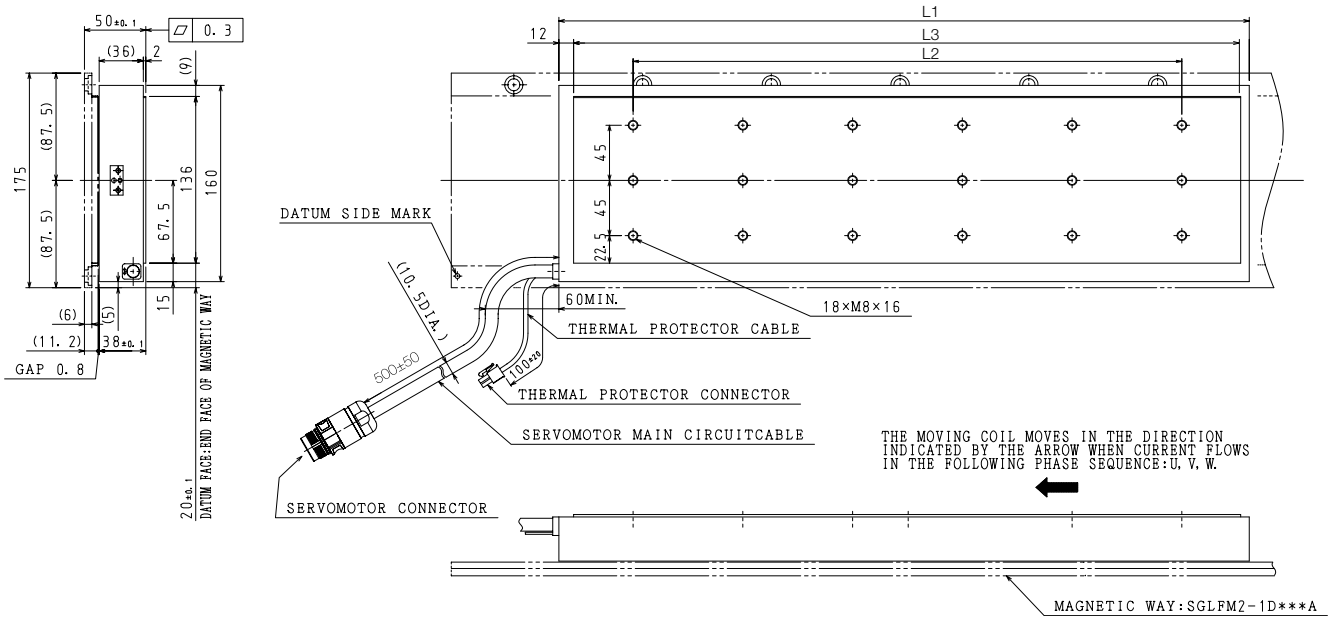
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



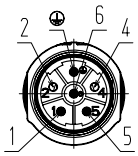
### Moving Coils without Polarity Sensor: SGLFW2-1DA560AT1E




| Mgnetic Way Model SGLFW2- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 1DA560AT | 563 | 447.5 | 554 | 0.3 | 21.5 |

## Connector Specifications

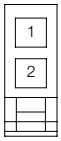
### Servomotor Connector




| | |
|---|---|
| 1 | Phase V |
| 2 | – |
| 4 | – |
| 5 | Phase U |
| 6 | Phase W |
| Ground | FG |
| Case | Shield |

Connector: SF-5EP1N8A90A2 (1605496)
Contact: SF-7MP2000 (1605626)
From Phoenix Contact GmbH & Co. KG

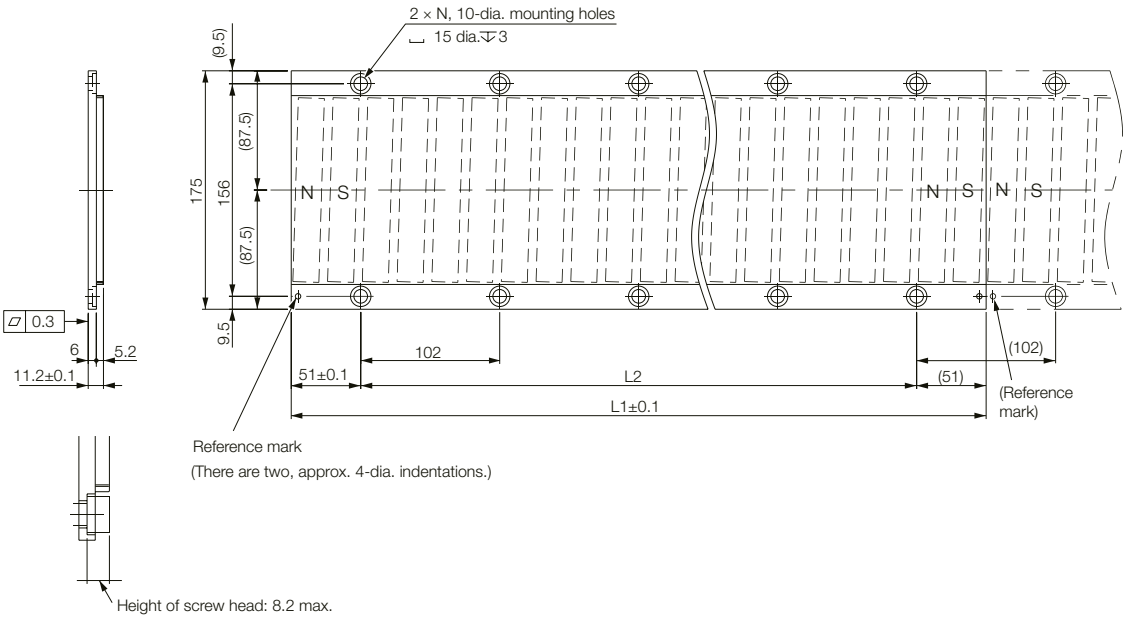
### Thermostat Connector




| | |
|---|---|
| 1 | Thermal Protector |
| 2 | Thermal Protector |

Receptacle housing: 5557-02R
Terminals: 5556T or 5556TL
From Molex Japan LLC
**Mating Connector**
Plug housing: 5559-02P
Terminals: 5558T or 5558TL

## Magnetic Ways: SGLFM2-1D□□□A



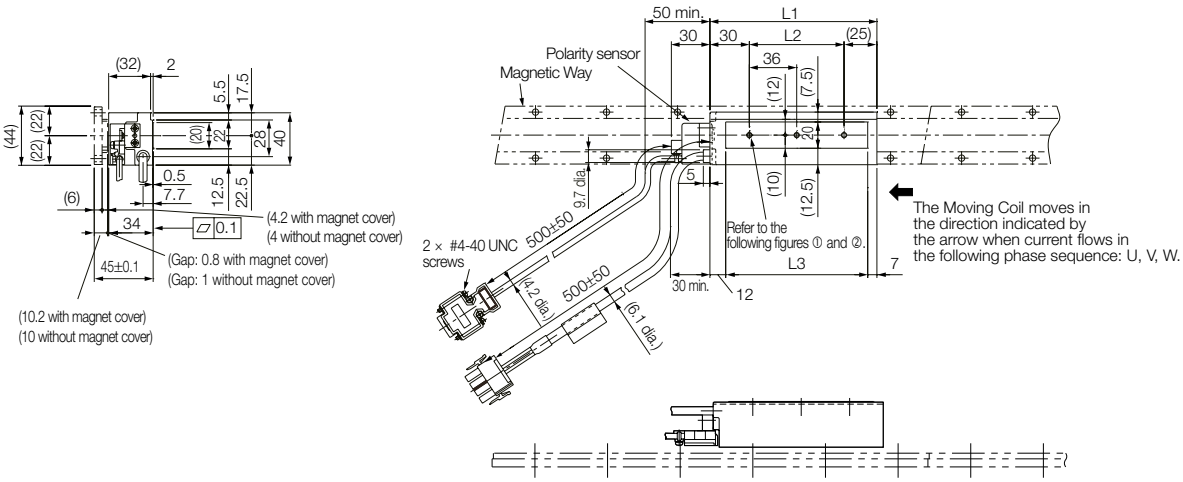

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

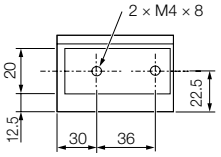
| Magnetic Way Model SGLFM2- | L1±0.1 | L2 | N | Approx. Mass [kg] |
|---|---|---|---|---|
| 1D306A | 306 | 204 (102 × 2) | 3 | 3.7 |
| 1D510A | 510 | 408 (102 × 4) | 5 | 6.2 |
| 1D714A | 714 | 612 (102 × 6) | 7 | 8.6 |

# SGLFW-20

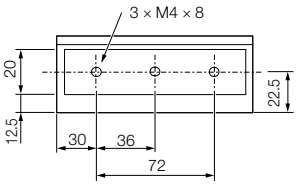
## Moving Coils: SGLFW-20A□□□A□-E




①SGLFW-20A090A□-E




②SGLFW-20A120A□-E



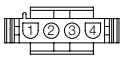

Unit: mm

| Moving Coil Model SGLFW- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 20A090A□ | 91 | 36 | 72 | 0.7 |
| 20A120A□ | 127 | 72 | 108 | 0.9 |

Note:
The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

# Connector Specifications

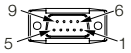
## Servomotor Connector




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 1 | Phase W | Black |
| 2 | FG | Green |

Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350536-3 or 350550-3

## Polarity Sensor Connector

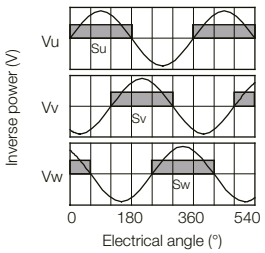



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

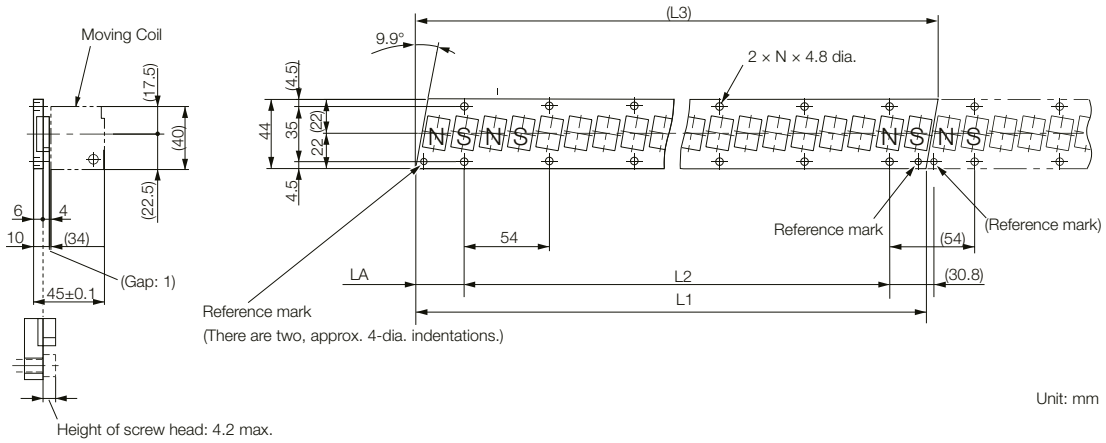
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



## Magnetic Ways: SGLFM-20□□□A-E




Unit: mm

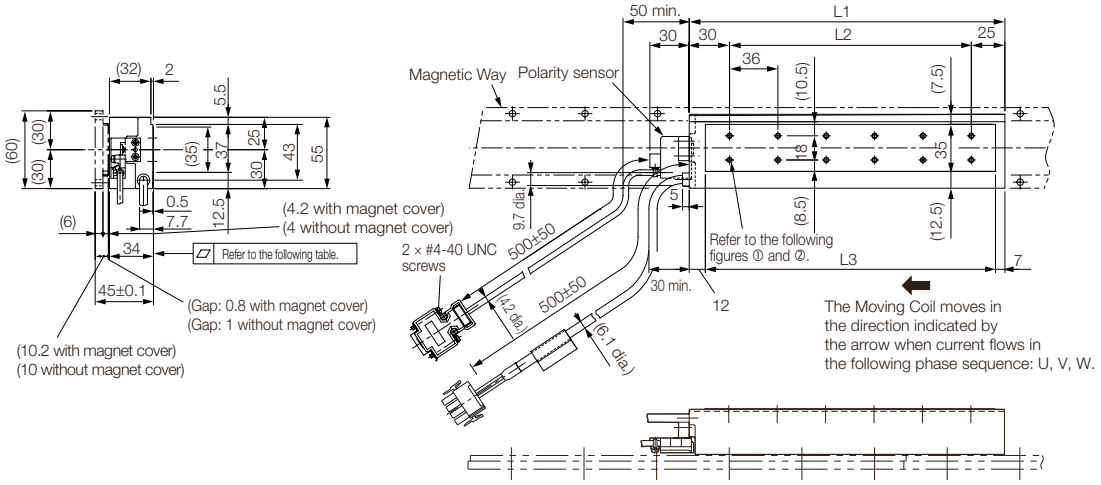
Mounting Section Details

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

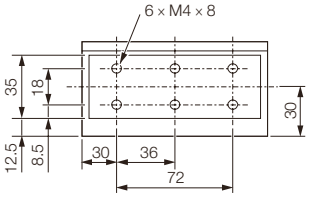
| Magnetic Way Model SGLFM- | L1 | L2 | (L3) | LA | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 20324A | $324^{-0.1}_{-0.3}$ | 270 (54 × 5) | (331.6) | $30.8^{0}_{-0.2}$ | 6 | 0.9 |
| 20540A | $540^{-0.1}_{-0.3}$ | 486 (54 × 9) | (547.6) | $30.8^{0}_{-0.2}$ | 10 | 1.4 |
| 20756A | $756^{-0.1}_{-0.3}$ | 702 (54 × 13) | (763.6) | $30.8^{0}_{-0.2}$ | 14 | 2 |

# SGLFW-35

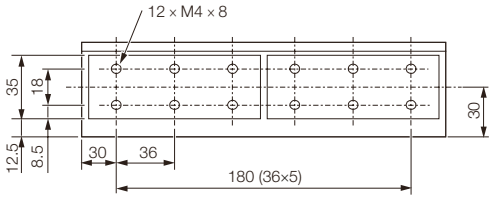
## Moving Coils: SGLFW-35A□□□A□-E




①SGLFW-35A120A□-E




②SGLFW-35A230A□-E



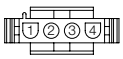

Unit: mm

| Moving Coil Model SGLFW- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 35A120A□ | 127 | 72 | 108 | 1.3 |
| 35A230A□ | 235 | 180 | 216 | 2.3 |

Note:
The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

# Connector Specifications

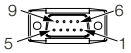
## Servomotor Connector




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 1 | Phase W | Black |
| 2 | FG | Green |

Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350536-3 or 350550-3

## Polarity Sensor Connector

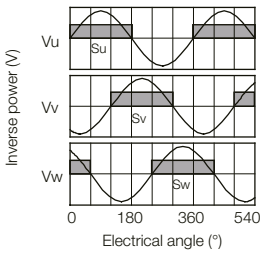



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

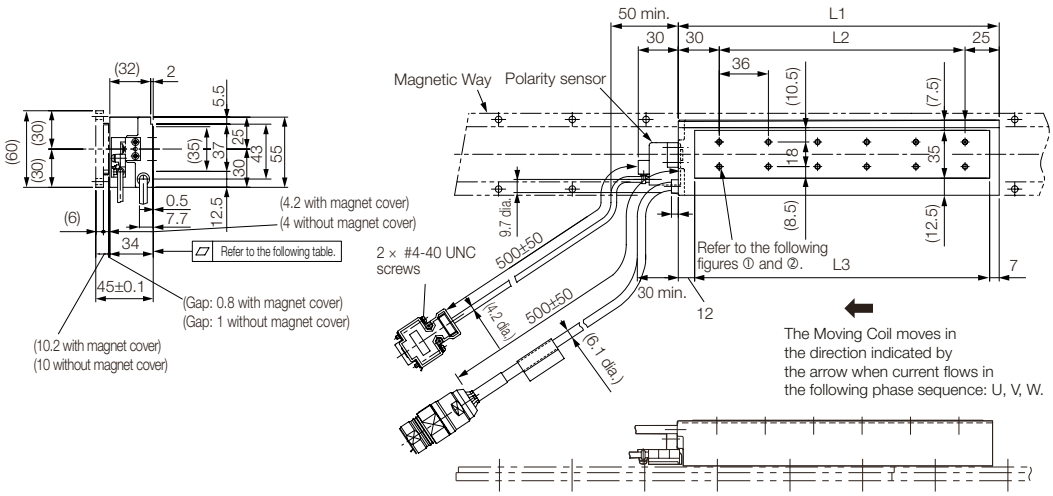
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

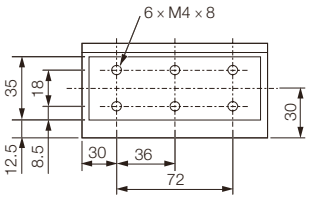
The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



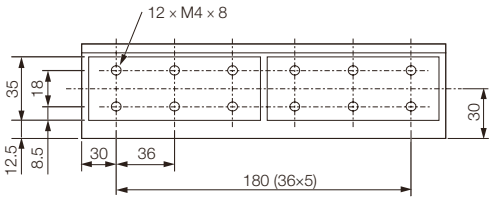
## Moving Coils: SGLFW-35A□□□A□D-E




①SGLFW-35A120A□D-E




②SGLFW-35A230A□D-E




Unit: mm

| Moving Coil Model SGLFW- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 35A120A□D | 127 | 72 | 108 | 1.3 |
| 35A230A□D | 235 | 180 | 216 | 2.3 |

Note:
The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

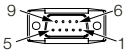
# Connector Specifications

## Servomotor Connector

| | | | |
|---|---|---|---|
| 1 | Phase U | 5 | Not used |
| 2 | Phase V | 6 | |
| 4 | Phase W | ⏚ | Ground |

Extension: ARRA06AMRPN182
Pins: 021.279.1020
From Interconnectron GmbH
**Mating Connector**
Plug: APRA06BFRDN170
Socket: 020.105.1020

## Polarity Sensor Connector

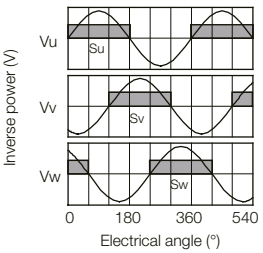



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | | |
| 2 | Phase U | 6 | Not used |
| 3 | Phase V | 7 | |
| 4 | Phase W | 8 | |
| 5 | 0 V (power supply) | 9 | |

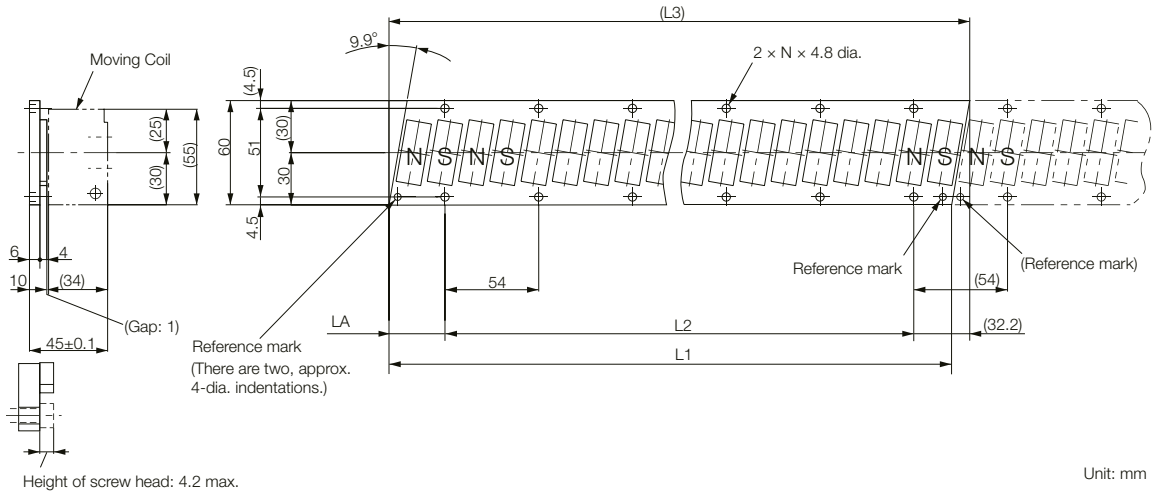
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



## Magnetic Ways: SGLFM-35□□□A-E



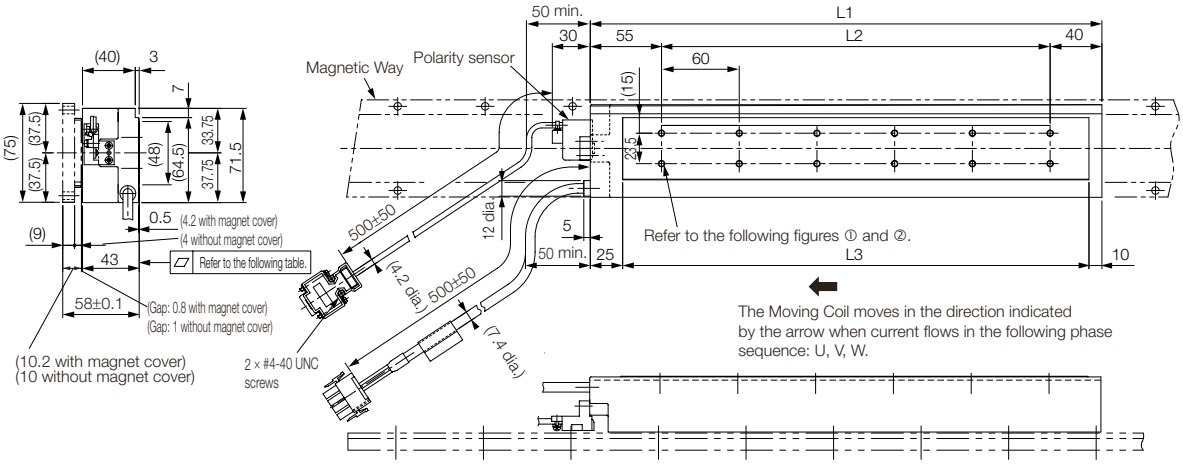

Unit: mm

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

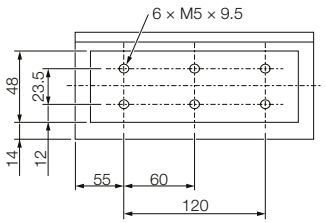
| Magnetic Way Model SGLFM- | L1 | L2 | (L3) | LA | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 35324A | $324^{-0.1}_{-0.3}$ | 270 (54 × 5) | (334.4) | $32.2^{0}_{-0.2}$ | 6 | 1.2 |
| 35540A | $540^{-0.1}_{-0.3}$ | 486 (54 × 9) | (550.4) | $32.2^{0}_{-0.2}$ | 10 | 2 |
| 35756A | $756^{-0.1}_{-0.3}$ | 702 (54 × 13) | (763.4) | $32.2^{0}_{-0.2}$ | 14 | 2.9 |

# SGLFW-50

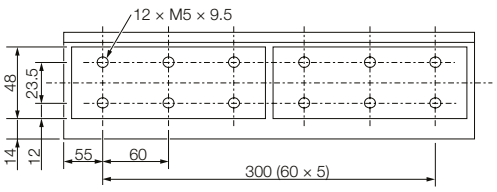
## Moving Coils: SGLFW-50A□□□B□-E




①SGLFW-50A200B□-E




②SGLFW-50A380B□-E



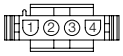

Unit: mm

| Moving Coil Model SGLFW- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 50A200B□ | 215 | 120 | 180 | 3.5 |
| 50A380B□ | 395 | 300 | 360 | 6.9 |

Note: The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

# Connector Specifications

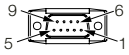
## Servomotor Connector




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Black |
| 4 | FG | Green |

Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350536-3 or 350550-3

## Polarity Sensor Connector

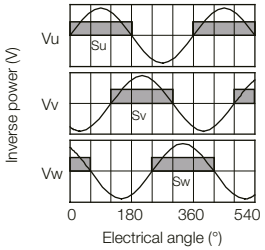



| | | | |
|---|---|---|---|
| 1 | +5 V (thermal protector), +5 V (power supply) | | |
| 2 | Su | 6 | Not used |
| 3 | Sv | 7 | |
| 4 | Sw | 8 | |
| 5 | 0 V (power supply) | 9 | Thermal Protector |

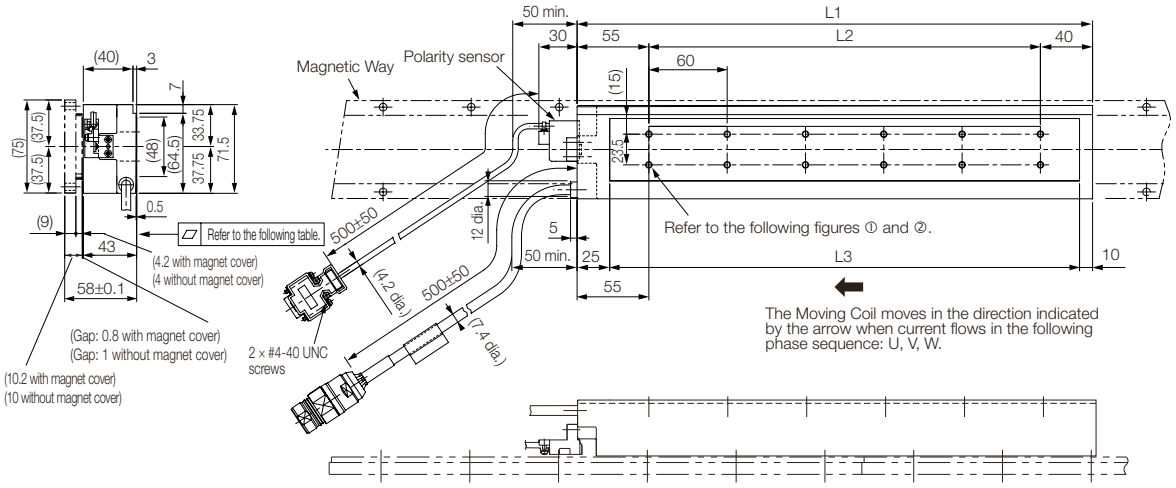
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

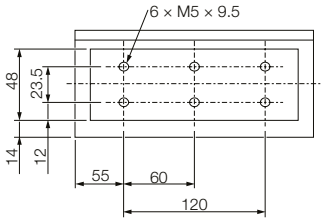
The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



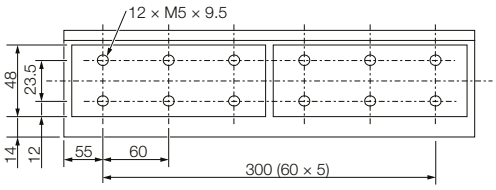
## Moving Coils: SGLFW-50A□□□B□D-E




①SGLFW-50A200B□D-E




②SGLFW-50A380B□D-E



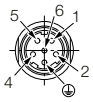

Unit: mm

| Moving Coil Model SGLFW- | L1 | L2 | L3 | Flatness | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 50A200B□D | 215 | 120 | 180 | 0.2 | 3.5 |
| 50A380B□D | 395 | 300 | 360 | 0.3 | 6.9 |

Note:
The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

# Connector Specifications

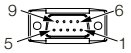
## Servomotor Connector




| | | | |
|---|---|---|---|
| 1 | Phase U | 5 | Not used |
| 2 | Phase V | 6 | |
| 4 | Phase W | ⏚ | Ground |

Extension: ARRA06AMRPN182
Pins: 021.279.1020
From Interconnectron GmbH
**Mating Connector**
Plug: APRA06BFRDN170
Socket: 020.105.1020

## Polarity Sensor Connector

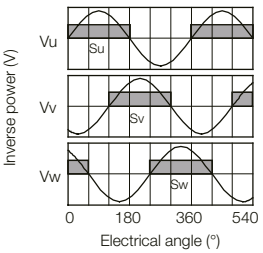



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | | |
| 2 | Phase U | 6 | Not used |
| 3 | Phase V | 7 | |
| 4 | Phase W | 8 | |
| 5 | 0 V (power supply) | 9 | |

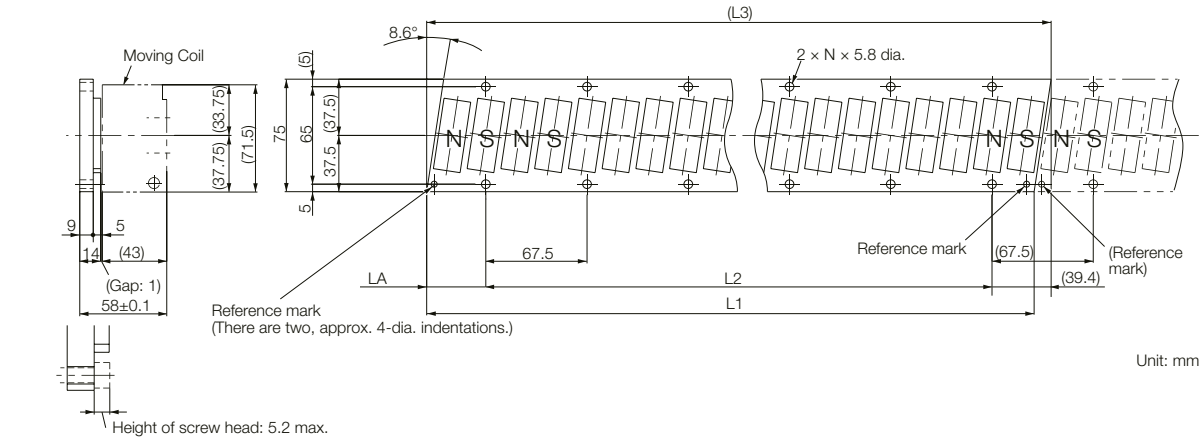
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



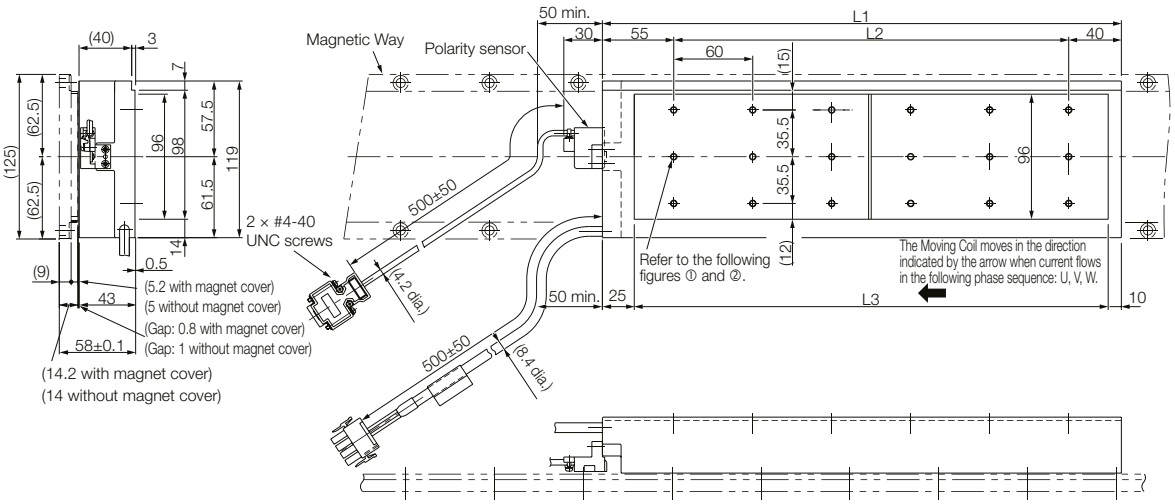
## Magnetic Ways: SGLFM-50□□□A-E



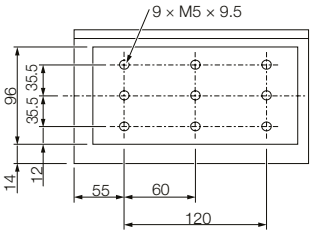

Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Magnetic Way SGLFM- | L1 | L2 | (L3) | LA | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 50405A | $405^{-0.1}_{-0.3}$ | 337.5 (67.5 × 5) | (416.3) | $39.4^{0}_{-0.2}$ | 6 | 2.8 |
| 50675A | $675^{-0.1}_{-0.3}$ | 607.5 (67.5 × 9) | (686.3) | $39.4^{0}_{-0.2}$ | 10 | 4.6 |
| 50945A | $945^{-0.1}_{-0.3}$ | 877.5 (67.5 × 13) | (956.3) | $39.4^{0}_{-0.2}$ | 14 | 6.5 |

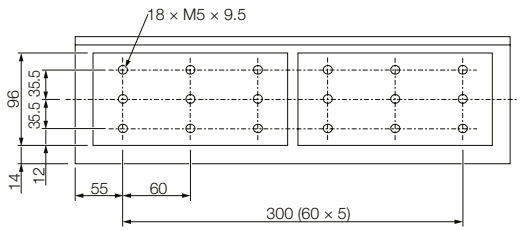
## Moving Coils: SGLFW-1ZA□□□B□-E




①SGLFW-1ZA200B□-E




②SGLFW-1ZA380B□-E

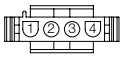



Unit: mm

| Moving Coil Model SGLFW- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 1ZA200B□ | 215 | 120 | 180 | 6.4 |
| 1ZA380B□ | 395 | 300 | 360 | 11.5 |

# Connector Specifications

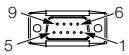
## Servomotor Connector




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Black |
| 4 | FG | Green |

Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350536-3 or 350550-3

## Polarity Sensor Connector

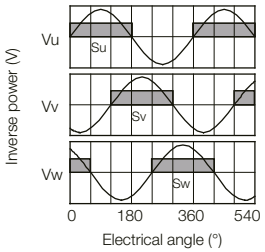



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | | |
| 2 | Phase U | 6 | Not used |
| 3 | Phase V | 7 | |
| 4 | Phase W | 8 | |
| 5 | 0 V (power supply) | 9 | |

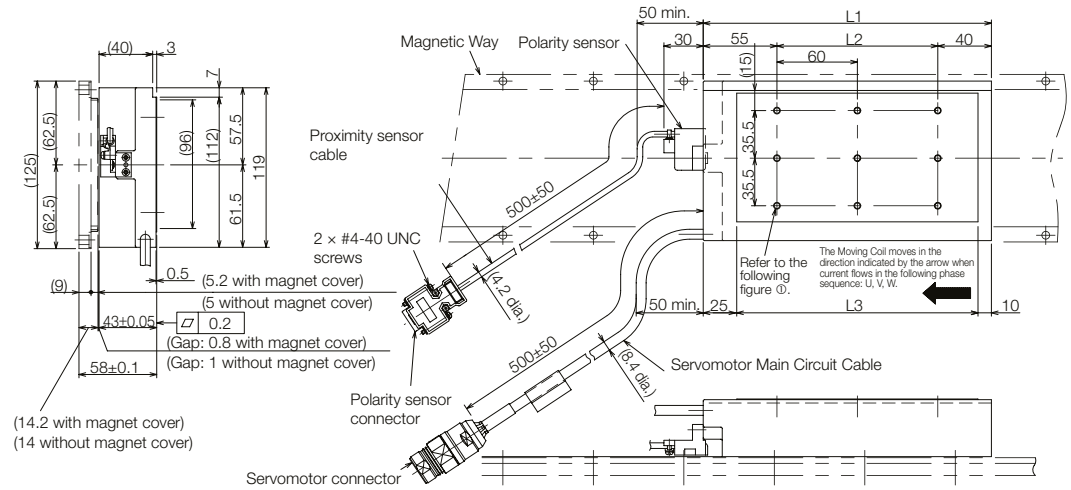
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

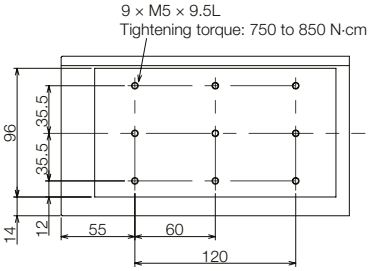
The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



## Moving Coils: SGLFW-1ZA200B□D-E




①SGLFW-1ZA200B□D-E

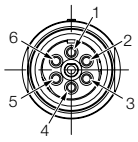



Note:
The above dimensional drawing gives the dimensions for both models with polarity sensors and models without polarity sensors.

| Moving Coil Model SGLFW- | L1 | L2 | L3 | Approx. Mass [kg] |
|---|---|---|---|---|
| 1ZA200B□D | 215 | 120 | 180 | 6.4 |

# Connector Specifications

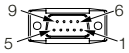
## Servomotor Connector




| | | | |
|---|---|---|---|
| 1 | Phase U | 4 | Not used |
| 2 | Phase V | 5 | |
| 3 | Phase W | 6 | Ground |

Extension: SROC06JMSCN169
Pins: 021.423.1020
From Interconnectron GmbH
**Mating Connector**
Plug: SPUC06KFSDN236
Socket: 020.030.1020

## Polarity Sensor Connector

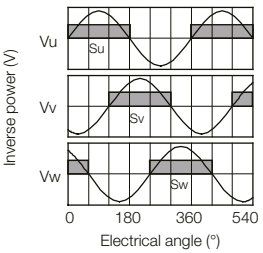



| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | | |
| 2 | Phase U | 6 | Not used |
| 3 | Phase V | 7 | |
| 4 | Phase W | 8 | |
| 5 | 0 V (power supply) | 9 | |

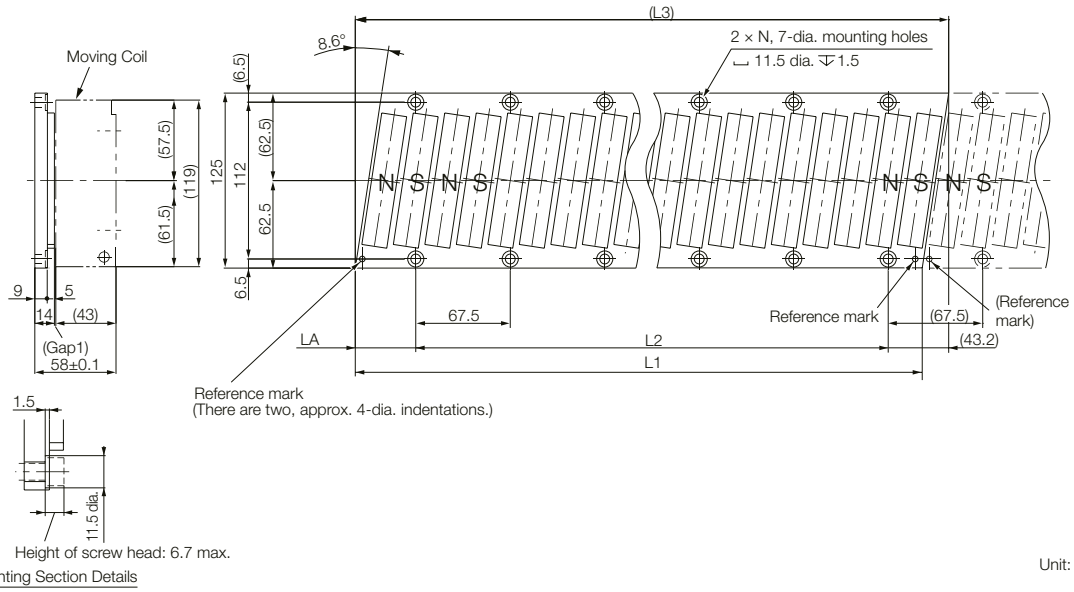
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



## Magnetic Ways: SGLFM-1Z□□□A-E




Mounting Section Details

Unit: mm

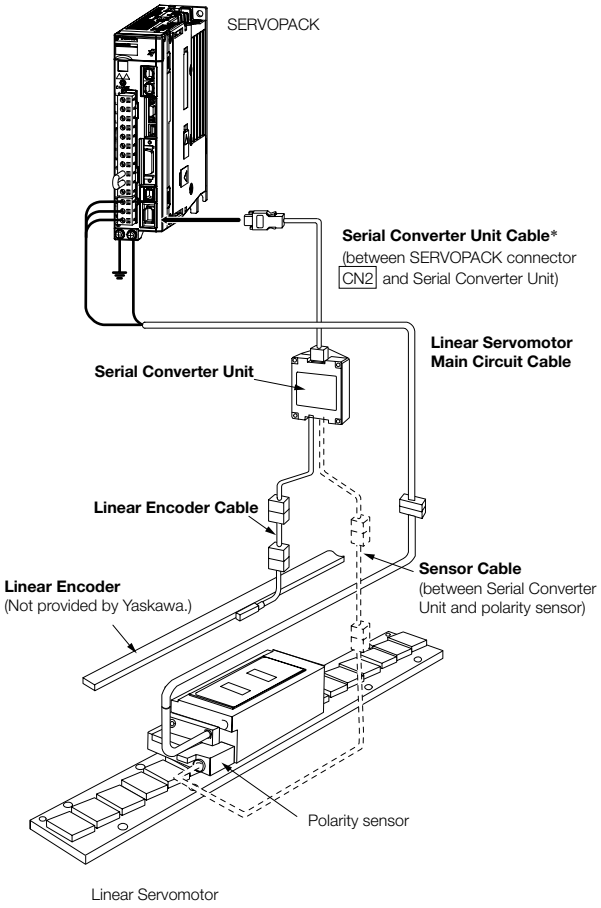
Note:
More than one Magnetic Way can be connected. Connect the Magnetic Ways so that the reference marks on them are aligned in the same direction as shown in the figure.

| Magnetic Way SGLFM- | L1 | L2 | (L3) | LA | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|
| 1Z405A | $405^{-0.1}_{-0.3}$ | 337.5 (67.5 × 5) | (423.9) | $43.2^{0}_{-0.2}$ | 6 | 5 |
| 1Z675A | $675^{-0.1}_{-0.3}$ | 607.5 (67.5 × 9) | (693.9) | $43.2^{0}_{-0.2}$ | 10 | 8.3 |
| 1Z945A | $945^{-0.1}_{-0.3}$ | 877.5 (67.5 × 13) | (963.9) | $43.2^{0}_{-0.2}$ | 14 | 12 |

# Selecting Cables SGLF

## Cable Configurations

To select a Linear Encoder, use Recommended Linear Encoders. Prepare the cable required for the encoder.




* You can connect directly to an absolute linear encoder.

Note:
Refer to the following manual for the following information.

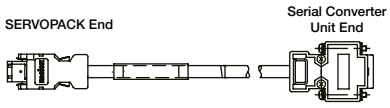
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables
- Order numbers and specifications for wiring materials

  Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

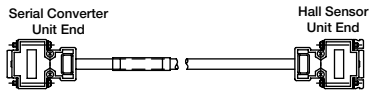
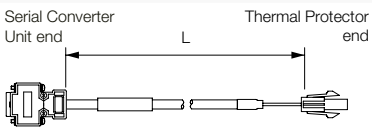
# Linear Servomotor Main Circuit Cables SGLFW2

| Servomotor Model | Cable & Connector Type | Length | Order Number | Appearance |
|---|---|---|---|---|
| SGLFW2-30A070 to SGLFW2-30A230 | Flexible Power cable 4 x1.5 mm² with M17 connector | 3 m | JZSP-C7M143-03-E-G6 | |
| | | 5 m | JZSP-C7M143-05-E-G6 | |
| | | 10 m | JZSP-C7M143-10-E-G6 | |
| | | 15 m | JZSP-C7M143-15-E-G6 | |
| | | 20 m | JZSP-C7M143-20-E-G6 | |
| SGLFW2-45A200 | Flexible Power cable 4 x1.5 mm² with M23 connector | 3 m | JZSP-C7M144-03-E-G6 | |
| | | 5 m | JZSP-C7M144-05-E-G6 | |
| | | 10 m | JZSP-C7M144-10-E-G6 | |
| | | 15 m | JZSP-C7M144-15-E-G6 | |
| | | 20 m | JZSP-C7M144-20-E-G6 | |
| SGLFW2-45A380 to SGLFW2-90A200 | Flexible Power cable 4 x 2.5 mm² with M23connector | 3 m | JZSP-C7M154-03-E-G6 | |
| | | 5 m | JZSP-C7M154-05-E-G6 | |
| | | 10 m | JZSP-C7M154-10-E-G6 | |
| | | 15 m | JZSP-C7M154-15-E-G6 | |
| | | 20 m | JZSP-C7M154-20-E-G6 | |
| SGLFW2-90A380 to SGLFW2-90A560 | Flexible Power cable 4 x 4 mm² with M23 connector | 3 m | JZSP-C7M164-03-E-G6 | |
| | | 5 m | JZSP-C7M164-05-E-G6 | |
| | | 10 m | JZSP-C7M164-10-E-G6 | |
| | | 15 m | JZSP-C7M164-15-E-G6 | |
| | | 20 m | JZSP-C7M164-20-E-G6 | |
| SGLFW2-1DA380 to SGLFW2-1DA560 | Flexible Power cable 4 x 4 mm² with M23 connector | 3 m | JZSP-C7M164-03-E-G6 | |
| | | 5 m | JZSP-C7M164-05-E-G6 | |
| | | 10 m | JZSP-C7M164-10-E-G6 | |
| | | 15 m | JZSP-C7M164-15-E-G6 | |
| | | 20 m | JZSP-C7M164-20-E-G6 | |

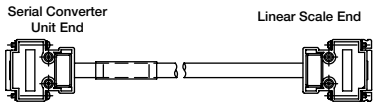
# Cables for connecting Serial Converter Units SGLFW2

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLP70-01-E |   |
| | 3 m | JZSP-CLP70-03-E | |
| | 5 m | JZSP-CLP70-05-E | |
| | 10 m | JZSP-CLP70-10-E | |
| | 15 m | JZSP-CLP70-15-E | |
| | 20 m | JZSP-CLP70-20-E | |

# Cables for connecting Hall Sensors SGLFW2

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| SGLFW2-□□A□□□AS□ (with polarity sensor) | 1 m | JZSP-CL2L100-01-E |   |
| | 3 m | JZSP-CL2L100-03-E | |
| | 5 m | JZSP-CL2L100-05-E | |
| | 10 m | JZSP-CL2L100-10-E | |
| | 15 m | JZSP-CL2L100-15-E | |
| SGLFW2-□□A□□□AT□ (without polarity sensor) | 1 m | JZSP-CL2TH00-01-E |   |
| | 3 m | JZSP-CL2TH00-03-E | |
| | 5 m | JZSP-CL2TH00-05-E | |
| | 10 m | JZSP-CL2TH00-10-E | |
| | 15 m | JZSP-CL2TH00-15-E | |

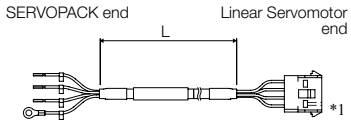
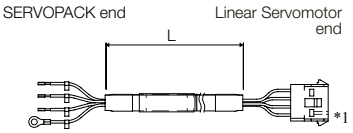
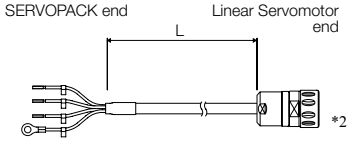
# Linear Encoder Cables SGLFW2

| Description | Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|---|
| For linear encoder from Renishaw PLC | All Models | 1m | JZSP-CLL00-01-E |  |
| | | 3m | JZSP-CLL00-03-E | |
| | | 5m | JZSP-CLL00-05-E | |
| | | 10m | JZSP-CLL00-10-E | |
| | | 15m | JZSP-CLL00-15-E | |
| For linear encoder from Heidenhain Corporation | | 1m | JZSP-CLL30-01-E | |
| | | 3m | JZSP-CLL30-03-E | |
| | | 5m | JZSP-CLL30-05-E | |
| | | 10m | JZSP-CLL30-10-E | |
| | | 15m | JZSP-CLL30-15-E | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3m.

# Linear Servomotor Main Circuit Cables SGLFW

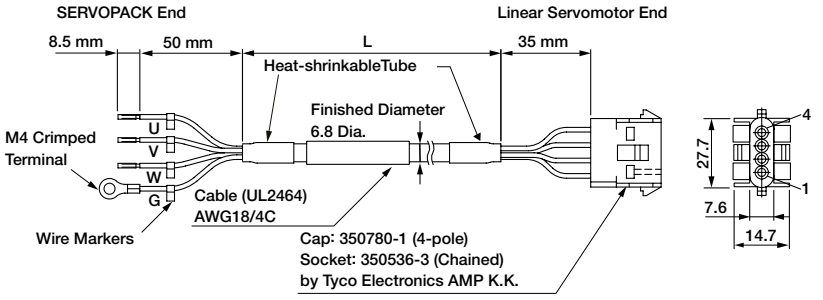
| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| SGLFW-20A, -35A | 1 m | JZSP-CLN11-01-E |   |
| | 3 m | JZSP-CLN11-03-E | |
| | 5 m | JZSP-CLN11-05-E | |
| | 10 m | JZSP-CLN11-10-E | |
| | 15 m | JZSP-CLN11-15-E | |
| | 20 m | JZSP-CLN11-20-E | |
| SGLFW-50A, -1ZA | 1 m | JZSP-CLN21-01-E |   |
| | 3 m | JZSP-CLN21-03-E | |
| | 5 m | JZSP-CLN21-05-E | |
| | 10 m | JZSP-CLN21-10-E | |
| | 15 m | JZSP-CLN21-15-E | |
| | 20 m | JZSP-CLN21-20-E | |
| SGLFW-□□A□□□□□D | 3 m | DP9325254-03G |   |
| | 5 m | DP9325254-05G | |
| | 10 m | DP9325254-10G | |
| | 15 m | DP9325254-15G | |
| | 20 m | DP9325254-20G | |

Note: Estimates are available for models other than those listed above (SGLFW2-90A□□□A□L and SGLFW2-1D□□□A□L).

*1. Connector from Tyco Electronics Japan G.K.
*2. Connector from Interconnectron GmbH

# Connector Specifications for Main Circuit Cables SGLFW

## JZSP-CLN11-01-E



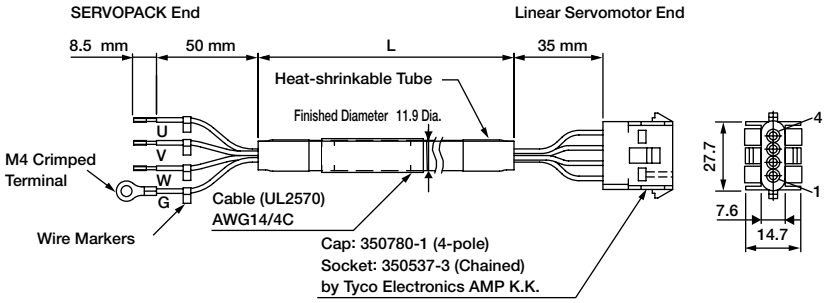

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Red | Phase U |
| White | Phase V |
| Blue | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin. No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| FG | 4 |

## JZSP-CLN21-01-E



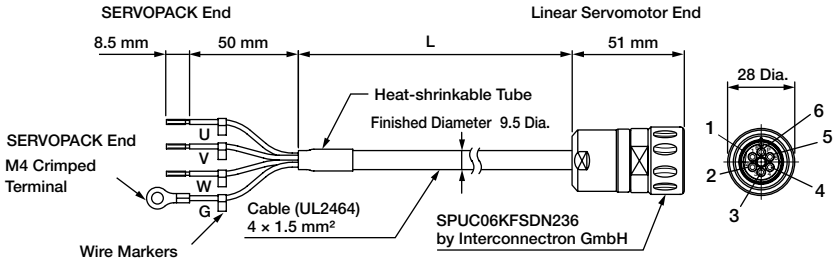

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Red | Phase U |
| White | Phase V |
| Blue | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin. No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| FG | 4 |

## DP9325254-□□G



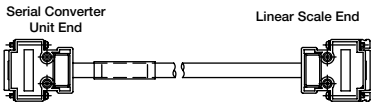

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Black 1 | Phase U |
| Black 2 | Phase V |
| Black 3 | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| — | 4 |
| — | 5 |
| FG | 6 |

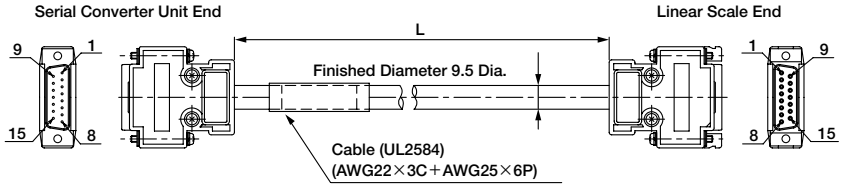
# Cables for connecting Linear Scales SGLFW

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLL00-01-E-G# |  |
| | 3 m | JZSP-CLL00-03-E-G# | |
| | 5 m | JZSP-CLL00-05-E-G# | |
| | 10 m | JZSP-CLL00-10-E-G# | |
| | 15 m | JZSP-CLL00-15-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

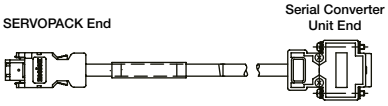
Connector:
17JE-23150-02 (D8C)
(15-pin, soldered)
by DDK Ltd.




Connector:
17JE-13150-02 (D8C)
(With stud)
(15-pin, soldered)
by DDK Ltd.

| Serial Converter Unit End | | Linear Scale End | |
|---|---|---|---|
| Pin No. | Signal | Pin No. | Signal |
| 1 | /Cos (V1-) | 1 | /Cos (V1-) |
| 2 | /Sin (V2-) | 2 | /Sin (V2-) |
| 3 | Ref (V0+) | 3 | Ref (V0+) |
| 4 | +5V | 4 | +5V |
| 5 | 5Vs | 5 | 5Vs |
| 6 | BID | 6 | BID |
| 7 | Vx | 7 | Vx |
| 8 | Vq | 8 | Vq |
| 9 | Cos (V1+) | 9 | Cos (V1+) |
| 10 | Sin (V2+) | 10 | Sin (V2+) |
| 11 | /Ref (V0+) | 11 | /Ref (V0-) |
| 12 | 0V | 12 | 0V |
| 13 | 0Vs | 13 | 0Vs |
| 14 | DIR | 14 | DIR |
| 15 | Inner | 15 | Inner |
| Case | Shield | Case | Shield |

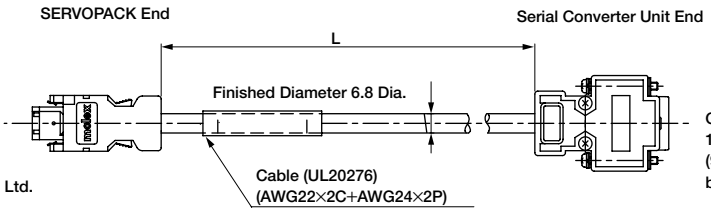
# Cables for connecting Serial Converter Units SGLFW

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLP70-01-E-G# |  |
| | 3 m | JZSP-CLP70-03-E-G# | |
| | 5 m | JZSP-CLP70-05-E-G# | |
| | 10 m | JZSP-CLP70-10-E-G# | |
| | 15 m | JZSP-CLP70-15-E-G# | |
| | 20 m | JZSP-CLP70-20-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

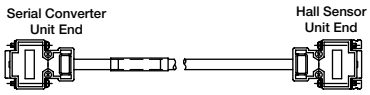
Connector:
55100-0670
(6-pin, soldered)
by Molex Japan Co., Ltd.




Connector:
17JE-23090-02 (D8C)
(9-pin, soldered)
by DDK Ltd.

| SERVOPACK End | | | Serial Converter Unit End | | |
|---|---|---|---|---|---|
| Pin No. | Signal | Wire Color | Pin No. | Signal | Wire Color |
| 1 | PG5V | Red | 1 | +5V | Red |
| 2 | PG0V | Black | 5 | 0V | Black |
| 3 | - | - | 3 | - | - |
| 4 | - | - | 4 | - | - |
| 5 | PS | Light blue | 2 | Phase S output | Light blue |
| 6 | /PS | Light blue/white | 6 | Phase /S output | Light blue/white |
| Shell | Shield | - | Case | Shield | - |
| | | | 7 | - | - |
| | | | 8 | - | - |
| | | | 9 | - | - |

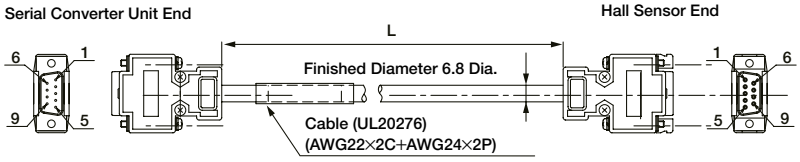
# Cables for connecting Hall Sensors SGLFW

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLL10-01-E-G# |  |
| | 3 m | JZSP-CLL10-03-E-G# | |
| | 5 m | JZSP-CLL10-05-E-G# | |
| | 10 m | JZSP-CLL10-10-E-G# | |
| | 15 m | JZSP-CLL10-15-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

Connector:
17JE-23090-02 (D8C)
(9-pin, soldered)
by DDK Ltd.




Connector:
17JE-13090-02 (D8C)
(With stud)
(9-pin, soldered)
by DDK Ltd.

| Serial Converter Unit End | | Hall Sensor End | |
|---|---|---|---|
| Pin No. | Signal | Pin No. | Signal |
| 1 | +5V | 1 | +5V |
| 2 | Phase U input | 2 | Phase U input |
| 3 | Phase V input | 3 | Phase V input |
| 4 | Phase W input | 4 | Phase W input |
| 5 | 0V | 5 | 0V |
| 6 | - | 6 | - |
| 7 | - | 7 | - |
| 8 | - | 8 | - |
| 9 | - | 9 | - |
| Case | Shield | Case | Shield |

# SGLT (Models with T-Type Iron Cores)

## Model Designations

### Moving Coil

| SGL | T | W | - | 20 | A | 170 | A | P | □ | - E |
|---|---|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series Linear Servomotors | 1st | 2nd | | 3rd + 4th | 5th | 6th ... 8th | 9th | 10th | 11th | 12th digit |

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| T | With T-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| W | Moving Coil |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 20 | 20 mm |
| 35 | 36 mm |
| 40 | 40 mm |
| 50 | 51 mm |
| 80 | 76.5 mm |

**5th digit - Power Supply Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**6th ... 8th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 170 | 170 mm |
| 320 | 315 mm |
| 400 | 394.2 mm |
| 460 | 460 mm |
| 600 | 574.2 mm |

**9th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |
| H | High-efficiency model |

**10th digit - Sensor Specifications and Cooling Method**

| Code | Specifications | | Applicable Models |
|---|---|---|---|
| | Polarity Sensor | Cooling Method | |
| None | None | Self-cooled | All models |
| C* | None | Water-cooled | SGLTW-40, -80 |
| H* | Yes | Water-cooled | |
| P | Yes | Self-cooled | All models |

**11th digit - Connector for Servomotor Main Circuit Cable**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Connector from Tyco Electronics Japan G.K. | SGLTW-20A□□□□□<br>-35A□□□□□ |
| | MS connector | SGLTW-40A□□□□B□<br>-80A□□□□B□ |
| | Loose lead wires with no connector | SGLTW-35A□□□H□<br>-50A□□□H□ |

**12th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

* Contact your YASKAWA representative for the characteristics, dimensions, and other details on servomotors with these specifications.

Note: This information is provided to explain model numbers. It is not meant to imply that models are available for all combination of codes.

### Magnetic Way

| SGL | T | M | - | 20 | 324 | A | □ | - E |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series Linear Servomotors | 1st | 2nd | | 3rd + 4th | 5th ... 7th | 8th | 9th | 10th digit |

**1st digit - Servomotor Type**

| Code | Specification |
|---|---|
| T | With T-type iron core |

**2nd digit - Moving Coil/Magnetic Way**

| Code | Specification |
|---|---|
| M | Magnetic Way |

**3rd + 4th digit - Magnet Height**

| Code | Specification |
|---|---|
| 20 | 20 mm |
| 35 | 36 mm |
| 40 | 40 mm |
| 50 | 51 mm |
| 80 | 76.5 mm |

**5th ... 7th digit - Length of Moving Coil**

| Code | Specification |
|---|---|
| 324 | 324 mm |
| 405 | 405 mm |
| 540 | 540 mm |
| 675 | 675 mm |
| 756 | 756 mm |
| 945 | 945 mm |

**8th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A, B, ... | Revision |
| H | High-efficiency model |

**9th digit - Options**

| Code | Specification | Applicable Models |
|---|---|---|
| None | Without options | – |
| C | With magnet cover | All models |
| Y | With base and magnet cover | SGLTM-20, -35*, -40, -80 |

**10th digit**

| Code | Specifications |
|---|---|
| E | RoHS II Suffix |

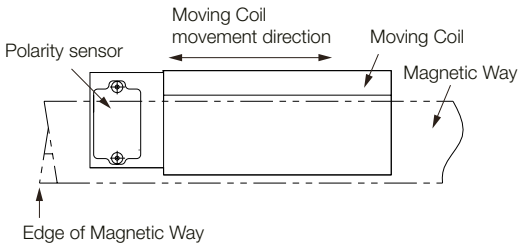
* The SGLTM-35□□□H (high-efficiency models) do not support this specification.

# Precautions on Moving Coils with Polarity Sensors

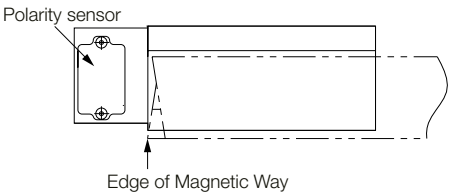
Note

When you use a Moving Coil with a Polarity Sensor, the Magnetic Way must cover the bottom of the polarity sensor. Refer to the example that shows the correct installation.
When determining the length of the Moving Coil's stroke or the length of the Magnetic Way, consider the total length of the Moving Coil and the polarity sensor. Refer to the following table.

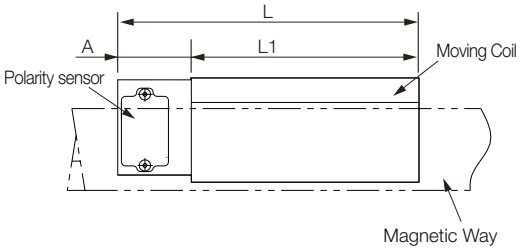
## Correct Installation




## Incorrect Installation




## Total Length of Moving Coil with Polarity Sensor




| Moving Coil Model SGLTW- | Length of Moving Coil, L1 [mm] | Length of Polarity Sensor, A [mm] | Total Length, L [mm] |
|---|---|---|---|
| 20A170AP□ | 170 | 34 | 204 |
| 20A320AP□ | 315 | | 349 |
| 20A460AP□ | 460 | | 494 |
| 35A170AP□ | 170 | 34 | 204 |
| 35A320AP□ | 315 | | 349 |
| 35A460AP□ | 460 | | 494 |
| 35A170HP□ | 170 | 34 | 204 |
| 35A320HP□ | 315 | | 349 |
| 50A170HP□ | 170 | 34 | 204 |
| 50A320HP□ | 315 | | 349 |
| 40A400BH□<br>40A400BP□ | 394.2 | 26 | 420.2 |
| 40A600BH□<br>40A600BP□ | 574.2 | 26 | 600.2 |
| 80A400BH□<br>80A400BP□ | 394.2 | 26 | 420.2 |
| 80A600BH□<br>80A600BP□ | 574.2 | 26 | 600.2 |

# Specifications and Ratings

## Specifications

| Linear Servomotor Moving Coil | | Standard Models | | | | | | | | | High-efficiency Models | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20A | | | 35A | | | 40A | | 80A | 35A | | 50A | |
| Model SGLTW- | | 170A | 320A | 460A | 170A | 320A | 460A | 400B | 600B | 400B | 600B | 170H | 320H | 170H | 320H |
| Time Rating | | Continuous | | | | | | | | | | | | | |
| Thermal Class | | B | | | | | | | | | | | | | |
| Insulation Resistance | | 500 VDC, 10 MΩ min. | | | | | | | | | | | | | |
| Withstand Voltage | | 1,500 VAC for 1 minute | | | | | | | | | | | | | |
| Excitation | | Permanent magnet | | | | | | | | | | | | | |
| Cooling Method | | Self-cooled | | | | | | | | | | | | | |
| Protective Structure | | IP00 | | | | | | | | | | | | | |
| Environmental Conditions | Ambient Temperature | 0°C to 40°C (without freezing) | | | | | | | | | | | | | |
| | Ambient Humidity | 20% to 80% relative humidity (without condensation) | | | | | | | | | | | | | |
| | Installation Site | • Must be indoors and free of corrosive and explosive gases.<br>• Must be well-ventilated and free of dust and moisture.<br>• Must facilitate inspection and cleaning.<br>• Must have an altitude of 1,000 m or less.<br>• Must be free of strong magnetic fields. | | | | | | | | | | | | | |
| Shock Resistance | Impact Acceleration Rate | 196 $m/s^2$ | | | | | | | | | | | | | |
| | Number of Impacts | 2 times | | | | | | | | | | | | | |
| Vibration Resistance | Vibration Acceleration Rate | 49 $m/s^2$<br>(the vibration resistance in three directions, vertical, side-to-side, and front-to-back) | | | | | | | | | | | | | |

## Ratings

| Linear Servomotor Moving Coil | | Standard Models | | | | | | | | | | High-efficiency Models | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20A | | | 35A | | | 40A | | 80A | | 35A | | 50A | |
| Model SGLTW- | | 170A | 320A | 460A | 170A | 320A | 460A | 400B | 600B | 400B | 600B | 170H | 320H | 170H | 320H |
| Rated Motor Speed (Reference Speed during Speed Control)*1 | | 3.0 | 3.0 | 3.0 | 2.5 | 2.5 | 2.5 | 1.5 | 2.0 | 2.0 | 2.0 | 2.5 | 2.0 | 2.0 | 2.0 |
| Maximum Speed*1 | m/s | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 3.1 | 3.1 | 2.5 | 2.5 | 4.8 | 4.8 | 3.2 | 3.1 |
| Rated Force*1, *2 | N | 130 | 250 | 380 | 220 | 440 | 670 | 670 | 1,000 | 1,300 | 2,000 | 300 | 600 | 450 | 900 |
| Maximum Force*1 | N | 380 | 760 | 1,140 | 660 | 1,320 | 2,000 | 2,600 | 4,000 | 5,000 | 7,500 | 600 | 1,200 | 900 | 1,800 |
| Rated Current*1 | A | 2.3 | 4.4 | 6.7 | 3.5 | 7.0 | 10.7 | 7.3 | 10.9 | 11.1 | 17.1 | 5.1 | 10.1 | 5.1 | 10.2 |
| Maximum Current*1 | A | 7.7 | 15.4 | 23.2 | 12.1 | 24.2 | 36.7 | 39.4 | 60.6 | 57.9 | 86.9 | 11.9 | 23.9 | 11.8 | 23.6 |
| Moving Coil Mass | kg | 2.5 | 4.6 | 6.7 | 3.7 | 6.8 | 10 | 15 | 23 | 24 | 35 | 4.9 | 8.8 | 6.0 | 11 |
| Force Constant | N/A | 61.0 | 61.0 | 61.0 | 67.5 | 67.5 | 67.5 | 99.1 | 99.1 | 126 | 126 | 64.0 | 64.0 | 95.2 | 95.2 |
| BEMF Constant | Vrms/ (m/s)/ phase | 20.3 | 20.3 | 20.3 | 22.5 | 22.5 | 22.5 | 33.0 | 33.0 | 42.0 | 42.0 | 21.3 | 21.3 | 31.7 | 31.7 |
| Motor Constant | $N/\sqrt{W}$ | 18.7 | 26.5 | 32.3 | 26.7 | 37.5 | 46.4 | 61.4 | 75.2 | 94.7 | 116 | 37.4 | 52.9 | 48.6 | 68.7 |
| Electrical Time Constant | ms | 5.9 | 5.9 | 5.9 | 6.9 | 6.8 | 6.9 | 15 | 15 | 17 | 17 | 15 | 16 | 16 | 17 |
| Mechanical Time Constant | ms | 7.1 | 6.6 | 6.4 | 5.2 | 4.8 | 4.6 | 4.0 | 4.1 | 2.7 | 2.6 | 3.5 | 3.1 | 2.5 | 2.4 |
| Thermal Resistance (with Heat Sink) | K/W | 1.01 | 0.49 | 0.38 | 0.76 | 0.44 | 0.32 | 0.24 | 0.20 | 0.22 | 0.18 | 0.76 | 0.40 | 0.61 | 0.30 |
| Thermal Resistance (without Heat Sink) | K/W | 1.82 | 1.11 | 0.74 | 1.26 | 0.95 | 0.61 | 0.57 | 0.40 | 0.47 | 0.33 | 1.26 | 0.83 | 0.97 | 0.80 |
| Magnetic Attraction*3 | N | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Magnetic Attraction on One Side*4 | N | 800 | 1,590 | 2,380 | 1,400 | 2,780 | 4,170 | 3,950 | 5,890 | 7,650 | 11,400 | 1,400 | 2,780 | 2,000 | 3,980 |
| Maximum Allowable Payload | kg | 25 | 50 | 76 | 44 | 88 | 130 | 280 | 440 | 690 | 1000 | 33 | 67 | 92 | 190 |
| Maximum Allowable Payload (With External Regenerative Resistor and External Dynamic Brake Resistor) | kg | 25 | 50 | 76 | 44 | 88 | 130 | 280 | 440 | 690 | 1000 | 40 | 82 | 95 | 190 |
| Combined Magnetic Way, SGLTM- | | 20□□□A□ | | | 35□□□A□ | | | 40□□□A□ | | 80□□□A□ | | 35□□□H□ | | 50□□□H□ | |
| Combined Serial Converter Unit, JZDP-□□□□- | | 011 | 012 | 013 | 014 | 015 | 016 | 185 | 186 | 187 | 188 | 105 | 106 | 108 | 109 |
| Applicable SERVOPACKs | SGD7S- | 3R8A | 7R6A | 120A | 5R5A | 120A | 180A | 180A | 330A | 330A | 550A | 5R5A | 120A | 5R5A | 120A |
| | SGD7W-<br>SGD7C- | 5R5A | 7R6A | – | 5R5A | – | – | – | – | – | – | 5R5A | – | 5R5A | – |

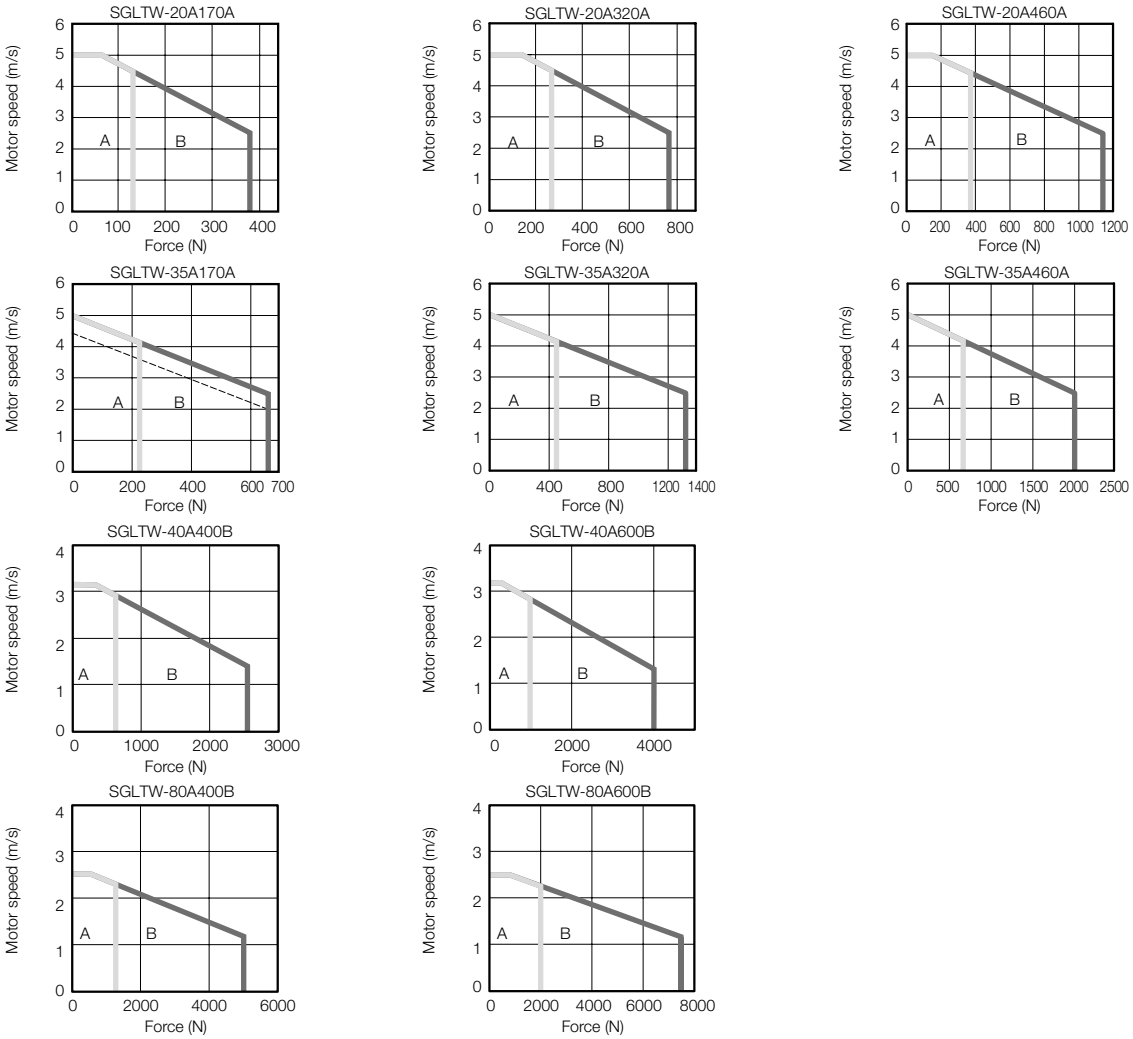
*1. These values are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C. The values for other items are at 20°C. These are typical values.
*2. The rated forces are the continuous allowable force values at a ambient air temperature of 40°C with an aluminum heat sink of the dimensions given in the following table.
- Heat Sink Dimensions
  - 254 mm × 254 mm × 25 mm: SGLTW-20A170A and -35A170A
  - 400 mm × 500 mm × 40 mm: SGLTW-20A320A -20A460A, -35A170H, -35A320A, -35A320H, -35A460A, and -50A170H
  - 609 mm × 762 mm × 50 mm: SGLTW-40A400B, -40A600B, -50A320H, -80A400B, and -80A600B

*3. The unbalanced magnetic gap that results from the Moving Coil installation condition causes a magnetic attraction on the Moving Coil.
*4. The value that is given is the magnetic attraction that is generated on one side of the Magnetic Way.

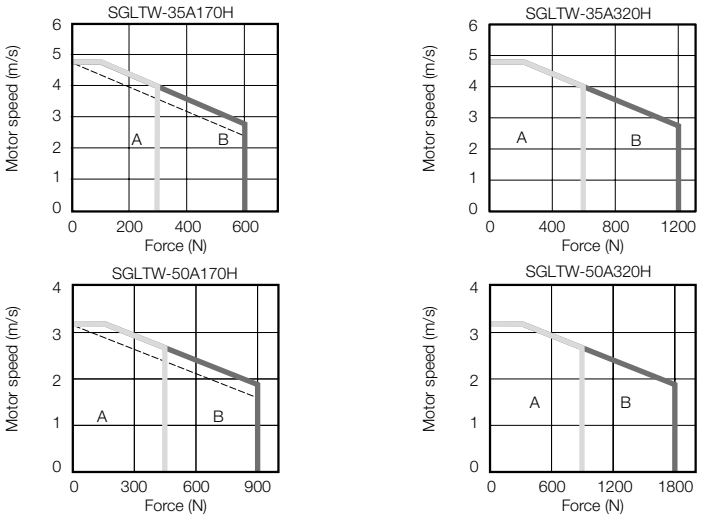
# Force-Motor Speed Characteristics

A : Continuous duty zone ———— (solid lines): With three-phase 200-V input
B : Intermittent duty zone - - - - - - - - (dotted lines): With single-phase 200-V input

## Standard Models




## High-efficiency Models

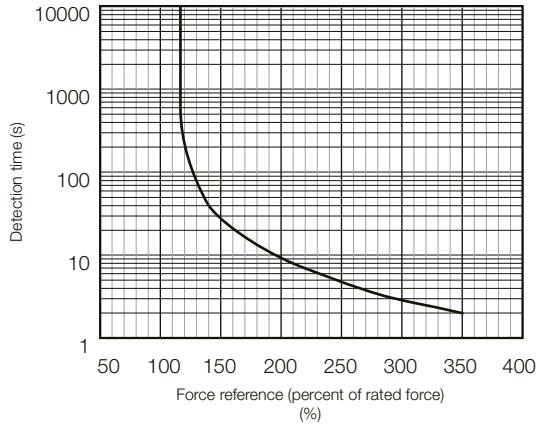



Note:
1. These values (typical values) are for operation in combination with a SERVOPACK when the temperature of the armature winding is 100°C.
2. The characteristics in the intermittent duty zone depend on the power supply voltage.
3. If the effective force is within the allowable range for the rated force, the Servomotor can be used within the intermittent duty zone.
4. If you use a three-phase 200-V power supply input, the intermittent duty zone in the torque-motor speed characteristics will become smaller because the voltage drop increases.

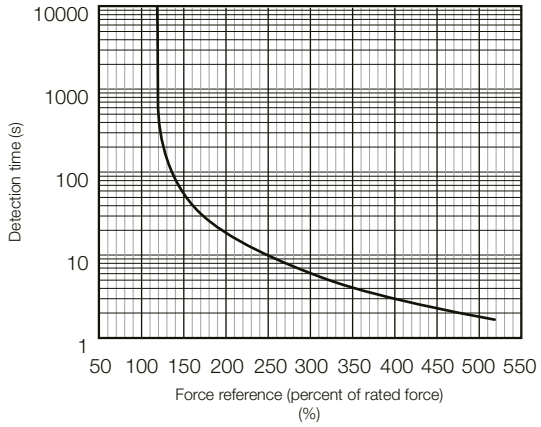
## Servomotor Overload Protection Characteristics

The overload detection level is set for hot start conditions with a Servomotor ambient air temperature of 40°C.

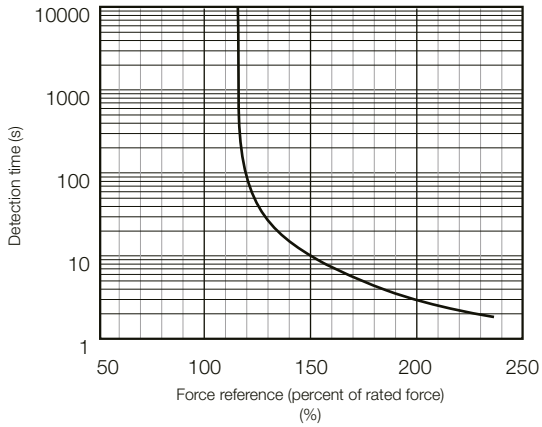
SGLTW-20A□□□A and -35A□□□A




SGLTW-40A□□□B and -80A□□□B




SGLTW-35A□□□H and -50A□□□H

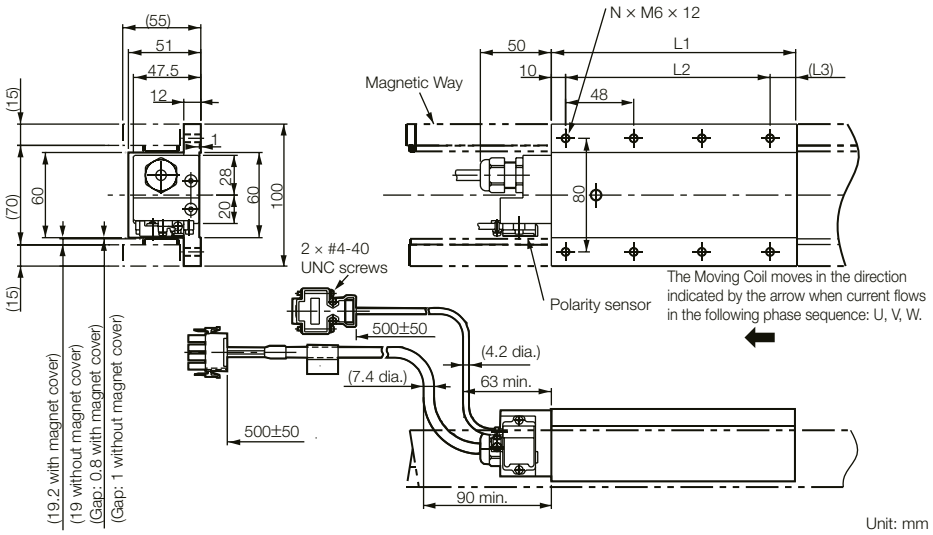



Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
Use the Servomotor so that the effective force remains within the continuous duty zone given in Force-Motor Speed Characteristics.

# External Dimensions

## SGLTW-20: Standard Models

### Moving Coils: SGLTW-20A□□□A□-E

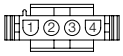



Unit: mm

| Moving Coil Model SGLTW- | L1 | L2 | L3 | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 20A170A□ | 170 | 144 (48 x 3) | (16) | 8 | 2.5 |
| 20A320A□ | 315 | 288 (48 x 6) | (17) | 14 | 4.6 |
| 20A460A□ | 460 | 432 (48 x 9) | (18) | 20 | 6.7 |

# Connector Specifications

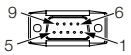
### Servomotor Connector




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Black |
| 4 | FG | Green |

Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350537-3 or 350550-3

### Polarity Sensor Connector

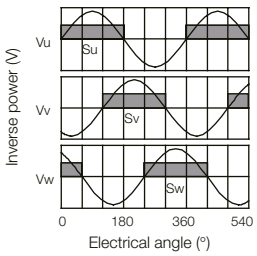



| | | | |
|---|---|---|---|
| 1 | +5 V (DC) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V | – | – |

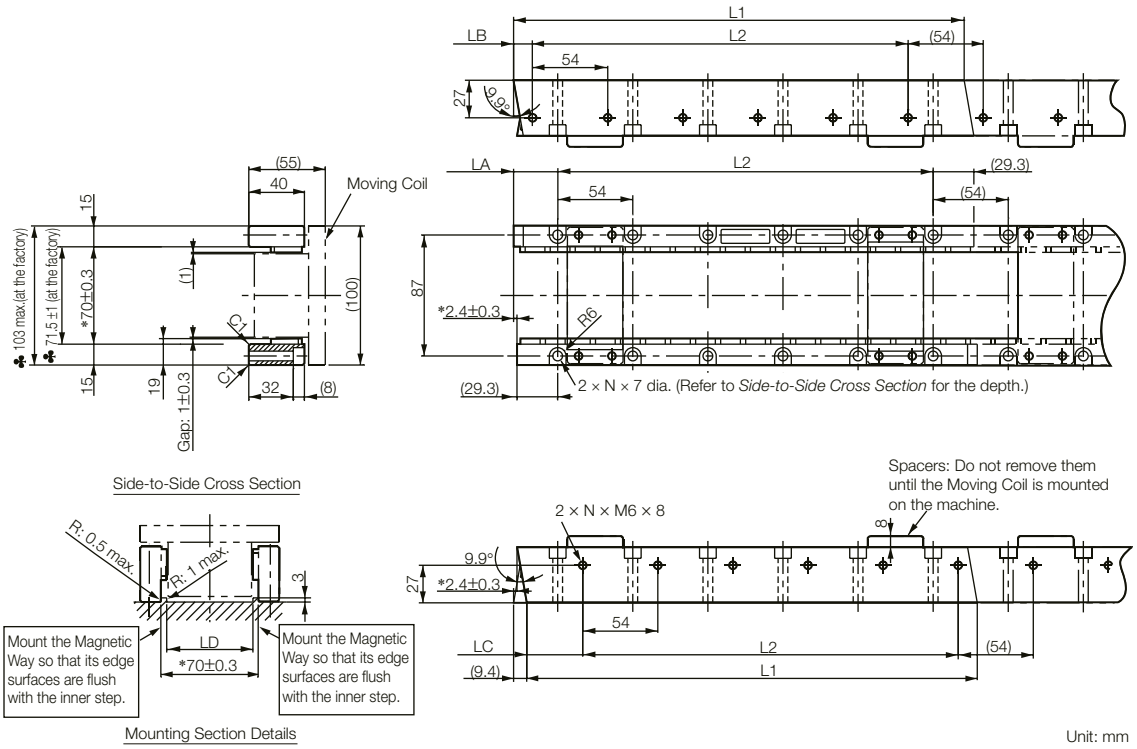
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

### Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



## Magnetic Ways: SGLTM-20□□□A-E

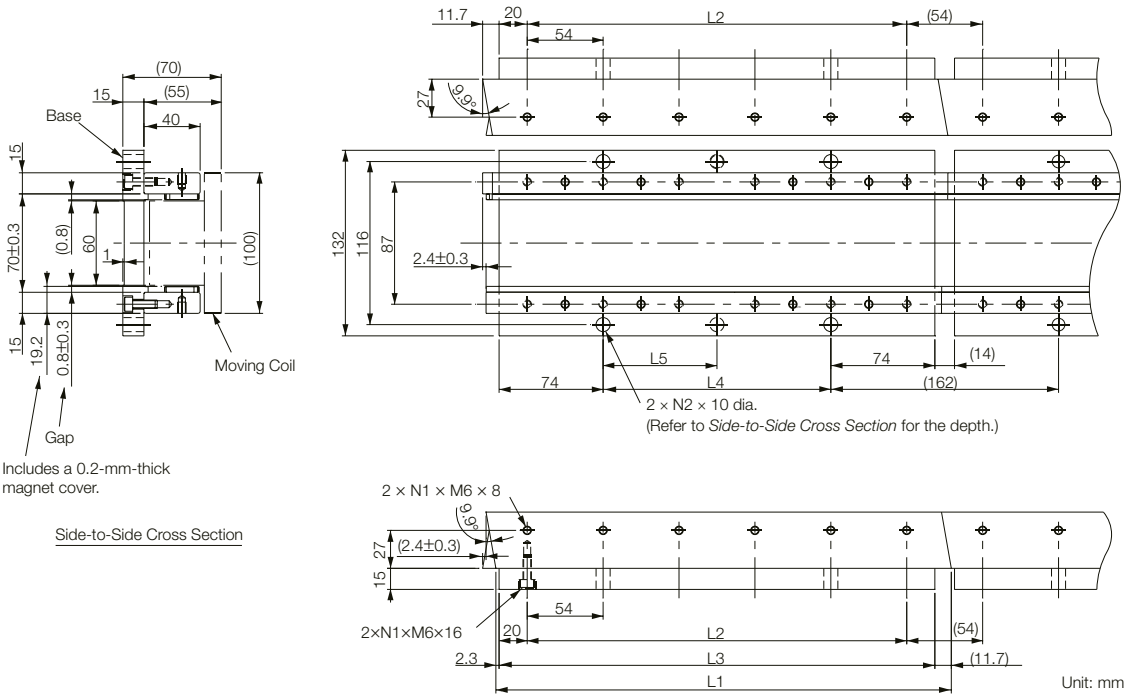



Unit: mm

Note:
1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in Mounting Section Details after installation.
   Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

| Magnetic Way SGLTM- | L1 | L2 | LA | LB | LC | LD | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 20324A□ | $324^{-0.1}_{-0.3}$ | 270 (54 × 5) | $31.7^{0}_{-0.2}$ | $13.7^{0}_{-0.2}$ | $40.3^{0}_{-0.2}$ | $62^{+0.6}_{0}$ | 6 | 3.4 |
| 20540A□ | $540^{-0.1}_{-0.3}$ | 486 (54 × 9) | $31.7^{0}_{-0.2}$ | $13.7^{0}_{-0.2}$ | $40.3^{0}_{-0.2}$ | $62^{+0.6}_{0}$ | 10 | 5.7 |
| 20756A□ | $756^{-0.1}_{-0.3}$ | 702 (54 × 13) | $31.7^{0}_{-0.2}$ | $13.7^{0}_{-0.2}$ | $40.3^{0}_{-0.2}$ | $62^{+0.6}_{0}$ | 14 | 7.9 |

## Magnetic Ways with Bases: SGLTM-20□□□AY-E

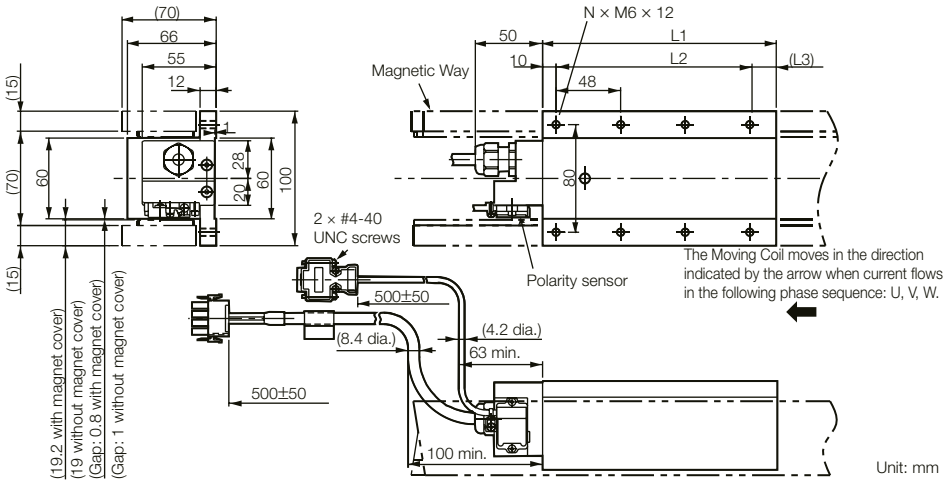



Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

| Magnetic Way SGLTM- | L1 | L2 | L3 | L4 | L5 | N1 | N2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 20324AY | $324^{-0.1}_{-0.3}$ | 270 | 310 | 162 | 162 | 6 | 2 | 5.1 |
| 20540AY | $540^{-0.1}_{-0.3}$ | 486 | 526 | 378 | 189 | 10 | 3 | 8.5 |
| 20756AY | $756^{-0.1}_{-0.3}$ | 702 | 742 | 594 | 198 | 14 | 4 | 12 |

# SGLTW-35: Standard Models

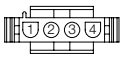
## Moving Coils: SGLTW-35A□□□A□-E




| Moving Coil Model SGLTW- | L1 | L2 | (L3) | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 35A170A□ | 170 | 144 (48 × 3) | (16) | 8 | 3.7 |
| 35A320A□ | 315 | 288 (48 × 6) | (17) | 14 | 6.8 |
| 35A460A□ | 460 | 432 (48 × 9) | (18) | 20 | 6.7 |

# Connector Specifications

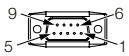
## Servomotor Connector




| | | |
|---|---|---|
| 1 | Phase U | Red |
| 2 | Phase V | White |
| 3 | Phase W | Black |
| 4 | FG | Green |

Plug: 350779-1
Pins: 350218-3 or 350547-3 (No.1 to 3)
350654-1 or 350669-1 (No. 4)
From Tyco Electronics Japan G.K.
**Mating Connector**
Cap: 350780-1
Socket: 350537-3 or 350550-3

## Polarity Sensor Connector

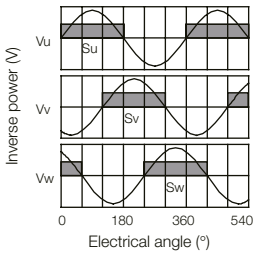



| | | | |
|---|---|---|---|
| 1 | +5 V (DC) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V | – | – |

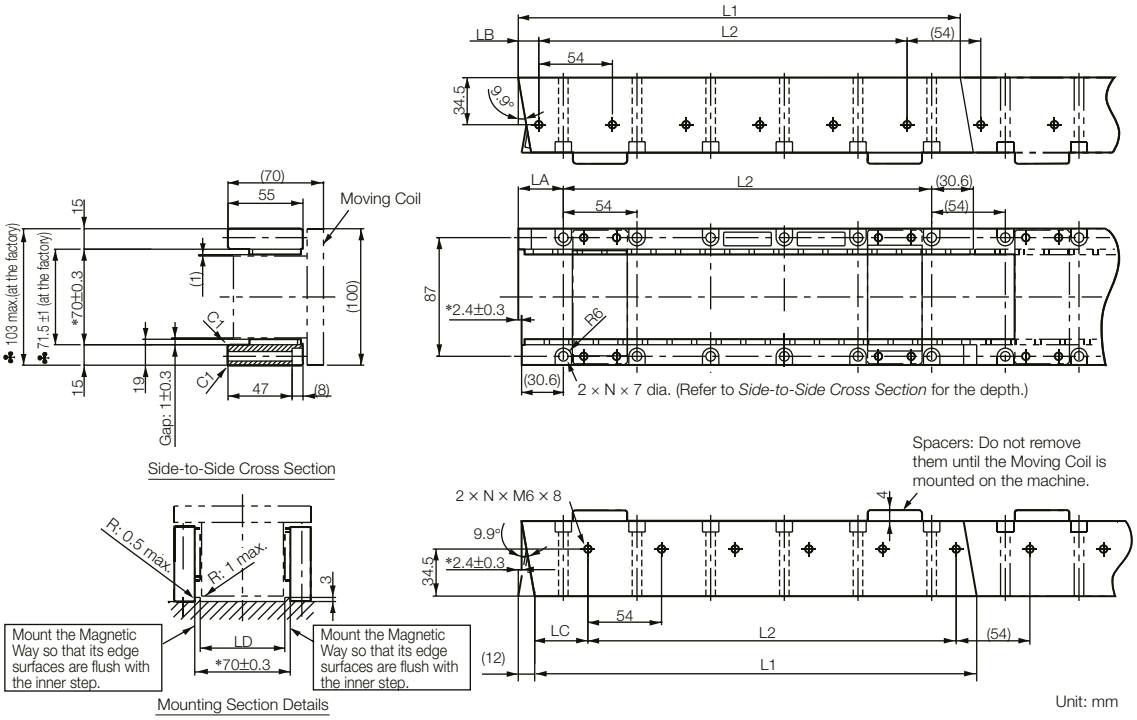
Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



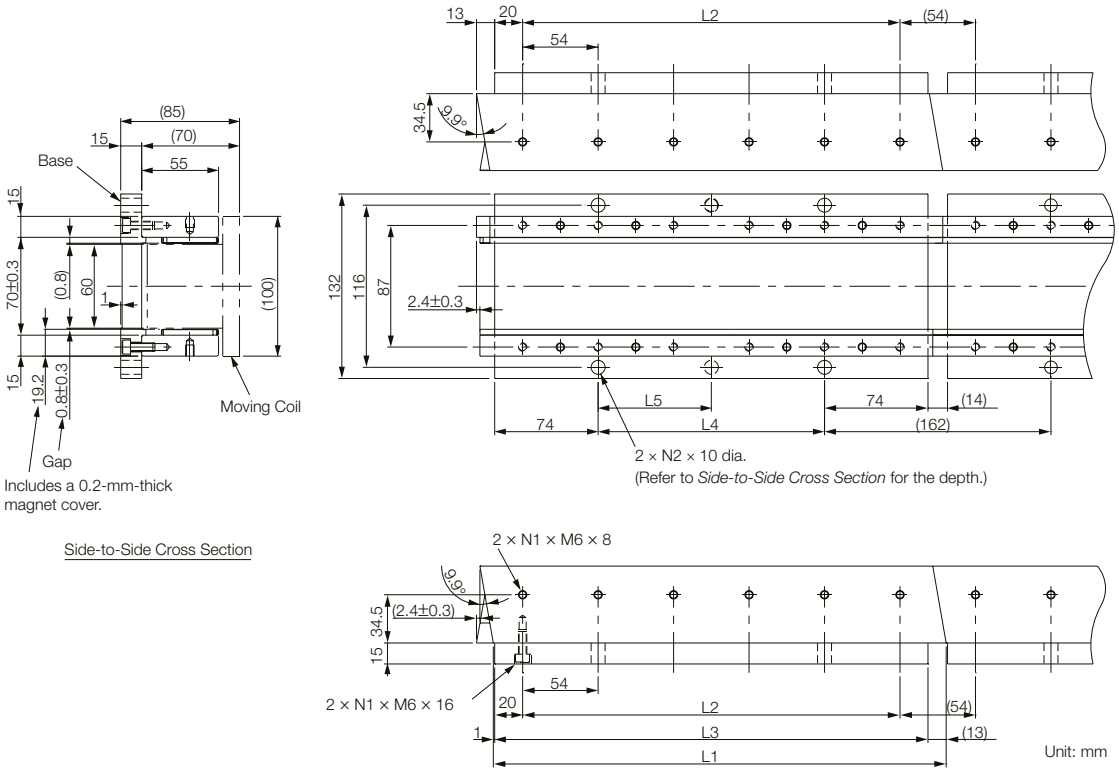
## Magnetic Ways: SGLTM-35□□□A□-E




Note:
1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in Mounting Section Details after installation.
   Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

| Magnetic Way Model SGLTM- | L1 | L2 | LA | LB | LC | LD | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 35324A□ | $324^{-0.1}_{-0.3}$ | 270 (54 × 5) | $33^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $39^{0}_{-0.2}$ | $62^{+0.6}_{0}$ | 6 | 4.8 |
| 35540A□ | $540^{-0.1}_{-0.3}$ | 486 (54 × 9) | $33^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $39^{0}_{-0.2}$ | $62^{+0.6}_{0}$ | 10 | 8 |
| 35756A□ | $756^{-0.1}_{-0.3}$ | 702 (54 × 13) | $33^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $39^{0}_{-0.2}$ | $62^{+0.6}_{0}$ | 14 | 11 |

## Magnetic Ways with Bases: SGLTM-35□□□AY-E

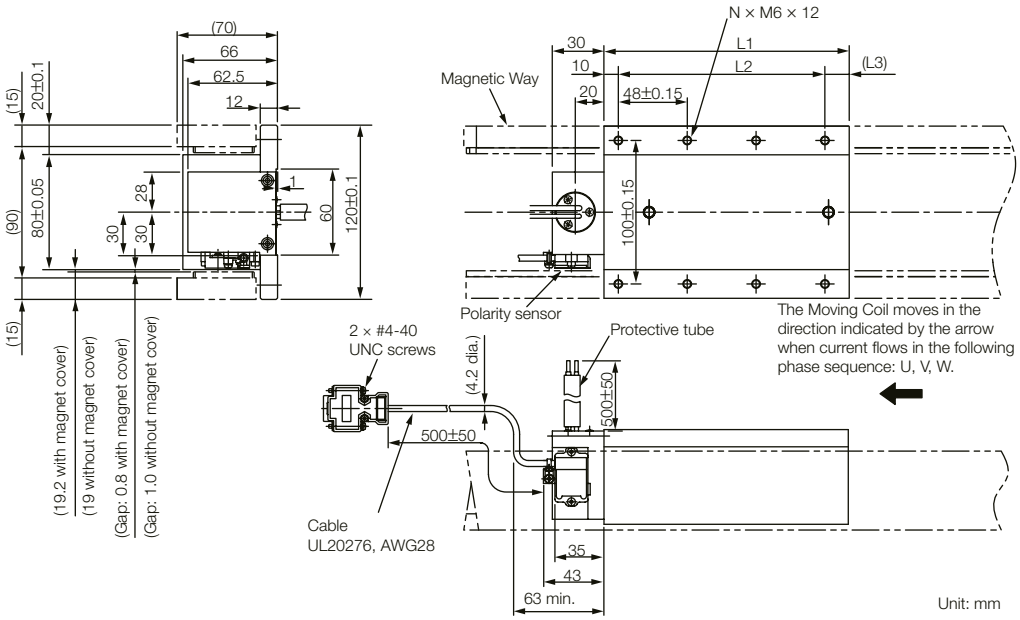



Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

| Magnetic Way Model SGLTM- | L1 | L2 | L3 | L4 | L5 | N1 | N2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

# SGLTW-35□□□□H□: High-Efficiency Models

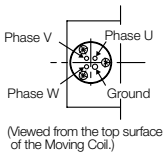
## Moving Coils: SGLTW-35A□□□H□-E




| Moving Coil Model SGLTW- | L1 | L2 | L3 | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 35A170H□ | 170 | 144 (48 × 3) | (16) | 8 | 4.7 |
| 35A320H□ | 315 | 288 (48 × 6) | (17) | 14 | 8.8 |

# Connector Specifications

## Moving Coil Lead



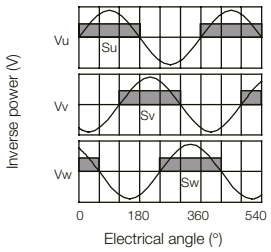
(Viewed from the top surface of the Moving Coil.)

| | | | |
|---|---|---|---|
| Phase U | Red | U | 2 mm² |
| Phase V | White | V | |
| Phase W | Black | W | |
| Ground | Green | – | |

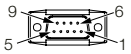
Secure the lead from the Moving Coil of the Linear Servomotor so that it moves together with the Moving Coil.

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



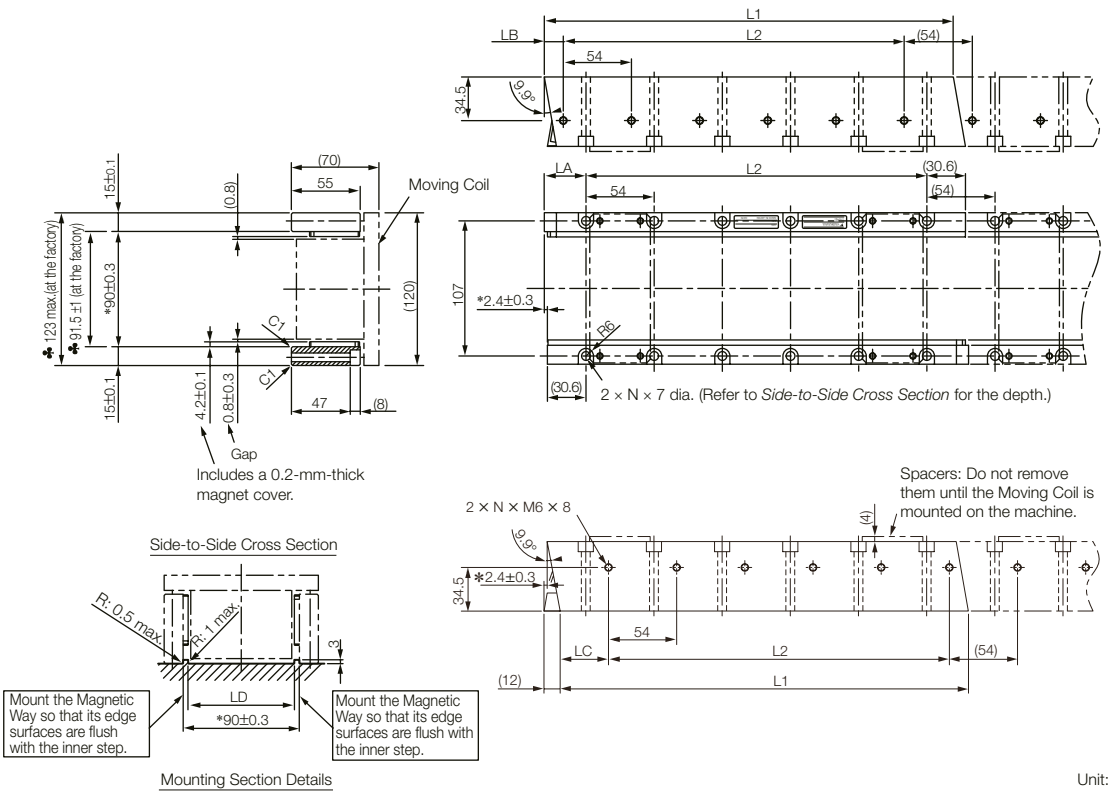

## Polarity Sensor Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (DC) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Magnetic Ways: SGLTM-35□□□H□-E

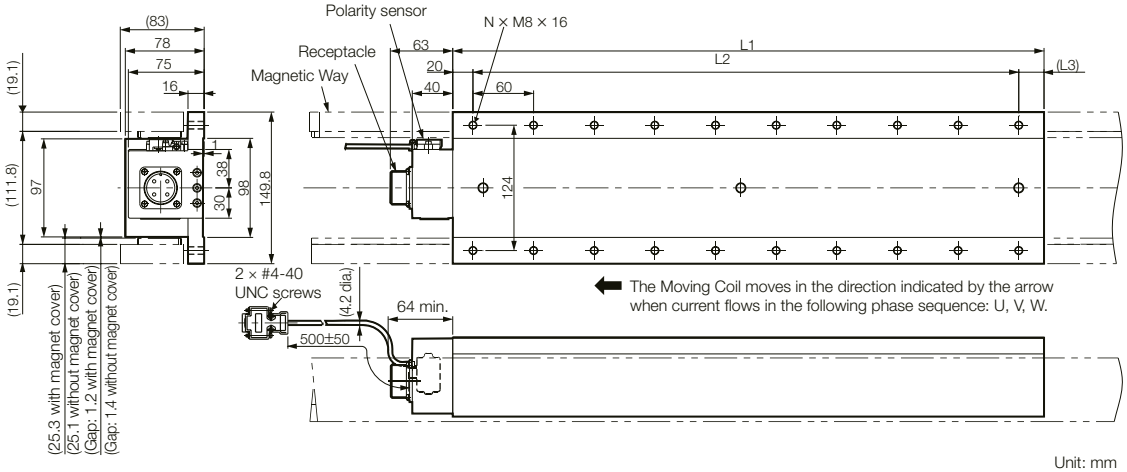



Note:
1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in Mounting Section Details after installation.
   Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

| Magnetic Way Model SGLTM- | L1 | L2 | LA | LB | LC | LD | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 35324H□ | $324^{-0.1}_{-0.3}$ | 270 (54 × 5) | $33^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $39^{0}_{-0.2}$ | $82^{+0.6}_{0}$ | 6 | 4.8 |
| 35540H□ | $540^{-0.1}_{-0.3}$ | 486 (54 × 9) | $33^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $39^{0}_{-0.2}$ | $82^{+0.6}_{0}$ | 10 | 8 |
| 35756H□ | $756^{-0.1}_{-0.3}$ | 702 (54 × 13) | $33^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $39^{0}_{-0.2}$ | $82^{+0.6}_{0}$ | 14 | 11 |

# SGLTW-40: Standard Models

## Moving Coils: SGLTW-40A□□□B□-E




Unit: mm

| Moving Coil Model SGLTW- | L1 | L2 | (L3) | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 40A400B□ | 394.2 | 360 (60 × 6) | (15) | 14 | 15 |
| 40A600B□ | 574.2 | 540 (60 × 9) | (15) | 20 | 22 |

# Connector Specifications

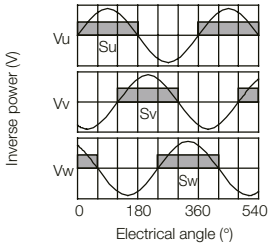
## Servomotor Connector

| | |
|---|---|
| A | Phase U |
| B | Phase V |
| C | Phase W |
| D | Ground |

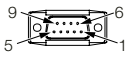
Receptacle: MS3102A-22-22P
From DDK Ltd.
**Mating Connector**
Right-angle plug: MS3108B22-22S
Straight plug: MS3106B22-22S
Cable clamp: MS3057-12A

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



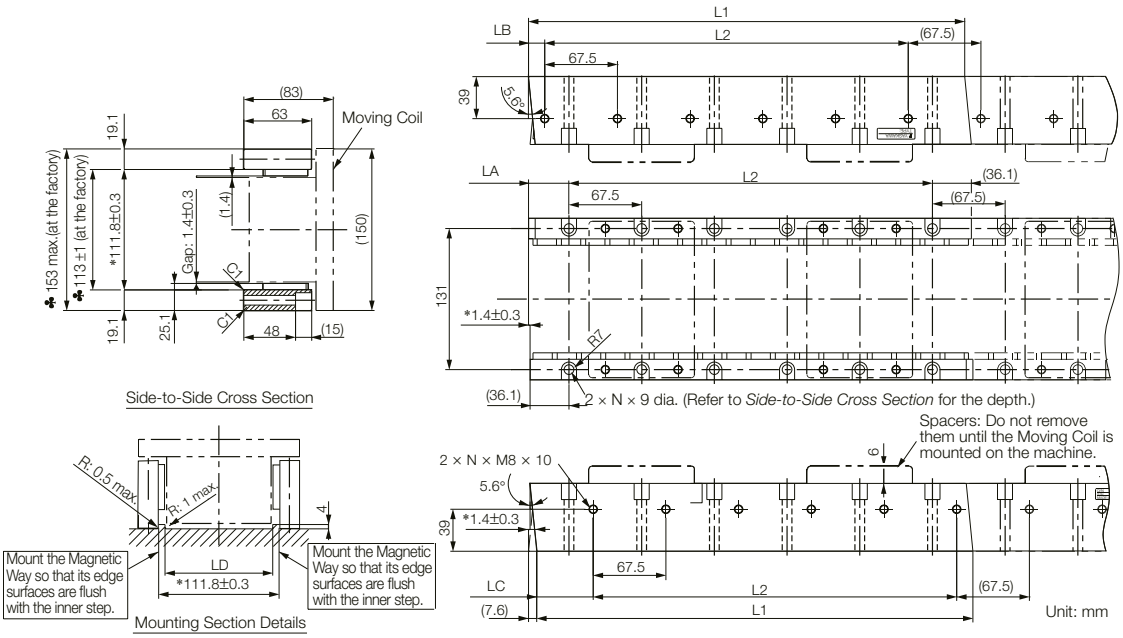

## Polarity Sensor Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Magnetic Ways: SGLTM-40□□□A□-E

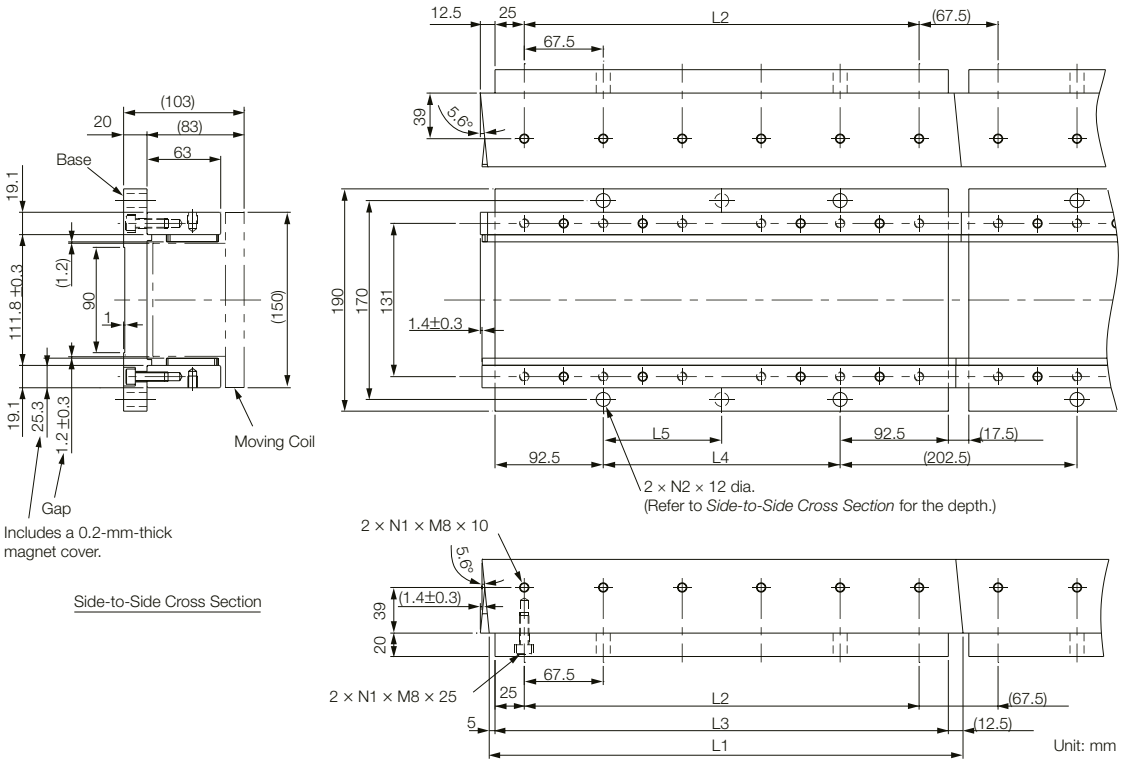



Note:
1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in Mounting Section Details after installation.

   Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

| Magnetic Way Model SGLTM- | L1 | L2 | LA | LB | LC | LD | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 40405A□ | $405^{-0.1}_{-0.3}$ | 337.5 (67.5 × 5) | $37.5^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $52.2^{0}_{-0.2}$ | $100^{+0.6}_{0}$ | 6 | 9 |
| 40675A□ | $675^{-0.1}_{-0.3}$ | 607.5 (67.5 × 9) | $37.5^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $52.5^{0}_{-0.2}$ | $100^{+0.6}_{0}$ | 10 | 15 |
| 40945A□ | $945^{-0.1}_{-0.3}$ | 877.5 (67.5 × 13) | $37.5^{0}_{-0.2}$ | $15^{0}_{-0.2}$ | $52.5^{0}_{-0.2}$ | $100^{+0.6}_{0}$ | 14 | 21 |

## Magnetic Ways with Bases: SGLTM-40□□□AY-E

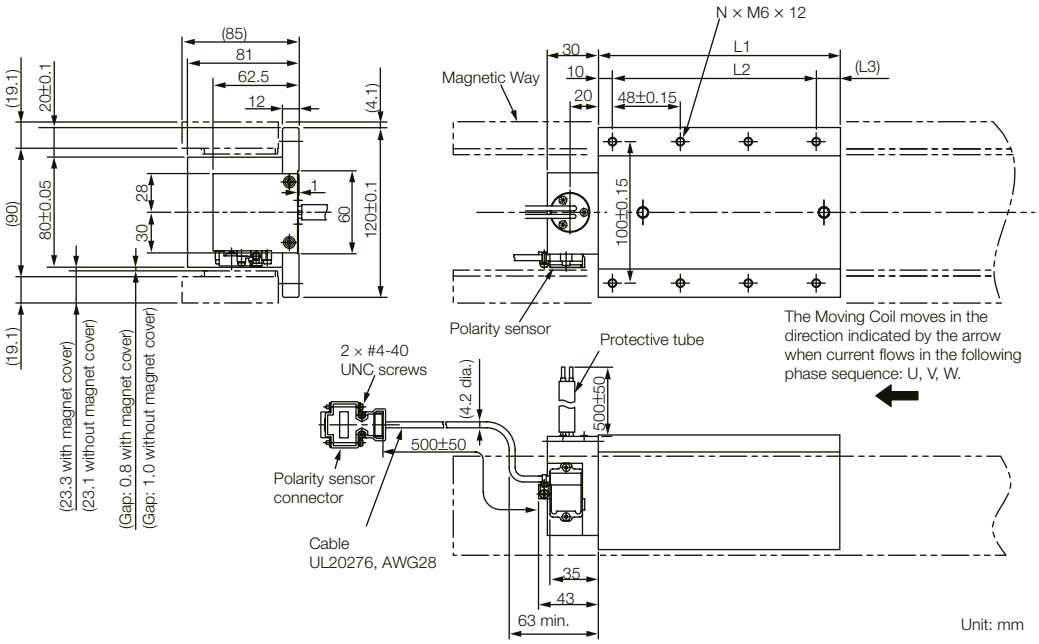



Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

| Magnetic Way Model SGLTM- | L1 | L2 | L3 | L4 | L5 | N1 | N2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

# SGLTW-50: High-Efficiency Models

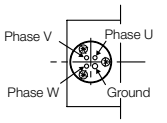
## Moving Coils: SGLTW-50A□□□H□-E




| Moving Coil Model SGLTW- | L1 | L2 | (L3) | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 50A170H□ | 170 | 144 (48 × 3) | (16) | 8 | 6 |
| 50A320H□ | 315 | 288 (48 × 6) | (17) | 14 | 11 |

# Connector Specifications

## Moving Coil Lead



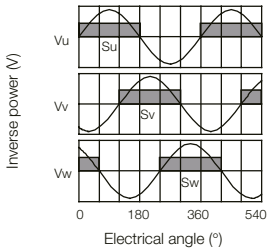
(Viewed from the top surface of the Moving Coil.)

| | | | |
|---|---|---|---|
| Phase U | Red | U | 2 mm² |
| Phase V | White | V | |
| Phase W | Black | W | |
| Ground | Green | – | |

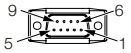
Secure the lead from the Moving Coil of the Linear Servomotor so that it moves together with the Moving Coil.

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



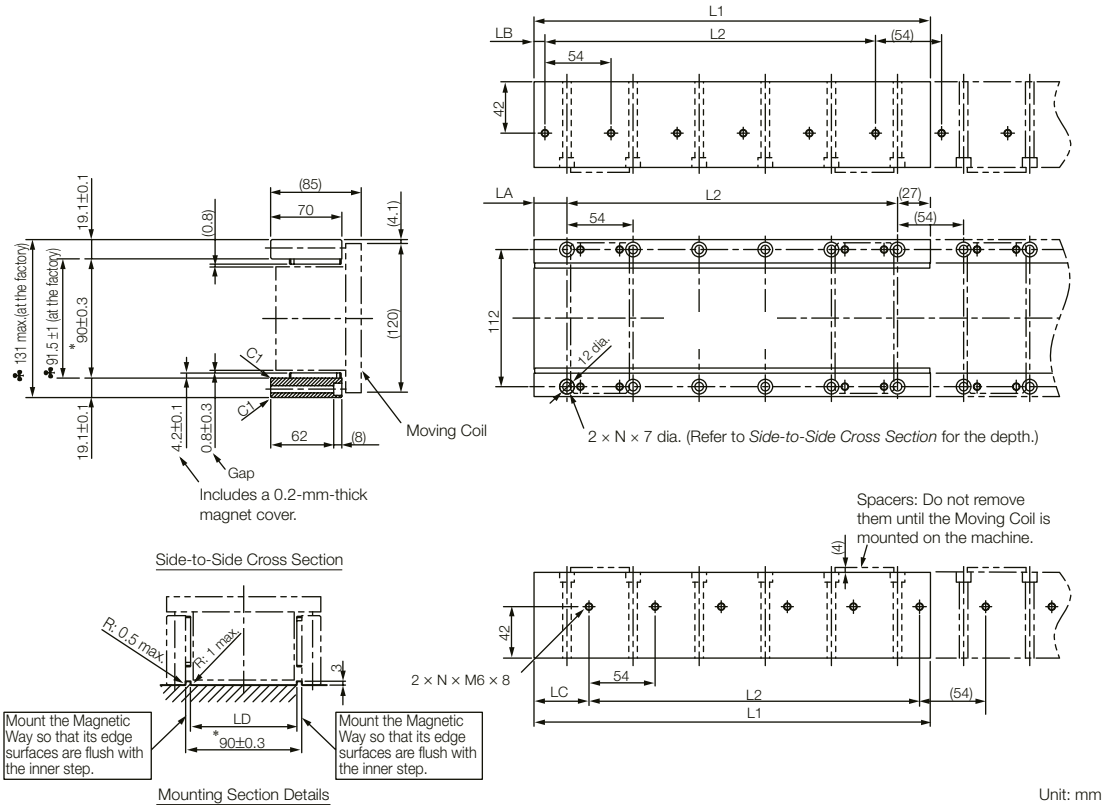

## Polarity Sensor Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (DC) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Magnetic Ways: SGLTM-50□□□H□-E



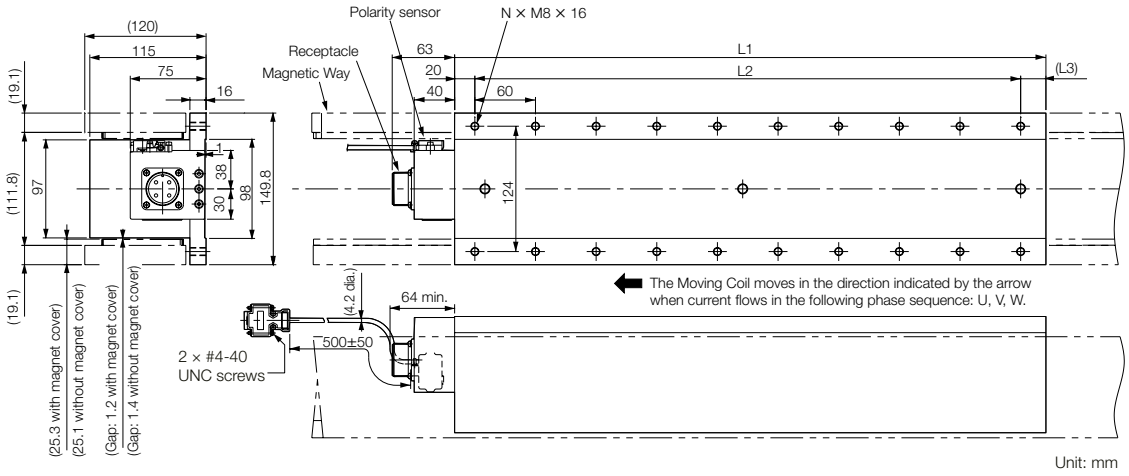

Note:
1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in Mounting Section Details after installation.

   Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

| Magnetic Way Model SGLTM- | L1 | L2 | LA | LB | LC | LD | N | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|
| 50324H□ | $324^{-0.1}_{-0.3}$ | 270 (54 × 5) | $27^{0}_{-0.2}$ | $9^{0}_{-0.2}$ | $45^{0}_{-0.2}$ | $82^{+0.6}_{0}$ | 6 | 8 |
| 50540H□ | $540^{-0.1}_{-0.3}$ | 486 (54 × 9) | $27^{0}_{-0.2}$ | $9^{0}_{-0.2}$ | $45^{0}_{-0.2}$ | $82^{+0.6}_{0}$ | 10 | 13 |
| 50756H□ | $756^{-0.1}_{-0.3}$ | 702 (54 × 13) | $27^{0}_{-0.2}$ | $9^{0}_{-0.2}$ | $45^{0}_{-0.2}$ | $82^{+0.6}_{0}$ | 14 | 18 |

# SGLTW-80: Standard Models

## Moving Coils: SGLTW-80A□□□B□-E




Unit: mm

| Moving Coil Model SGLTW- | L1 | L2 | (L3) | N | Approx. Mass [kg] |
|---|---|---|---|---|---|
| 80A400B□ | 394.2 | 360 (60 × 6) | (15) | 14 | 24 |
| 80A600B□ | 574.2 | 540 (60 × 9) | (15) | 20 | 35 |

# Connector Specifications

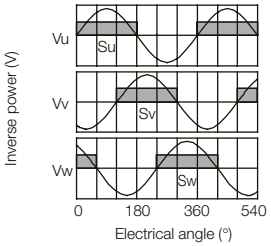
## Servomotor Connector

| | |
|---|---|
| A | Phase U |
| B | Phase V |
| C | Phase W |
| D | Ground |

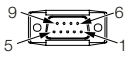
Receptacle: MS3102A-22-22P
From DDK Ltd.
**Mating Connector**
Right-angle plug: MS3108B22-22S
Straight plug: MS3106B22-22S
Cable clamp: MS3057-12A

## Polarity Sensor Output Signal

The figure on the right shows the relationship between the Su, Sv, and Sw polarity sensor output signals and the inverse power of each motor phase Vu, Vv, and Vw when the Moving Coil moves in the direction indicated by the arrow in the dimensional drawings of the Moving Coil.



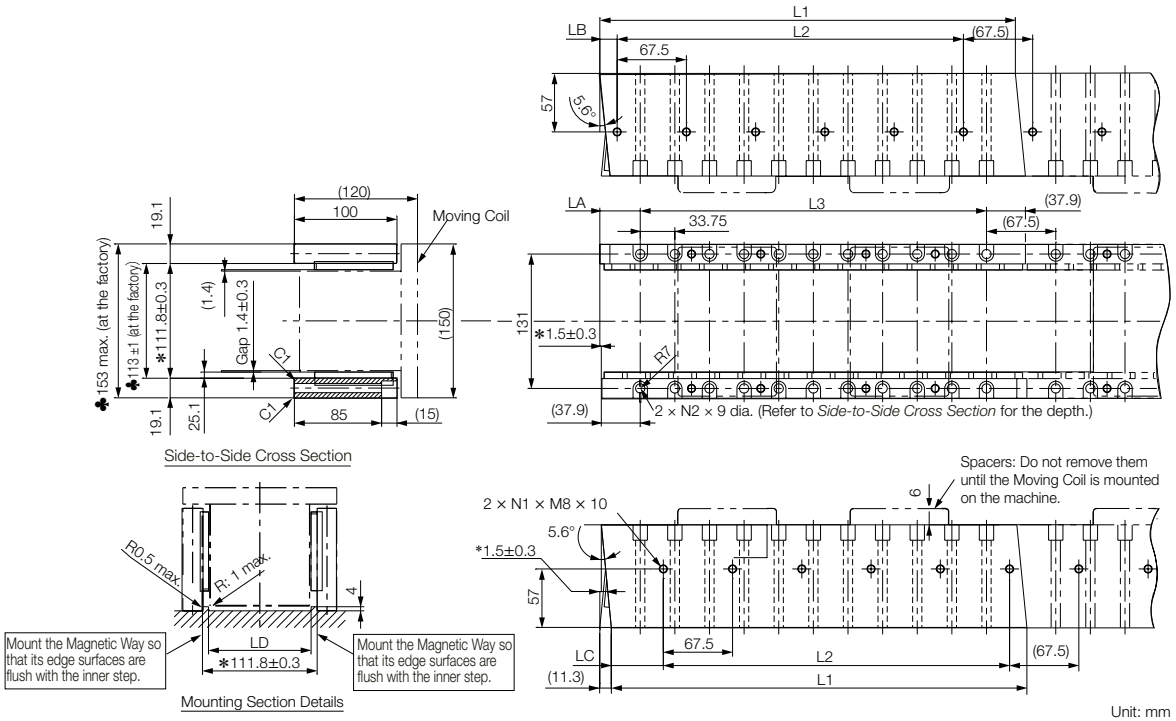

## Polarity Sensor Connector




| | | | |
|---|---|---|---|
| 1 | +5 V (power supply) | 6 | Not used |
| 2 | Phase U | 7 | |
| 3 | Phase V | 8 | |
| 4 | Phase W | 9 | |
| 5 | 0 V (power supply) | – | – |

Pin connector: 17JE-23090-02 (D8C)-CG
From DDK Ltd.
**Mating Connector**
Socket connector: 17JE-13090-02 (D8C)A-CG
Studs: 17L-002C or 17L-002C1

## Magnetic Ways: SGLTM-80□□□A□-E

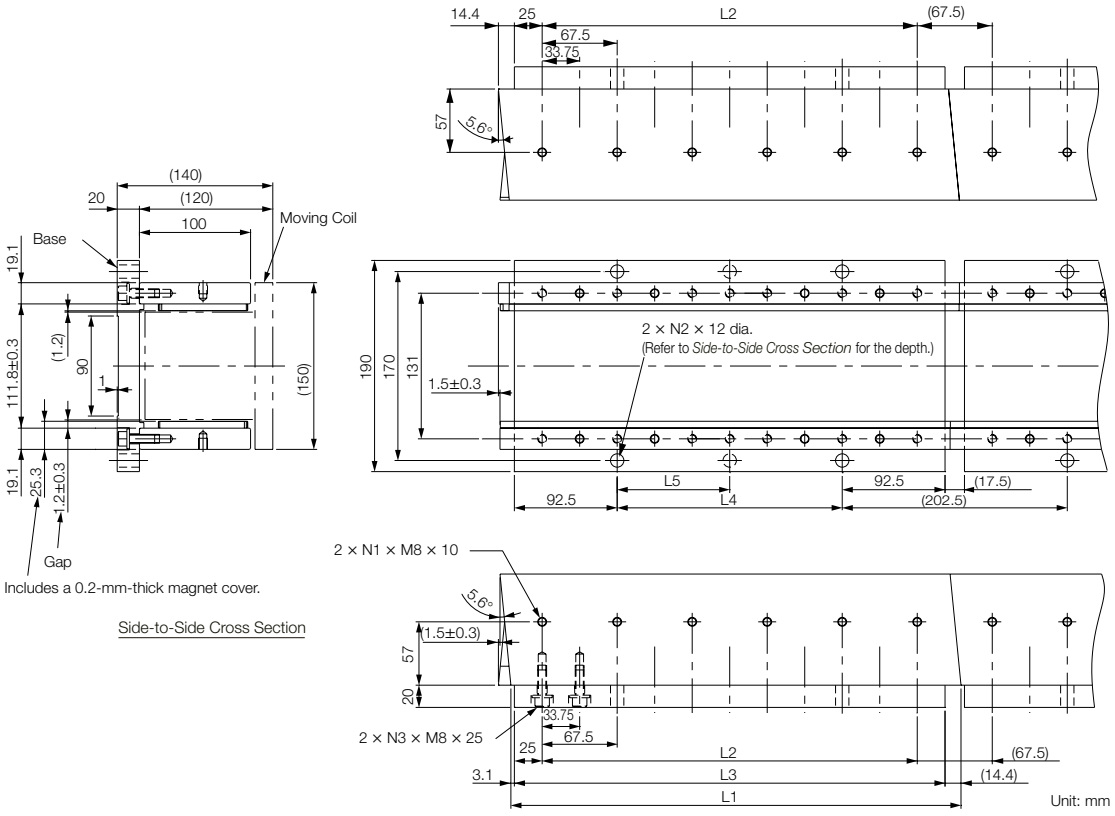



Note:
1. Two Magnetic Way tracks are used together as a set. For safety, when they are shipped, the two tracks are secured to a mounting spacer made from aluminum.
2. More than one Magnetic Way can be connected.
3. Dimensions with asterisks are the distances between the Magnetic Way tracks. Install the tracks according to the specified dimensions. Observe the dimensions given in Mounting Section Details after installation.

   Dimensions when the Magnetic Way is shipped from the factory are indicated by ♣.
4. Use socket head screws of strength class 10.9 or higher for the Magnetic Way mounting screws. (Do not use stainless steel screws.)

| Magnetic Way Model SGLTM- | L1 | L2 | L3 | LA | LB | LC | LD | N1 | N2 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|---|
| 80405A□ | $405^{-0.1}_{-0.3}$ | 337.5 (67.5 × 5) | 337.5 (33.75 × 10) | $39.4^{0}_{-0.2}$ | $16.9^{0}_{-0.2}$ | $50.6^{0}_{-0.2}$ | $100^{+0.6}_{0}$ | 6 | 11 | 14 |
| 80675A□ | $675^{-0.1}_{-0.3}$ | 607.5 (67.5 × 9) | 607.5 (33.75 × 18) | $39.4^{0}_{-0.2}$ | $16.9^{0}_{-0.2}$ | $50.6^{0}_{-0.2}$ | $100^{+0.6}_{0}$ | 10 | 19 | 24 |
| 80945A□ | $945^{-0.1}_{-0.3}$ | 877.5 (67.5 × 13) | 877.5 (33.75 × 26) | $39.4^{0}_{-0.2}$ | $16.9^{0}_{-0.2}$ | $50.6^{0}_{-0.2}$ | $100^{+0.6}_{0}$ | 14 | 27 | 34 |

## Magnetic Ways: SGLTM-80□□□AY-E



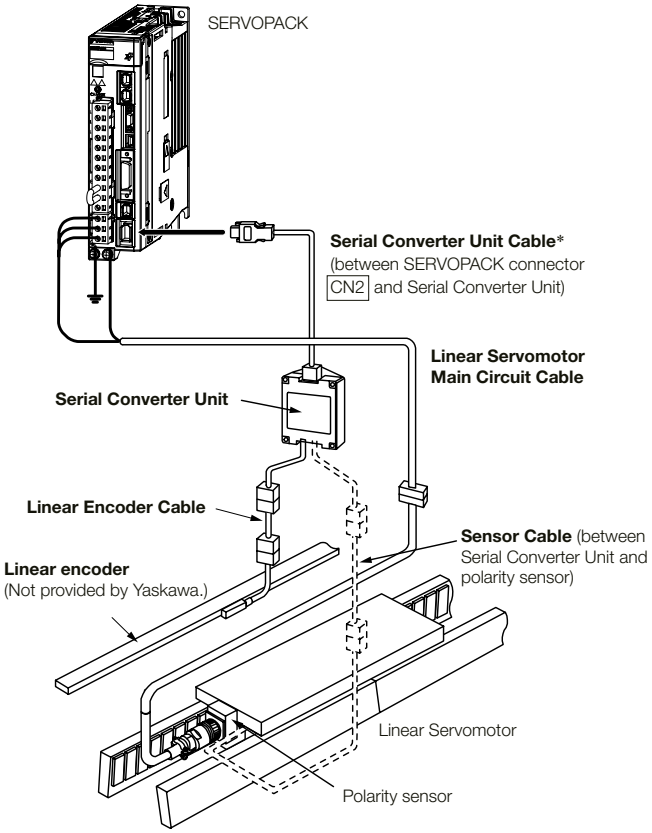

Note: Two Magnetic Way tracks are used together as a set. More than one Magnetic Way can be connected.

| Magnetic Way Model SGLTM- | L1 | L2 | L3 | L4 | L5 | N1 | N2 | N3 | Approx. Mass [kg] |
|---|---|---|---|---|---|---|---|---|---|
| 80405AY | $405^{-0.1}_{-0.3}$ | 337.5 | 387.5 | 202.5 | 202.5 | 6 | 2 | 11 | 18 |
| 80675AY | $675^{-0.1}_{-0.3}$ | 607.5 | 657.5 | 472.5 | 236.25 | 10 | 3 | 19 | 31 |
| 80945AY | $945^{-0.1}_{-0.3}$ | 877.5 | 927.5 | 742.5 | 247.5 | 14 | 4 | 27 | 43 |

# Selecting Cables SGLT

## Cable Configurations

To select a Linear Encoder, use Recommended Linear Encoders. Prepare the cable required for the encoder.

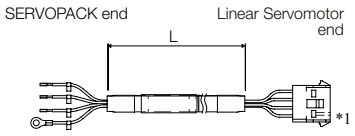
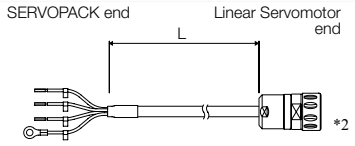
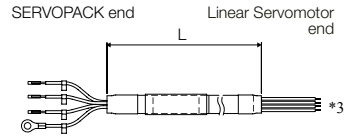



* You can connect directly to an absolute linear encoder.

Note:
Refer to the following manual for the following information.

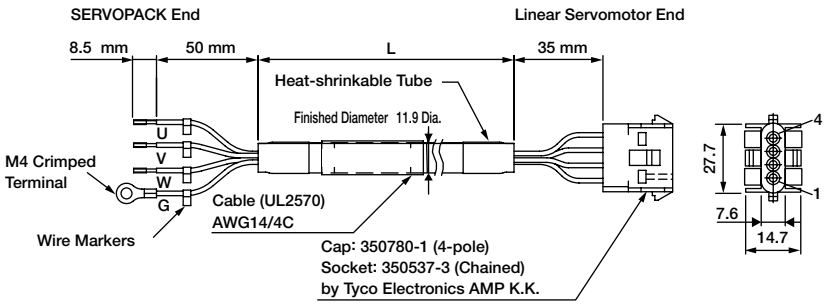
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables
- Order numbers and specifications for wiring materials
  Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

# Linear Servomotor Main Circuit Cables SGLT

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| SGLTW-20A, -35A | 1 m | JZSP-CLN21-01-E |   |
| | 3 m | JZSP-CLN21-03-E | |
| | 5 m | JZSP-CLN21-05-E | |
| | 10 m | JZSP-CLN21-10-E | |
| | 15 m | JZSP-CLN21-15-E | |
| | 20 m | JZSP-CLN21-20-E | |
| SGLTW-□□A□□□□□D | 3 m | DP9325254-03G |   |
| | 5 m | DP9325254-05G | |
| | 10 m | DP9325254-10G | |
| | 15 m | DP9325254-15G | |
| | 20 m | DP9325254-20G | |
| SGLTW-40□□□□B□<br>-80□□□□B□ | 1 m | JZSP-CLN39-01-E |   |
| | 3 m | JZSP-CLN39-03-E | |
| | 5 m | JZSP-CLN39-05-E | |
| | 10 m | JZSP-CLN39-10-E | |
| | 15 m | JZSP-CLN39-15-E | |
| | 20 m | JZSP-CLN39-20-E | |

*1. Connector from Tyco Electronics Japan G.K.
*2. Connector from Interconnectron GmbH
*3. A connector is not provided on the Linear Servomotor end. Obtain a connector according to your specifications.
Refer to the next page for information on connectors.

## JZSP-CLN21-01-E



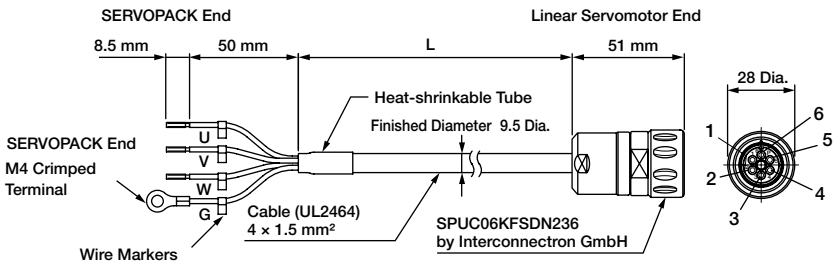

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Red | Phase U |
| White | Phase V |
| Blue | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| FG | 4 |

## DP9325254-□□G



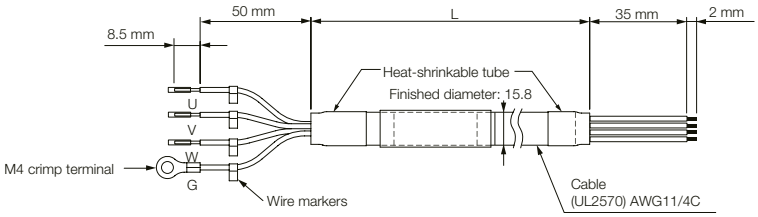

SERVOPACK-end Leads

| Wire Color | Signal |
|---|---|
| Black 1 | Phase U |
| Black 2 | Phase V |
| Black 3 | Phase W |
| Green/yellow | FG |

Linear Servomotor-end Connector

| Signal | Pin No. |
|---|---|
| Phase U | 1 |
| Phase V | 2 |
| Phase W | 3 |
| — | 4 |
| — | 5 |
| FG | 6 |

## JZSP-CLN39-□□-E Cables




SERVOPACK Leads

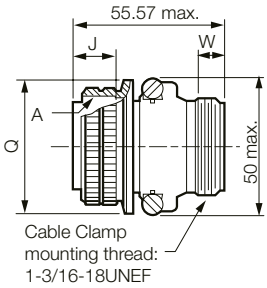
| Wire Color | Signal |
|---|---|
| Red | Phase U |
| White | Phase V |
| Blue | Phase W |
| Green/yellow | FG |

Servomotor Connector

| Signal | Pin |
|---|---|
| Phase U | A |
| Phase V | B |
| Phase W | C |
| FG | D |

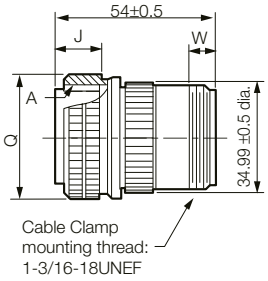
| Applicable Servomotor | Connector Provided with Servomotor | Plug | | Cable Clamp |
|---|---|---|---|---|
| | | Straight | Right-angle | |
| SGLTW-40 and -80 | MS3102A22-22P | MS3106B22-22S or MS3106A22-22S | MS3108B22-22S | MS3057-12A |

## MS3106B22-2S: Straight Plug with Two-piece Shell



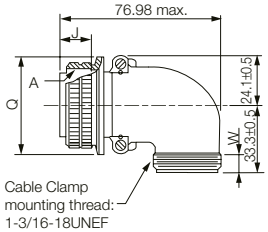

| Shell Size | Joint Thread A | Length of Joint J ±0.12 | Joint Nut Outer Diameter Q +0/-0.38 | Effective Thread Length W min. |
|---|---|---|---|---|
| 22 mm | 1-3/8-18UNEF | 18.26 mm | 40.48 mm | 9.53 mm |

## MS3106A22-2S: Straight Plug with Solid Shell



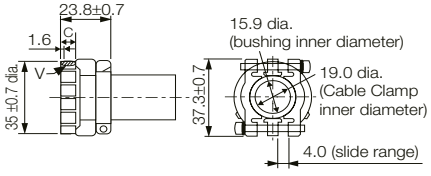

| Shell Size | Joint Thread A | Length of Joint J ±0.12 | Joint Nut Outer Diameter Q +0/-0.38 | Effective Thread Length W min. |
|---|---|---|---|---|
| 22 mm | 1-3/8-18UNEF | 18.26 mm | 40.48 mm | 9.53 mm |

## MS3108B22-2S: Right-angle Plug with Two-piece Shell



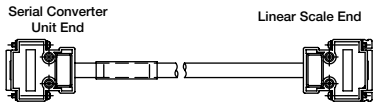

| Shell Size | Joint Thread A | Length of Joint J ±0.12 | Joint Nut Outer Diameter Q +0/-0.38 | Effective Thread Length W min. |
|---|---|---|---|---|
| 22 mm | 1-3/8-18UNEF | 18.26 mm | 40.48 mm | 9.53 mm |

## Dimensional Drawings: MS3057-12A Cable Clamp with Rubber Bushing




| Applicable Connector Shell Size | Effective Thread Length C | Mounting Thread V | Attached Bushing |
|---|---|---|---|
| 20.22 mm | 10.3 mm | 1-3/16-18UNEF | AN3420-12 |

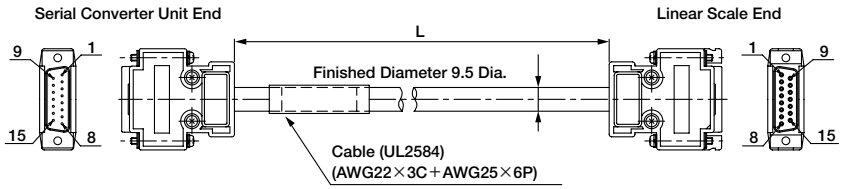
# Cables for connecting Linear Scales SGLT

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLL00-01-E-G# |  |
| | 3 m | JZSP-CLL00-03-E-G# | |
| | 5 m | JZSP-CLL00-05-E-G# | |
| | 10 m | JZSP-CLL00-10-E-G# | |
| | 15 m | JZSP-CLL00-15-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

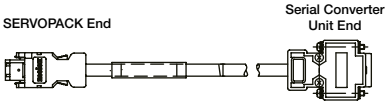
Connector:
17JE-23150-02 (D8C)
(15-pin, soldered)
by DDK Ltd.




Connector:
17JE-13150-02 (D8C)
(With stud)
(15-pin, soldered)
by DDK Ltd.

| Serial Converter Unit End | | Linear Scale End | |
|---|---|---|---|
| Pin No. | Signal | Pin No. | Signal |
| 1 | /Cos (V1-) | 1 | /Cos (V1-) |
| 2 | /Sin (V2-) | 2 | /Sin (V2-) |
| 3 | Ref (V0+) | 3 | Ref (V0+) |
| 4 | +5V | 4 | +5V |
| 5 | 5Vs | 5 | 5Vs |
| 6 | BID | 6 | BID |
| 7 | Vx | 7 | Vx |
| 8 | Vq | 8 | Vq |
| 9 | Cos (V1+) | 9 | Cos (V1+) |
| 10 | Sin (V2+) | 10 | Sin (V2+) |
| 11 | /Ref (V0+) | 11 | /Ref (V0-) |
| 12 | 0V | 12 | 0V |
| 13 | 0Vs | 13 | 0Vs |
| 14 | DIR | 14 | DIR |
| 15 | Inner | 15 | Inner |
| Case | Shield | Case | Shield |

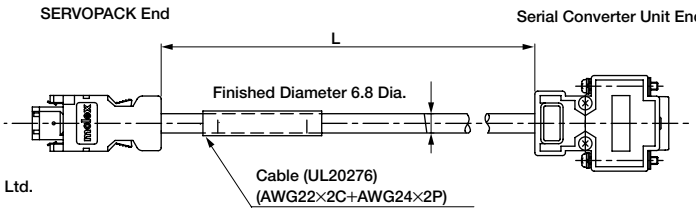
# Cables for connecting Serial Converter Units SGLT

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLP70-01-E-G# |  |
| | 3 m | JZSP-CLP70-03-E-G# | |
| | 5 m | JZSP-CLP70-05-E-G# | |
| | 10 m | JZSP-CLP70-10-E-G# | |
| | 15 m | JZSP-CLP70-15-E-G# | |
| | 20 m | JZSP-CLP70-20-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

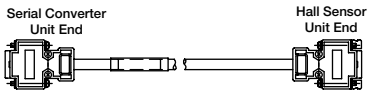
Connector:
55100-0670
(6-pin, soldered)
by Molex Japan Co., Ltd.




Connector:
17JE-23090-02 (D8C)
(9-pin, soldered)
by DDK Ltd.

| SERVOPACK End | | | Serial Converter Unit End | | |
|---|---|---|---|---|---|
| Pin No. | Signal | Wire Color | Pin No. | Signal | Wire Color |
| 1 | PG5V | Red | 1 | +5V | Red |
| 2 | PG0V | Black | 5 | 0V | Black |
| 3 | - | - | 3 | - | - |
| 4 | - | - | 4 | - | - |
| 5 | PS | Light blue | 2 | Phase S output | Light blue |
| 6 | /PS | Light blue/white | 6 | Phase /S output | Light blue/white |
| Shell | Shield | - | Case | Shield | - |
| | | | 7 | - | - |
| | | | 8 | - | - |
| | | | 9 | - | - |

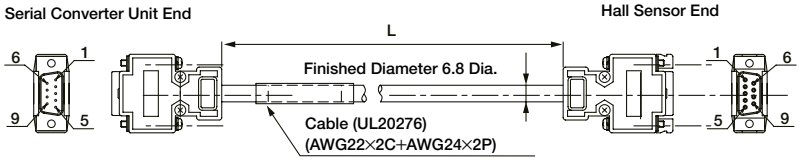
# Cables for connecting Hall Sensors SGLT

| Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLL10-01-E-G# |  |
| | 3 m | JZSP-CLL10-03-E-G# | |
| | 5 m | JZSP-CLL10-05-E-G# | |
| | 10 m | JZSP-CLL10-10-E-G# | |
| | 15 m | JZSP-CLL10-15-E-G# | |



Note: When using serial converter unit JZDP-G00□-□□□-E, the maximum cable length is 3 m.
The digit "#" of the order number represents the design revision.

Connector:
17JE-23090-02 (D8C)
(9-pin, soldered)
by DDK Ltd.




Connector:
17JE-13090-02 (D8C)
(With stud)
(9-pin, soldered)
by DDK Ltd.

Serial Converter Unit End

| Pin No. | Signal |
|---|---|
| 1 | +5V |
| 2 | Phase U input |
| 3 | Phase V input |
| 4 | Phase W input |
| 5 | 0V |
| 6 | - |
| 7 | - |
| 8 | - |
| 9 | - |
| Case | Shield |

Hall Sensor End

| Pin No. | Signal |
|---|---|
| 1 | +5V |
| 2 | Phase U input |
| 3 | Phase V input |
| 4 | Phase W input |
| 5 | 0V |
| 6 | - |
| 7 | - |
| 8 | - |
| 9 | - |
| Case | Shield |

# Recommended Linear Encoders & Cables



## Recommended Linear Encoders

### Incremental Linear Encoders

#### 1 Vp-p Analog Voltage

You must also use a YASKAWA Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.

| Manufacturer | Linear Encoder Type | Model | | | Linear Encoder Pitch [µm] | Resolution [nm] | Maximum Speed*1 [m/s] | Support for Polarity Sensor Input | Application to Linear Servomotors | Application to Fully-Closed Loop Control |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Scale | Sensor Heard | Relay Device between SERVOPACK and Linear Encoder*3 | | | | | | |
| Heidenhain Corporation | Exposed | LIDA48□ | | JZDP-H003/-H006 | 20 | 78.1 | 5 | ✓ | ✓ | ✓ |
| | | | | JZDP-J003/-J006 | | 4.9 | 2 | ✓ | ✓ | *4 |
| | | LIFA48□ | | JZDP-H003/-H006 | 4 | 45.6 | 1 | ✓ | ✓ | ✓ |
| | | | | JZDP-J003/-J006 | | 1 | 0.4 | ✓ | *4 | *4 |
| Renishaw plc*2 | | RGS20 | RGH22B | JZDP-H005/-H008 | 20 | 78.1 | 5 | ✓ | ✓ | ✓ |
| | | | | JZDP-J005/-J008 | | 4.9 | 2 | ✓ | ✓ | *4 |

✓: Applicable

*1. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a YASKAWA SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
*2. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected. If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
*3. These are the models of Serial Converter Units.
*4. Contact your YASKAWA representative.

Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Linear Encoder before you use it.

#### Encoder for YASKAWA Serial Interface

The multiplier (number of divisions) depends on the Linear Encoder. Also, you must write the Servomotor constant file to the Linear Encoder in advance.

| Manufacturer | Linear Encoder Type | Model | | | Linear Encoder Pitch [µm] | Resolution [nm] | Maximum Speed*1 [m/s] | Support for Polarity Sensor Input | Application to Linear Servomotors | Application to Fully-Closed Loop Control |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Scale | Sensor Heard | Relay Device between SERVOPACK and Linear Encoder | | | | | | |
| Magnescale Co., Ltd. | Exposed | SL7□0 | PL101 | PL101-RY*2 | 800 | 97.7 | 10 | – | ✓ | ✓ |
| | | | | MJ620-T13*3 | | | | ✓ | ✓ | *4 |
| | | SQ10 | PQ10 | MQ10-FLA | 400 | 48.83 | 3 | – | ✓ | ✓ |
| | | | | MQ10-GLA | | | | ✓ | ✓ | – |
| | Sealed | SR75-□□□□□LF | | – | 80 | 9.8 | 3.33 | – | ✓ | ✓ |
| | | SR75-□□□□□MF | | – | | 78.1 | | – | ✓ | ✓ |
| | | SR85-□□□□□LF | | – | | 9.8 | | – | ✓ | ✓ |
| | | SR85-□□□□□MF | | – | | 78.1 | | – | ✓ | ✓ |

✓: Applicable

*1. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a YASKAWA SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
*2. This is the model of the Sensor Head with Interpolator.
*3. This is the model of the Interpolator.
*4. Contact your YASKAWA representative.

Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Linear Encoder before you use it.

# Absolute Linear Encoders

## Encoder for YASKAWA Serial Interface

The multiplier (number of divisions) depends on the Linear Encoder. Also, you must write the Servomotor constant file to the Linear Encoder in advance.

| Manufacturer | Linear Encoder Type | Model | | | Linear Encoder Pitch*1 [µm] | Resolution [nm] | Maximum Speed*2 [m/s] | Support for Polarity Sensor Input | Application to Linear Servomotors | Application to Fully-Closed Loop Control |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Scale | Sensor Heard | Relay Device between SERVOPACK and Linear Encoder | | | | | | |
| Magnescale Co., Ltd. | Sealed | SR77-□□□□□LF | – | | 80 | 9.8 | 3.33 | – | ✓ | ✓ |
| | | SR77-□□□□□MF | – | | | 78.1 | | – | ✓ | ✓ |
| | | SR87-□□□□□LF | – | | | 9.8 | | – | ✓ | ✓ |
| | | SR87-□□□□□MF | – | | | 78.1 | | – | ✓ | ✓ |
| Mitutoyo Corporation | Exposed | ST781A | – | | 256 | 500 | 5 | – | ✓ | ✓ |
| | | ST782A | – | | | | | – | ✓ | ✓ |
| | | ST783A | – | | 51.2 | 100 | | – | ✓ | ✓ |
| | | ST784A | – | | | | | – | ✓ | ✓ |
| | | ST788A | – | | | | | – | ✓ | ✓ |
| | | ST789A*3 | – | | 25.6 | 50 | | – | ✓ | ✓ |
| | | ST1381 | – | | 5.12 | 10 | 8 | – | ✓ | ✓ |
| | | ST1382 | – | | 0.512 | 1 | 3.6*4 | – | ✓ | ✓ |
| Heidenhain Corporation | Exposed | LIC4100 Series | EIB3391Y*5 | | 20.48 | 5 | 10 | – | ✓ | ✓ |
| | Sealed | LC115 | | | 40.96 | 10 | 3 | – | ✓ | ✓ |
| Renishaw plc | Exposed | EL36Y-□□050F□□□ | – | | 12.8 | 50 | 100 | – | ✓ | ✓ |
| | | EL36Y-□□100F□□□ | – | | 25.6 | 100 | | – | ✓ | ✓ |
| | | EL36Y-□□500F□□□ | – | | 128 | 500 | | – | ✓ | ✓ |

✓: Applicable

*1. These are reference values for setting SERVOPACK parameters. Contact the manufacturer for actual linear encoder scale pitches.
*2. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a YASKAWA SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
*3. Contact Mitutoyo Corporation for details on the Linear Encoders.
*4. The speed is restricted for some SERVOPACKs.
*5. This is the model of the Interpolator.

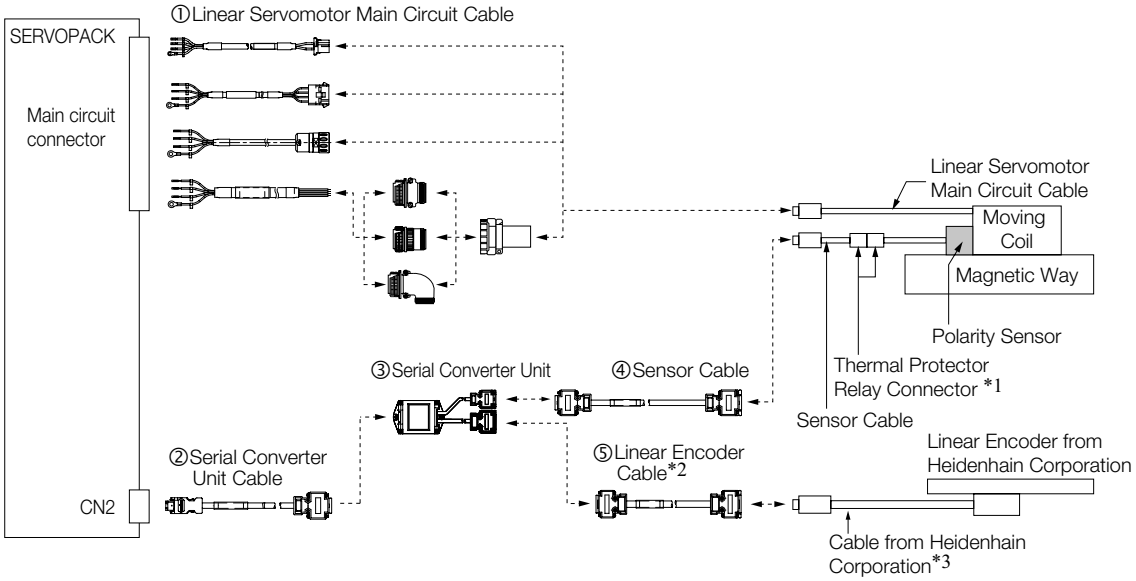
Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Linear Encoder before you use it.

# Connections to Linear Encoder from Heidenhain Corporation

## Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a YASKAWA Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.

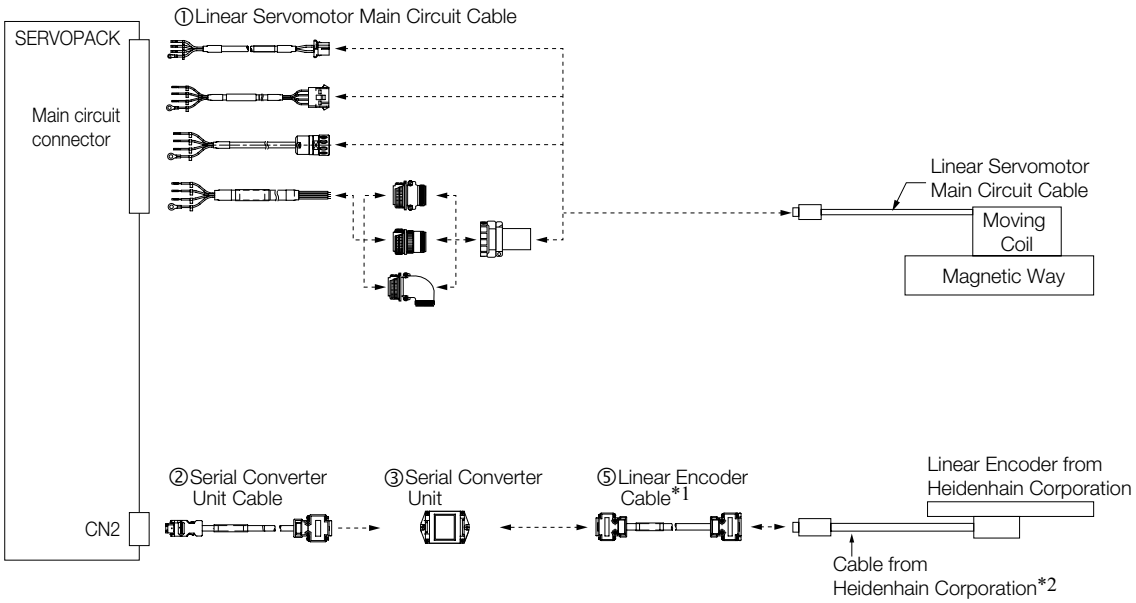
### Connecting to a Linear Servomotor with a Polarity Sensor




*1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a YASKAWA Linear Encoder Cable that is longer than 3 m.
*3. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

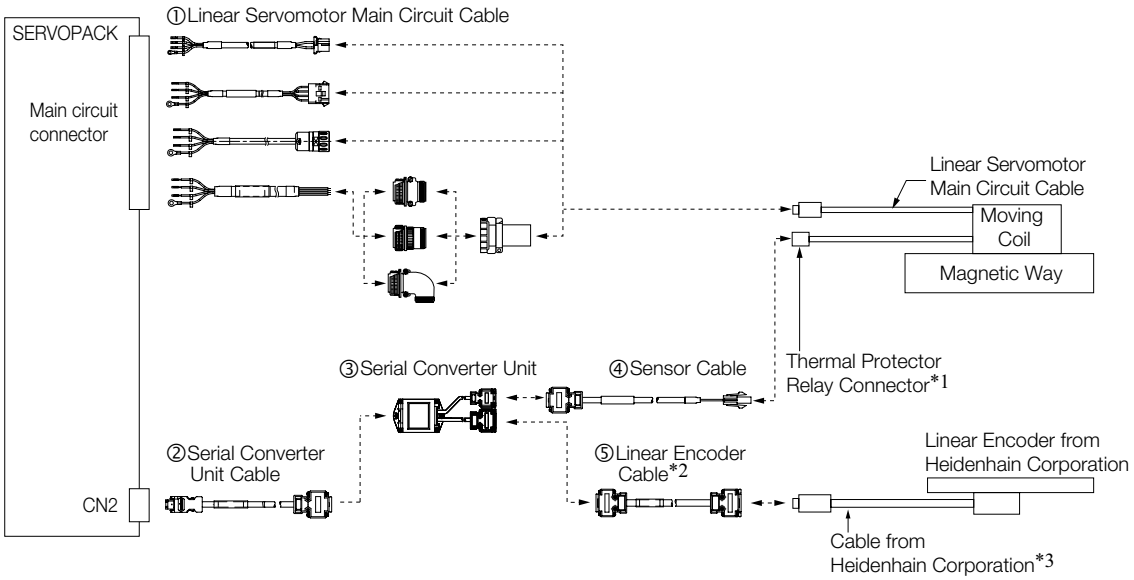
## Connecting to a Linear Servomotor without a Polarity Sensor

### Servomotors other than the SGLFW2




*1. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a YASKAWA Linear Encoder Cable that is longer than 3 m.
*2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

### SGLFW2 Servomotors

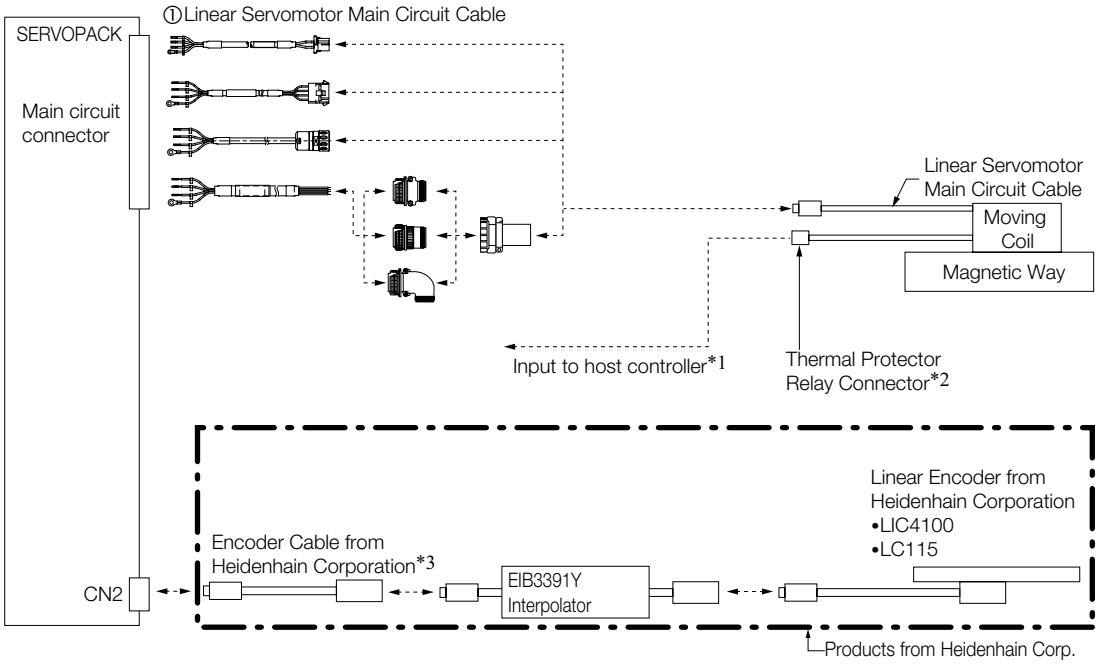



| No. | Cable Type |
|---|---|
| ① | Linear Servomotor Main Circuit Cable |
| ② | Serial Converter Unit Cable |
| ③ | Serial Converter Unit |
| ④ | Sensor Cable |
| ⑤ | Linear Encoder Cable |

## LIC4100 and LC115 Linear Encoder with EIB3391Y Interpolator

Important

1. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.




*1. Cables to connect to the host controller are not provided by YASKAWA. Refer to the following manual for information on connector models.
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*3. Use an Encoder Cable from Renishaw plc. Contact Renishaw plc for detailed Encoder Cable specifications.

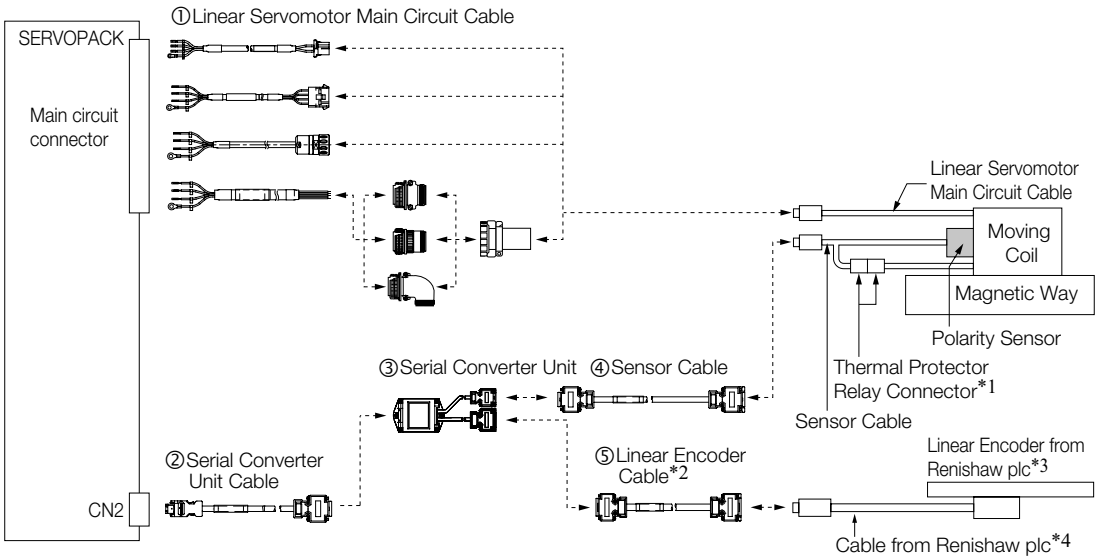
| No. | Cable Type |
|---|---|
| ① | Linear Servomotor Main Circuit Cable |

# Connections to Linear Encoder from Renishaw plc

## Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a YASKAWA Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.

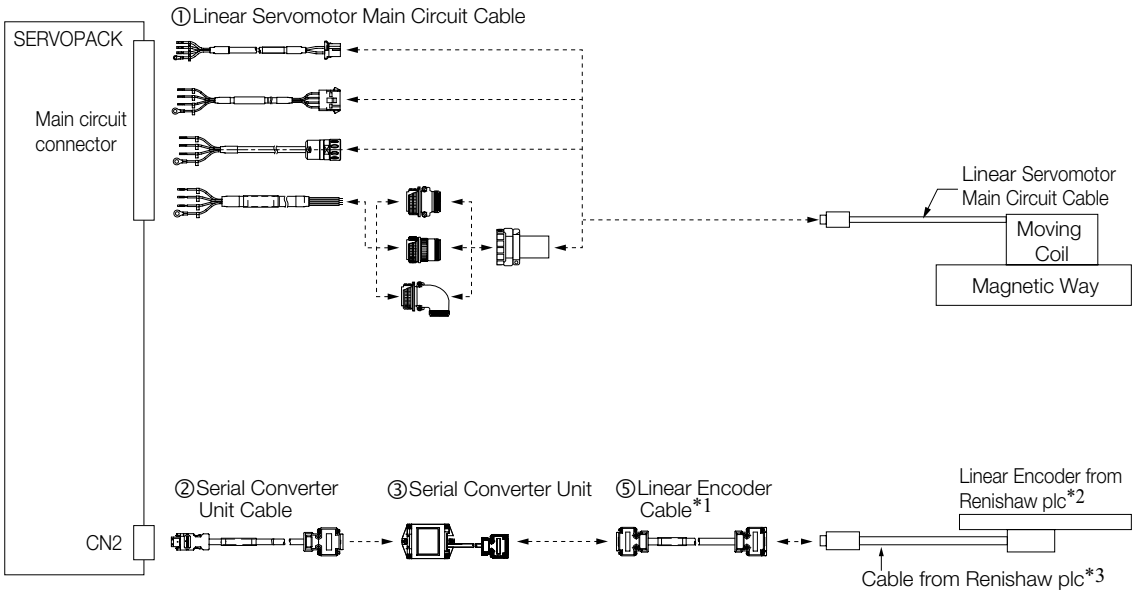
### Connecting to a Linear Servomotor with a Polarity Sensor




*1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a YASKAWA Linear Encoder Cable that is longer than 3 m.
*3. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected.
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
*4. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.

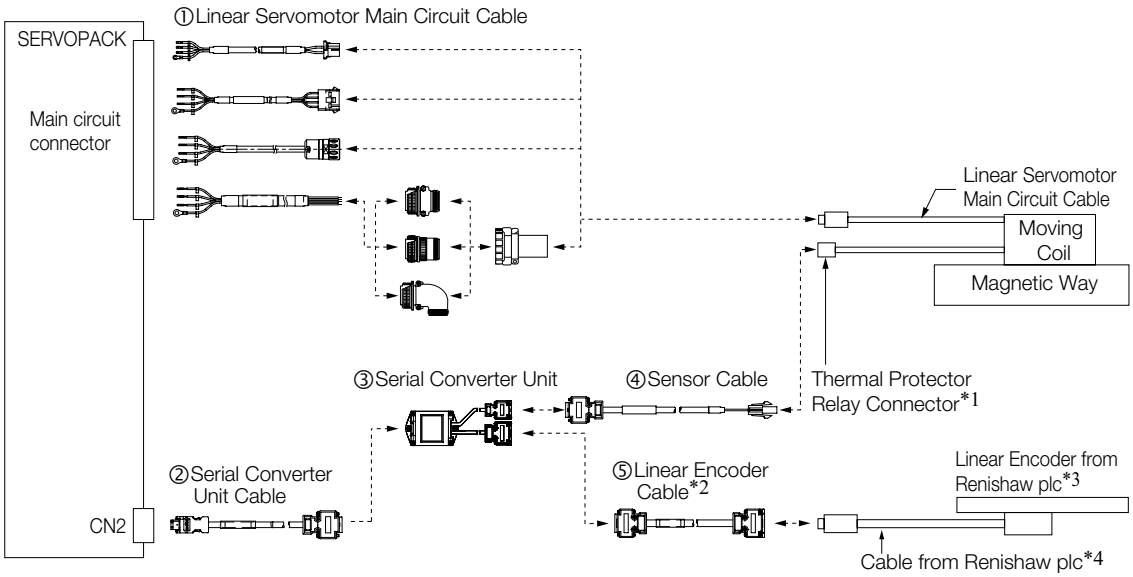
## Connecting to a Linear Servomotor without a Polarity Sensor

### Servomotors other than the SGLFW2




*1. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a YASKAWA Linear Encoder Cable that is longer than 3 m.
*2. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected.
If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
*3. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.

### SGLFW2 Servomotors



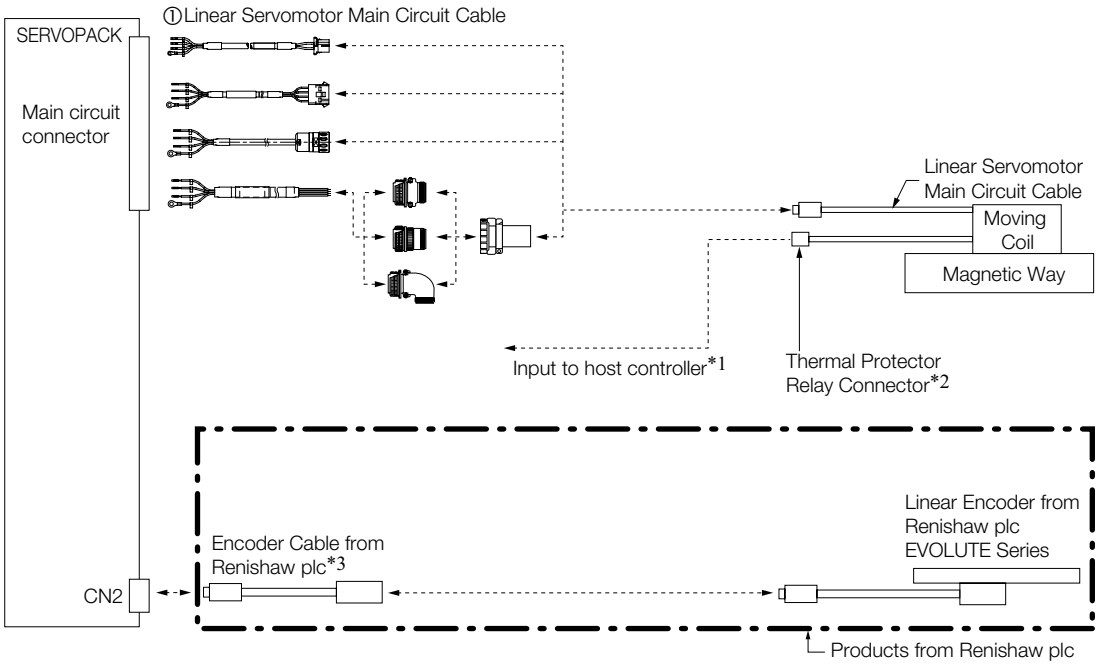

*1. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*2. When using a JZDP-J00□-□□□ Serial Converter Unit, do not use a YASKAWA Linear Encoder Cable that is longer than 3 m.
*3. If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected. If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
*4. Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc. However, the BID and DIR signals are not connected.

| No. | Cable Type |
|---|---|
| ① | Linear Servomotor Main Circuit Cable |
| ② | Serial Converter Unit Cable |
| ③ | Serial Converter Unit |
| ④ | Sensor Cable |
| ⑤ | Linear Encoder Cable |

## EVOLUTE Series Linear Encoder (model: EL36Y-□□□□□□□□□)

Important

1. You cannot use an EVOLUTE Series Linear Encoder together with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.




*1. Cables to connect to the host controller are not provided by YASKAWA. Refer to the following manual for information on connector models.
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*3. Use an Encoder Cable from Renishaw plc. Contact Renishaw plc for detailed Encoder Cable specifications.

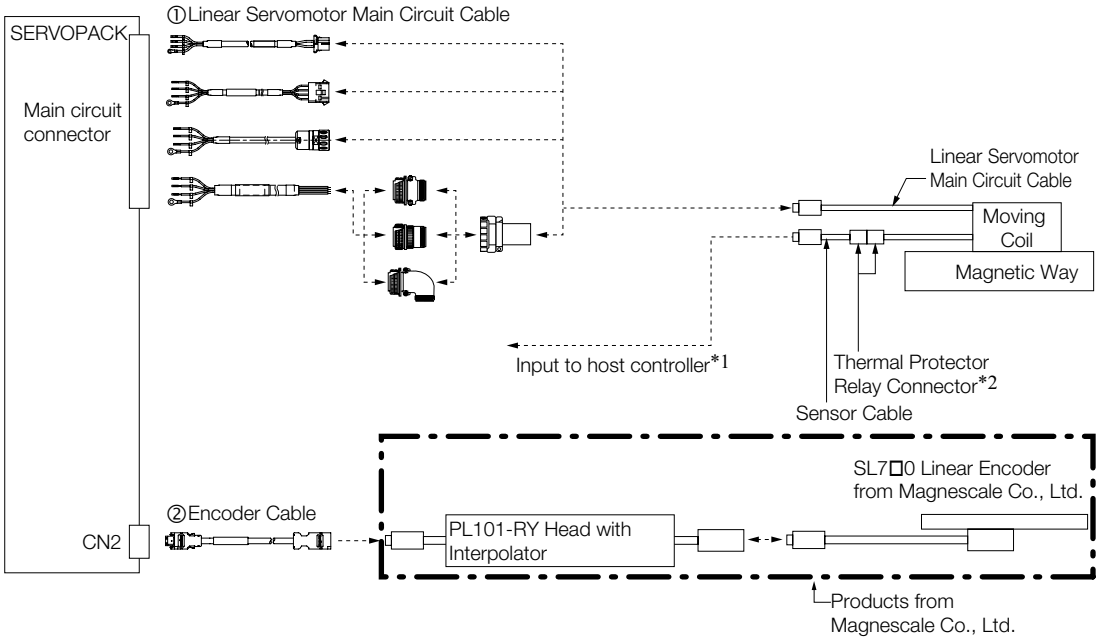
| No. | Cable Type |
|---|---|
| ① | Linear Servomotor Main Circuit Cable |

# Connections to Linear Encoder from Magnescale Co., Ltd.

## SL7□0 Linear Encoder and PL101-RY Sensor Head with Interpolator

**Important**

1. You cannot use a PL101-RY Sensor Head with an Interpolator together with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.




*1. Cables to connect to the host controller are not provided by YASKAWA. Refer to the following manual for information on connector models.
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

| No. | Cable Type |
|---|---|
| ① | Linear Servomotor Main Circuit Cable |
| ② | Encoder Cable |

### Encoder Cable

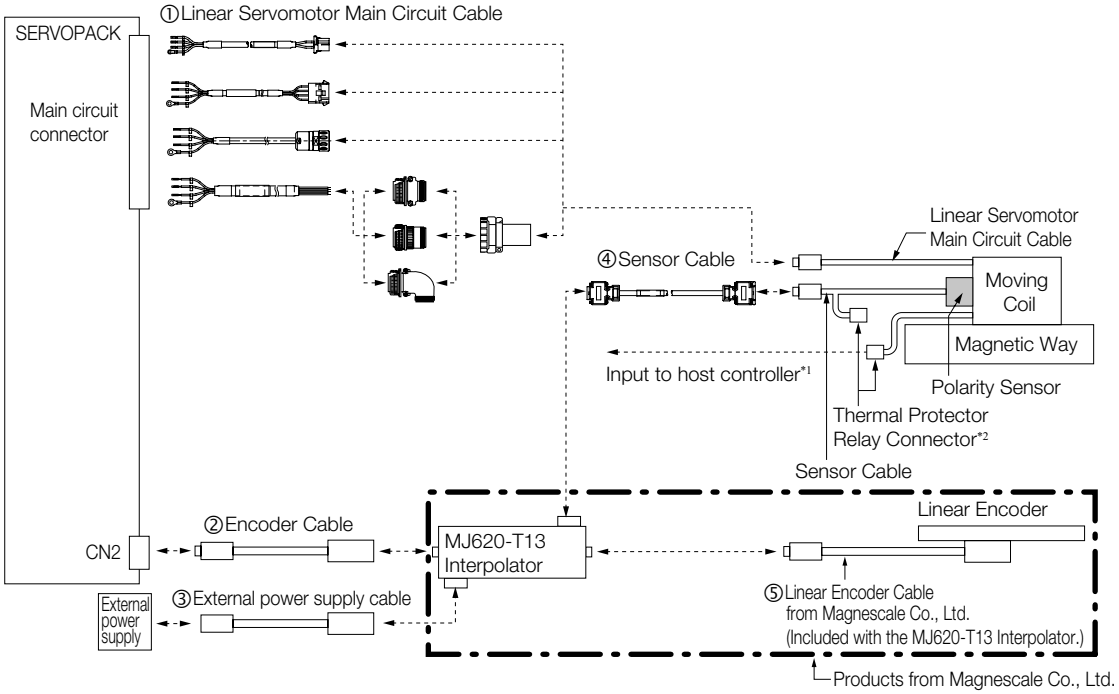
| Description | Length | Order Number | | Appearance |
|---|---|---|---|---|
| | | Standard Cable | Flexible Cable* | |
| Cable with Connectors on Both Ends | 3m | JZSP-CMP00-03-E | JZSP-CMP10-03-E | SERVOPACK end / Encoder end / L |
| | 5m | JZSP-CMP00-05-E | JZSP-CMP10-05-E | |
| | 10m | JZSP-CMP00-10-E | JZSP-CMP10-10-E | |
| | 15m | JZSP-CMP00-15-E | JZSP-CMP10-15-E | |
| | 20m | JZSP-CMP00-20-E | JZSP-CMP10-20-E | |

* Use Flexible Cables for moving parts of machines, such as robots. The recommended bending radius (R) is 68 mm or larger.

## SL7□0 Linear Encoder, PL101 Sensor Head, and MJ620-T13 Interpolator

Important

1. A 5-VDC power supply is required for the MJ620-T13. (The 5-VDC power supply is not provided by YASKAWA.)
2. Refer to the MJ620-T13 specifications from Magnescale Co., Ltd. for the current consumption of the MJ620-T13.
3. If you use an SGLFW2 Servomotor, remove the thermal protector relay connector and input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.




*1. Cables to connect to the host controller are not provided by YASKAWA. Refer to the following manual for information on connector models.
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

| No. | Cable Type | |
|---|---|---|
| ① | Linear Servomotor Main Circuit Cable | These cables are not provided by YASKAWA. |
| ② | Encoder Cable | |
| ③ | External Power Supply Cable | |
| ④ | Sensor Cable | |
| ⑤ | Linear Encoder Cable | Use the cables that come with the MJ620-T13 Interpolator. For details, refer to the specifications for the MJ620-T13 Interpolator. |

## Encoder Cables

These cables are not provided by YASKAWA. Use a shielded cable. Refer to the following tables for the pin layouts.

### SERVOPACK End of Cable (CN2)

- Plug Connector: 55100-0670 (Molex Japan LLC)
- Connector order number: JZSP-CMP9-1-E (SERVOPACK Connector Kit)

| Pin | Signal | Function |
|---|---|---|
| 1 | PG+5V | Encoder power supply +5 V |
| 2 | PG0V | Encoder power supply 0 V |
| 3 | – | – |
| 4 | – | – |
| 5 | PS | Serial data |
| 6 | /PS | |
| Shell | Shield | – |

### MJ620-T13 End of Cable

For details, refer to the specifications for the MJ620-T13 from Magnescale Co., Ltd..

- Receptacle: PCR-E20LMD+ (Honda Tsushin Kogyo Co., Ltd.)
- Plug: PCR-E20FS+ (Honda Tsushin Kogyo Co., Ltd.)
- Shell: PCS-E20L□ (Honda Tsushin Kogyo Co., Ltd.)

| Pin | Signal | Function | Pin | Signal | Function |
|---|---|---|---|---|---|
| 1 | Do not connect | – | 12 | 0V | 0V |
| 2 | Do not connect | – | 13 | Do not connect | – |
| 3 | Do not connect | – | 14 | 0V | 0V |
| 4 | Do not connect | – | 15 | Do not connect | – |
| 5 | SD | Serial data | 16 | 0V | 0V |
| 6 | /SD | | 17 | Do not connect | – |
| 7 | Do not connect | – | 18 | Do not connect | – |
| 8 | Do not connect | – | 19 | Do not connect | – |
| 9 | Do not connect | – | 20 | Do not connect | – |
| 10 | Do not connect | – | Shell | Shield | – |
| 11 | Do not connect | – | | | |

### Cables without Connectors

| Description | Length (L) | Order Number | |
|---|---|---|---|
| | | Standard Cable | Flexible Cable |
| Cables without Connectors | 5m | JZSP-CMP09-05-E | JZSP-CSP39-05-E |
| | 10m | JZSP-CMP09-10-E | JZSP-CSP39-10-E |
| | 15m | JZSP-CMP09-15-E | JZSP-CSP39-15-E |
| | 20m | JZSP-CMP09-20-E | JZSP-CSP39-20-E |

Note: We rercommend that you use flexible cables.

## External Power Supply Cables

This cable is not provided by YASKAWA. Refer to the table below for the pin layout.
For details, refer to the specifications for the MJ620-T13 from Magnescale Co., Ltd..

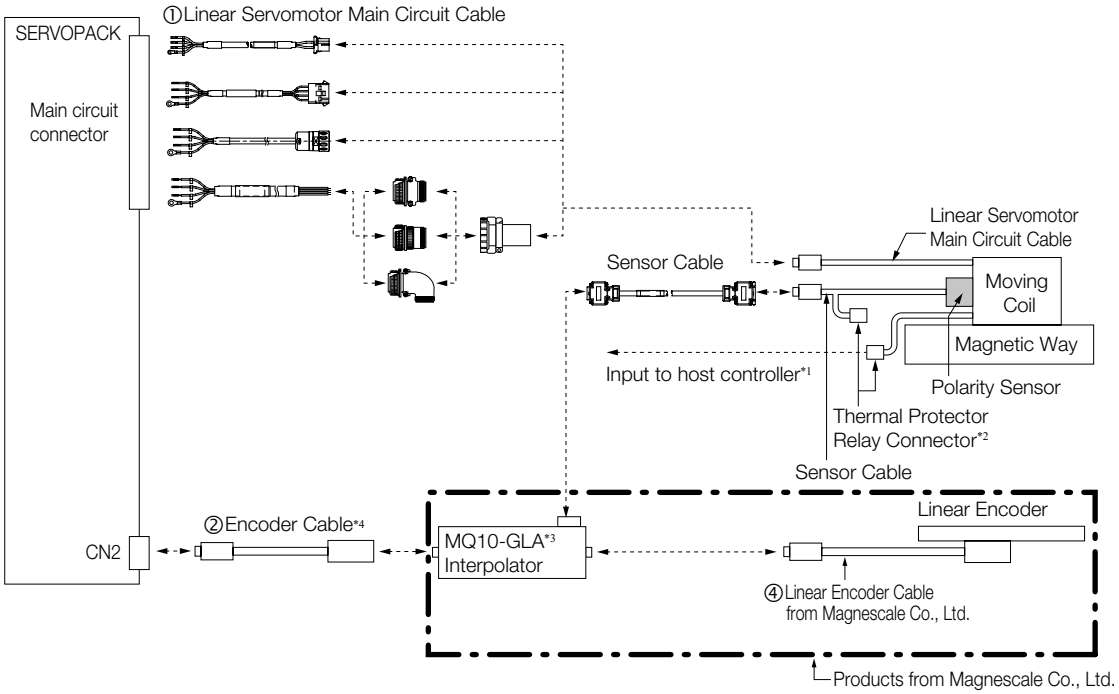
- Connector Header: MC1.5/2-GF-3.81 (Phoenix Contact)
- Connector Plug: MC1.5/2-STF-3.81 (Phoenix Contact)

| Pin | Signal | Function |
|---|---|---|
| 1 | +5V | +5 V |
| 2 | 0V | 0 V |

## SmartSCALE Linear Encoder (SQ10 Scale + MQ10-□LA Interpolator)

Important

If you use an SGLFW2 Servomotor, remove the thermal protector relay connector and input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.




*1. Cables to connect to the host controller are not provided by YASKAWA. Refer to the following manual for information on connector models.
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*3. This cable configurations shown above is the connection when you use the MQ10-GLA interpolator with polarity sensor.
*4. The maximum length of the Serial Converter Unit Cable is 15 m.

| No. | Cable Type | |
|---|---|---|
| ① | Linear Servomotor Main Circuit Cable | |
| ② | Encoder Cable | |
| ③ | Sensor Cable | |
| ④ | Linear Encoder Cable | Use the cables that come with the MQ10-□LA Interpolator. For details, refer to the specifications for the MQ10-□LA Interpolator. |

## Encoder Cables

These cables are not provided by YASKAWA. Use a shielded cable. Refer to the following tables for the pin layouts.

### SERVOPACK End of Cable (CN2)

- Plug Connector: 55100-0670 (Molex Japan LLC)
- Connector order number: JZSP-CMP9-1-E (SERVOPACK Connector Kit)

| Pin | Signal | Function |
|---|---|---|
| 1 | PG+5V | Encoder power supply +5 V |
| 2 | PG0V | Encoder power supply 0 V |
| 3 | – | – |
| 4 | – | – |
| 5 | PS | Serial data |
| 6 | /PS | |
| Shell | Shield | – |

### MQ10-□LA End of Cable

For details, refer to the specifications for the MQ10-□LA from Magnescale Co., Ltd.

### Cables without Connectors

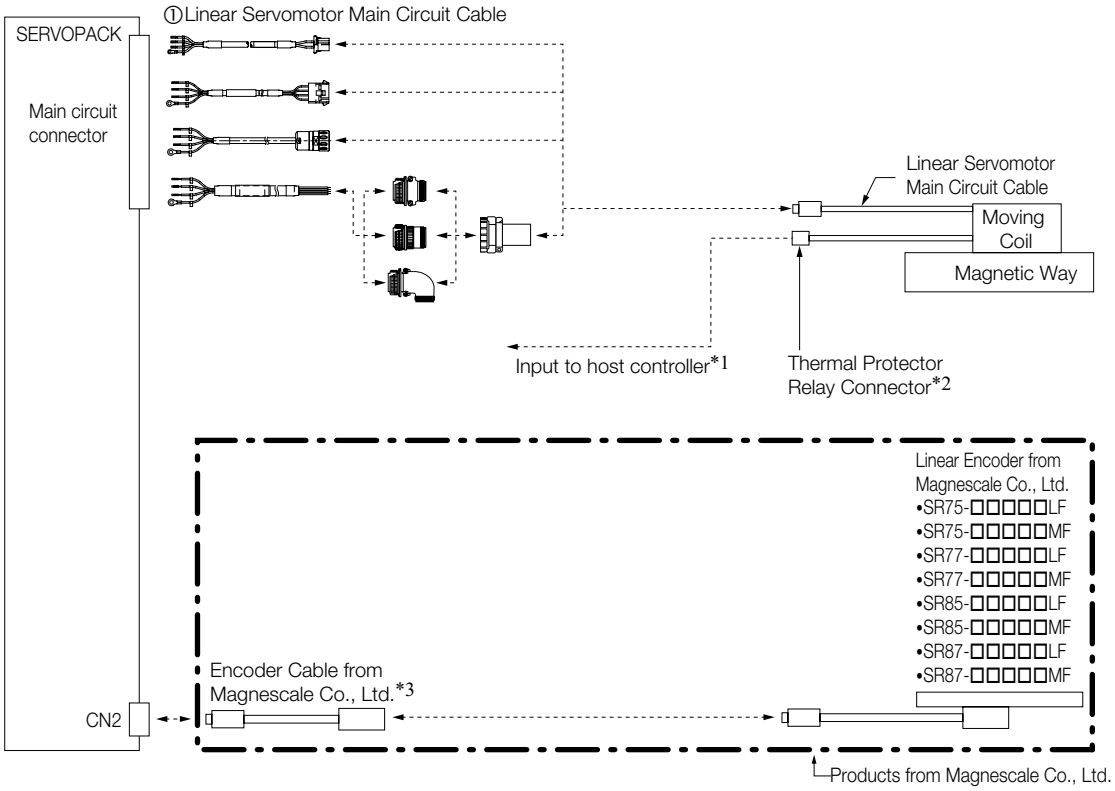
| Description | Length (L) | Order Number | |
|---|---|---|---|
| | | Standard Cable | Flexible Cable |
| Cables without Connectors | 5m | JZSP-CMP09-05-E | JZSP-CSP39-05-E |
| | 10m | JZSP-CMP09-10-E | JZSP-CSP39-10-E |
| | 15m | JZSP-CMP09-15-E | JZSP-CSP39-15-E |

Note: We rercommend that you use flexible cables.

## SR-75, SR-77, SR-85, and SR-87 Linear Encoders

Important

1. You cannot use an SR-75, SR-77, SR-85, or SR-87 Linear Encoder with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.




*1. Cables to connect to the host controller are not provided by YASKAWA. Refer to the following manual for information on connector models.
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.
*3. To connect the SERVOPACK and Linear Encoder, use a CH33-xx□□G Cable from Magnescale Co., Ltd. (This cable has connectors designed for use with YASKAWA products.)

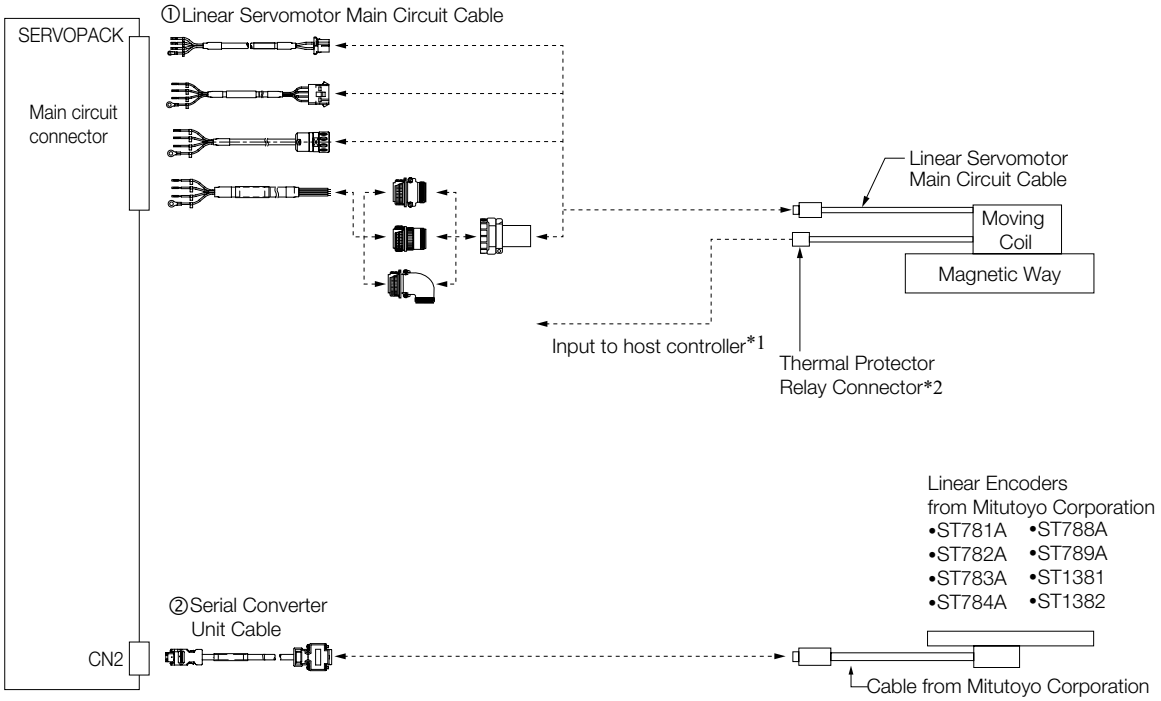
| No. | Cable Type |
|---|---|
| ① | Linear Servomotor Main Circuit Cable |

# Connections to Linear Encoders from Mitutoyo Corporation

## ST78□A/ST13□□ Linear Encoders

Important

1. You cannot use a ST78□A Linear Encoder together with a Linear Servomotor with a Polarity Sensor.
2. If you use an SGLFW2 Servomotor, input the thermal protector signal from the Linear Servomotor to the host controller. The thermal protector signal is closed when the temperature is normal and open when the thermal protector is activated. Do not exceed 3 A or 30 V.




*1. Cables to connect to the host controller are not provided by YASKAWA. Refer to the following manual for information on connector models.
Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
*2. Only SGLFW2 Servomotors come equipped with Thermal Protector Relay Connectors.

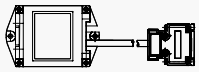
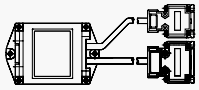
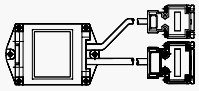
| No. | Cable Type |
|---|---|
| ① | Linear Servomotor Main Circuit Cable |
| ② | Serial Converter Unit Cable |

# Serial Converter Units

## Order Number

JZDP - □00□ - □□□

**Serial Converter Unit Model**

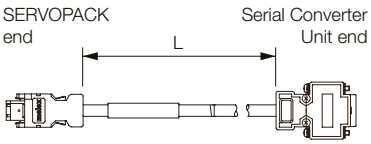
| Code | Appearance | Applicable Linear Encoder | Polarity Sensor | Thermal Protector |
|---|---|---|---|---|
| H003<br>J003 | | From Heidenhain Corp. | None | None |
| H005<br>J005 |  | From Renishaw PLC | None | None |
| H006<br>J006 |  | From Heidenhain Corp. | Yes*3 | Yes |
| H008<br>J008 |  | From Renishaw PLC | Yes*3 | Yes |

**Applicable Linear Servomotor**

| Servomotor Model | | Code | Servomotor Model | | Code |
|---|---|---|---|---|---|
| SGLGW - (coreless models) for standard-force magnetic way | 30A050C | 250 | SGLFW2- (models with F-type iron cores) | 30A070A | 628 |
| | 30A080C | 251 | | 30A120A | 629 |
| | 40A140C | 252 | | 30A230A | 630 |
| | 40A253C | 253 | | 45A200A | 631 |
| | 40A365C | 254 | | 45A380A | 632 |
| | 60A140C | 258 | | 90A200A | 633 |
| | 60A253C | 259 | | 90A380A | 634 |
| | 60A365C | 260 | | 90A560A | 648 |
| | 90A200C | 264 | | 1DA380A | 649 |
| | 90A370C | 265 | | 1DA560A | 650 |
| | 90A535C | 266 | SGLTW- (models with Ttype iron cores) | 20A170A | 011 |
| SGLGW - + SGLGM - □-M (coreless models) For Highforce Magnetic Way | 40A140C | 255 | | 20A320A | 012 |
| | 40A253C | 256 | | 20A460A | 013 |
| | 40A365C | 257 | | 35A170A | 014 |
| | 60A140C | 261 | | 35A320A | 015 |
| | 60A253C | 262 | | 35A460A | 016 |
| | 60A365C | 263 | | 35A170H | 105 |
| SGLFW- (models with F-type iron cores) | 20A090A | 017 | | 35A320H | 106 |
| | 20A120A | 018 | | 50A170H | 108 |
| | 35A120A | 019 | | 50A320H | 109 |
| | 35A230A | 020 | | 40A400B | 185 |
| | 50A200B | 181 | | 40A600B | 186 |
| | 50A380B | 182 | | 80A400B | 187 |
| | 1ZA200B | 183 | | 80A600B | 188 |
| | 1ZA380B | 184 | | | |

Note:
1. Refer to the following manual for detailed specifications of the Serial Converter Units.
   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)
2. Contact your YASKAWA representative for information on the water cooling specifications of the SGLFW2.
3. Hall sensor can be optionally disabled by a Servopack parameter.
4. Code H□□□ for 8 bit interpolation, Code J□□□ for 12 bit interplation.

# Serial Converter Unit Cables

| Linear Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| All Models | 1 m | JZSP-CLP70-01-E |  |
| | 3 m | JZSP-CLP70-03-E | |
| | 5 m | JZSP-CLP70-05-E | |
| | 10 m | JZSP-CLP70-10-E | |
| | 15 m | JZSP-CLP70-15-E | |
| | 20 m | JZSP-CLP70-20-E | |



## Servoamplifier Connector

Connector Kit : JZSP-CMP9-1-E-G1
Receptacle hosung: 55100-0670 (soldered)
From Molex Japan Co., Ltd.

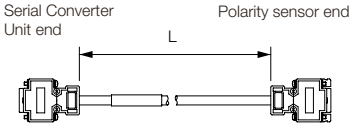
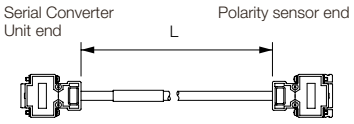
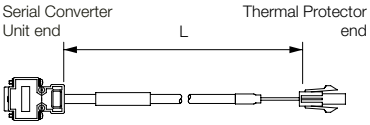
| Pin No. | Function | Wire Color |
|---|---|---|
| Shell | FG | Shield |
| 1 | PG 5V | White |
| 2 | PG 0V | Brown |
| 3 | – | Grey |
| 4 | – | Pink |
| 5 | PS | Green |
| 6 | /PS | Yellow |

## Serial Converter Connector

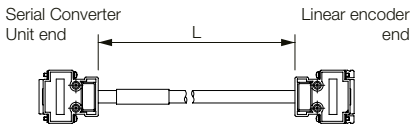
Connector Kit: 17JE-23090-02 (D8C)
From DDK Ltd.

| Pin No. | Function | Wire Color |
|---|---|---|
| Shell | FG | Shield |
| 1 | PG +˝5V | White |
| 2 | PS | Green |
| 3 | – | – |
| 4 | – | – |
| 5 | PG 0V | Brown |
| 6 | /PS | Yellow |
| 7 | – | – |
| 8 | – | – |
| 9 | – | – |

# Sensor Cables

| Linear Servomotor Model | Length | Order Number | Appearance |
|---|---|---|---|
| SGLGW-□□A<br>SGLFW-□□A<br>SGLTW-□□A | 1m | JZSP-CLL10-01-E |  |
| | 3m | JZSP-CLL10-03-E | |
| | 5m | JZSP-CLL10-05-E | |
| | 10m | JZSP-CLL10-10-E | |
| | 15m | JZSP-CLL10-15-E | |
| SGLFW2-□□A□□□AS□<br>(With Polarity Sensor) | 1m | JZSP-CL2L100-01-E |  |
| | 3m | JZSP-CL2L100-03-E | |
| | 5m | JZSP-CL2L100-05-E | |
| | 10m | JZSP-CL2L100-10-E | |
| | 15m | JZSP-CL2L100-15-E | |
| SGLFW2-□□A□□□AT□<br>(Without Polarity Sensor) | 1m | JZSP-CL2TH00-01-E |  |
| | 3m | JZSP-CL2TH00-03-E | |
| | 5m | JZSP-CL2TH00-04-E | |
| | 10m | JZSP-CL2TH00-10-E | |
| | 15m | JZSP-CL2TH00-15-E | |

# Linear Encoder Cables

| Description | Linear Servomotor Model | Length* | Order Number | Appearance |
|---|---|---|---|---|
| For linear encoder from Renishaw PLC | All Models | 1m | JZSP-CLL00-01-E |  |
| | | 3m | JZSP-CLL00-03-E | |
| | | 5m | JZSP-CLL00-05-E | |
| | | 10m | JZSP-CLL00-10-E | |
| | | 15m | JZSP-CLL00-15-E | |
| For linear encoder from Heidenhain Corporation | | 1m | JZSP-CLL30-01-E | |
| | | 3m | JZSP-CLL30-03-E | |
| | | 5m | JZSP-CLL30-05-E | |
| | | 10m | JZSP-CLL30-10-E | |
| | | 15m | JZSP-CLL30-15-E | |

* When using a JZDP-J00□-□□□-E Serial Converter Unit, do not exceed a cable length of 3m.

# SERVOPACKs


| | |
|---|---|
| Sigma-7S Analog Voltage/Pulse Train | 332 |
| Sigma-7S MECHATROLINK-II | 346 |
| Sigma-7S MECHATROLINK-III | 360 |
| Sigma-7S MECHATROLINK-III with RJ45 | 374 |
| Sigma-7S EtherCAT | 388 |
| Sigma-7S PROFINET | 403 |
| Sigma-7W MECHATROLINK-III | 415 |
| Sigma-7C with built-in controller | 426 |
| Sigma-7S Command Option Attachable Type | 442 |
| Sigma-7Siec (with integrated iec-Controller) | 463 |
| Connector Specifications and Dimension Examples | 474 |

# Sigma-7S Analog Voltage/Pulse Train

## Model Designations

SGD7S - R70 A 00 A 001 000

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |
|---|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5*1 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120*2 | 1.5 kW |
| 180 | 2.0 kW |
| 200*3 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| 00 | Analog Voltage/ Pulse Train Reference |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 001 | Rack-mounted | SGD7S-R70A to -330A |
| | Duct-ventilated | SGD7S-470A to -780A |
| 002 | Varnished | All models |
| 008 | Single-phase, 200 V power input | SGD7S-120A |
| 020*6 | No dynamic brake | SGD7S-R70A to -2R8A |
| | External dynamic brake resistor | SGD7S-3R8A to -780A |
| 00A | Varnished and single-phase power input | All models |

**11th ... 13th digit - FT/EX Specifications**

| Code | Specifications |
|---|---|
| None | None |
| F50*8 | Application function for integrated MPiec |
| F82*7 | Application function option for special motors, SGM7D motor drive |
| F83*7 | Application function option for special motors, SGM7D motor drive, indexing |

Note:

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

Note:
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 11.6 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 28 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 16 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4.0 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.1 | 12.1 | 23.7 | 39.2 | 71.8 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17.0 | 19.1 | 24.1 | 35.7 | 61.2 | 103.8 |
| Regenerative Resistor | Built-in Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

### Three-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84.0 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3.0 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1.0 | 1.3 | 1.6 | 2.3 | 3.2 | 4.0 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.0 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17.0 | 19.0 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

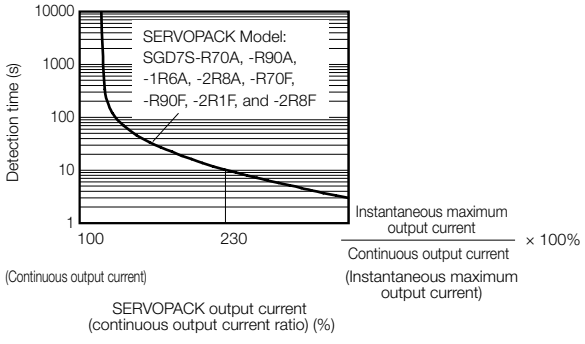
Note: Readily available up to 1.5 kW. Others available on request.

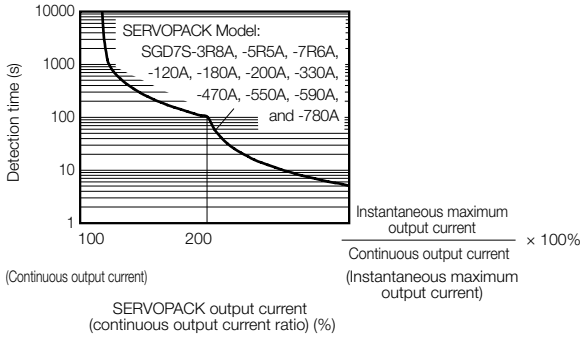
| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6.0 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78.0 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]*1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | Built-in Regenerative Resistor Power Loss [W] | | 180*2 | 180*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| External Regenerative Resistor Unit | External Regenerative Resistor Unit | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

Note: Readily available up to 1.5 kW. Others available on request.

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

# SERVOPACK Overload Protection Characteristics




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque (or effective force) within the continuous duty zone of the torque-motor speed characteristic (or force-motor speed characteristics) of the Servomotor.

# Specifications

| Item | | Specification | |
|---|---|---|---|
| Control Method | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Ambient Air Temperature*1 | -5°C to 55°C<br>With derating, usage is possible between 55°C and 60°C. Refer to the following section for Derating Specifications. | |
| | Storage Temperature | -20°C to 85°C | |
| | Ambient Air Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | 4.9 $m/s^2$ | |
| | Shock Resistance | 19.6 $m/s^2$ | |
| | Protection Class | Class | SERVOPACK Model: SGD7S- |
| | | IP20 | R70A, R90A,1R6A, 2R8A, 3R8A, 5R5A, 7R6A,120A |
| | | IP10 | 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude*1 | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m.<br>Refer to the following section for Derating specifications. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | UL 61800-5-1, EN 50178, CSA C22.2 No.14, EN 61800-5-1, EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, EN 61800-3, IEC 61508-1 to 4, IEC 61800-5-2, IEC 62061, ISO 13849-1, and IEC 61326-3-1 | |
| Mounting | | Mounting | SERVOPACK Model: SGD7S- |
| | | Base-mounted | All models |
| | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, R70F, R90F, 2R1F, 2R8F |
| | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | 1:5000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation*2 | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) | |
| | Torque Control Precision (Repeatability) | ±1% | |
| | Soft Start Time Setting | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |

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| Item | | | Specification |
|---|---|---|---|
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Fixed Input | Allowable voltage range: 5 VDC ±5%<br>Number of input points: 1<br>Absolute Data Request (SEN) |
| | | Input Signals That Can Be Allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals:<br>● /S-ON (Servo ON) signal<br>● /P-CON (Proportional Control) Signal<br>● P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>● /ALM-RST (Alarm Reset) signal<br>● /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>● /SPD-D (Motor Direction) signal<br>● /SPD-A and /SPD-B (Internal Set Speed Selection) signals<br>● /C-SEL (Control Selection) signal<br>● /ZCLAMP (Zero Clamping) signal<br>● /INHIBIT (Reference Pulse Inhibit) signal<br>● /G-SEL (Gain Selection) signal<br>● /P-DET (Polarity Detection) signal<br>● SEN (Absolute Data Request) signal<br>● /PSEL (Reference Pulse Input Multiplication Switch) Signal<br>● FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: Servo Alarm (ALM) |
| | | Output Signals That Can Be Allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 6<br>(A photocoupler output (isolated) is used for three of the outputs.)<br>(An open-collector output (non-isolated) is used for the other three outputs.)<br>Output Signals:<br>● /COIN (Positioning Completion) Signal<br>● /V-CMP (Speed Coincidence Detection) Signal<br>● /TGON (Rotation Detection) Signal<br>● /S-RDY (Servo Ready) signal<br>● /CLT (Torque Limit Detection) Signal<br>● /VLT (Speed Limit Detection) Signal<br>● /BK (Brake) signal<br>● /WARN (Warning) Signal<br>● /NEAR (Near) signal<br>● /PSELA (Reference Pulse Input Multiplication Switching Output) signal<br>● ALO1, ALO2, and ALO3 (Alarm Code) signals<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB2.0 standard (12 Mbps). |
| Displays/ Indicators | | | CHARGE indicator and five-digit seven-segment display |
| Panel Operator | | | Four push switches |
| Analog Monitor (CN5) | | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to Built-In Regenerative Resistor. |
| Overtravel (OT) Prevention | | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | | ISO13849-1 PLe (Category 3) and IEC61508 SIL3 |
| Option Module | | | Fully-Closed Modules and Safety Modules.<br>Note: You cannot use a Fully-Closed Module and a Safety Module together. |

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| Item | | | | | Specification |
|---|---|---|---|---|---|
| Controls | Speed Control | Soft Start Time Setting | | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| | | Input Signal | Reference Voltage | | • Maximum input voltage: ±12 V (forward motor rotation for positive reference).<br>• 6 VDC at rated speed (default setting). Input gain setting can be changed. |
| | | | Input Impedance | | Approx. 14 kΩ |
| | | | Circuit Time Constant | | 30 μs |
| | | Internal Set Speed Control | Rotation Direction Selection | | With Proportional Control signal |
| | | | Speed Selection | | With Forward/Reverse External Torque Limit signals (speed 1 to 3 selection).<br>Servomotor stops or another control method is used when both signals are OFF. |
| | Position Control | Feedforward Compensation | | | 0% to 100% |
| | | Output Signal Positioning Completed Width Setting | | | 0 to 1,073,741,824 reference units |
| | | Input Signals | Reference pulses | Reference Pulse Form | One of the following is selected:<br>Sign + pulse train, CW + CCW pulse trains, and two-phase pulse trains with 90° phase differential |
| | | | | Input Form | Line driver or open collector |
| | | | | Maximum Input Frequency | • Line Driver<br>Sign + pulse train or CW + CCW pulse trains: 4 Mpps Two-phase pulse trains with 90° phase differential: 1 Mpps<br>• Open Collector<br>Sign + pulse train or CW + CCW pulse trains: 200 kpps Two-phase pulse trains with 90° phase differential: 200 kpps |
| | | | | Input Multiplication Switching | 1 to 100 times |
| | | | Clear Signal | | Position deviation clear<br>Line driver or open collector |
| | Torque Control | Input Signal | Reference Voltage | | • Maximum input voltage: ±12 V (forward torque output for positive reference)<br>• 3 VDC at rated torque (default setting). Input gain setting can be changed |
| | | | Input Impedance | | Approx. 14 kΩ |
| | | | Circuit Time Constant | | 16 μs |

1. If you combine a S-7-Series SERVOPACK with a S-V-Series Option Module, the following S-V-Series SERVOPACKs specifications must be used: a surrounding air temperature of 0°C to 55°C and an altitude of 1,000 m max. Also, the applicable range cannot be increased by derating.
2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

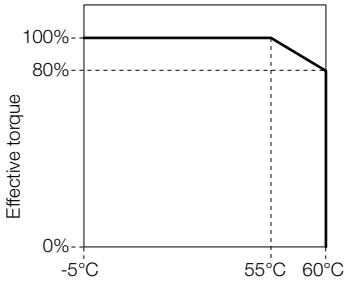
$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

3. Always perform risk assessment for the system and confirm that the safety requirements are met.

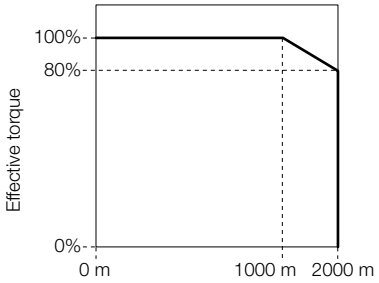
# Derating Specifications

If you use the SERVOPACK at a surrounding air temperature of 55°C to 60°C or at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graphs.

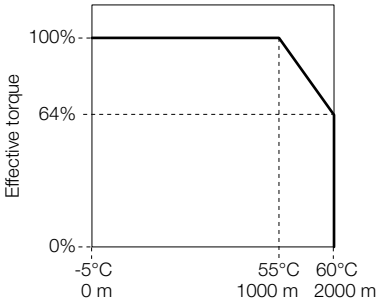
### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F




Surrounding air temperature

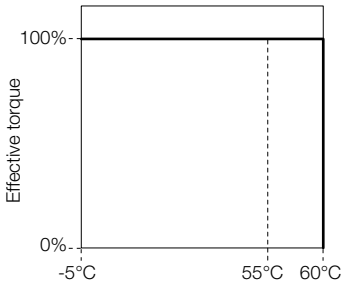



Altitude

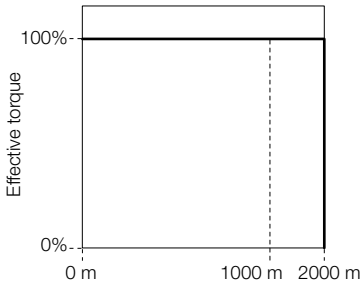



Surrounding air temperature and altitude

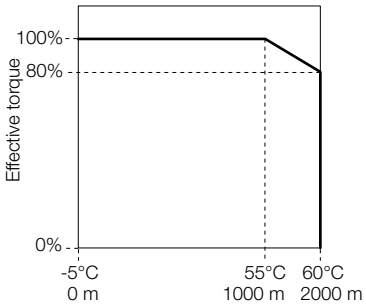
### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A




Surrounding air temperature



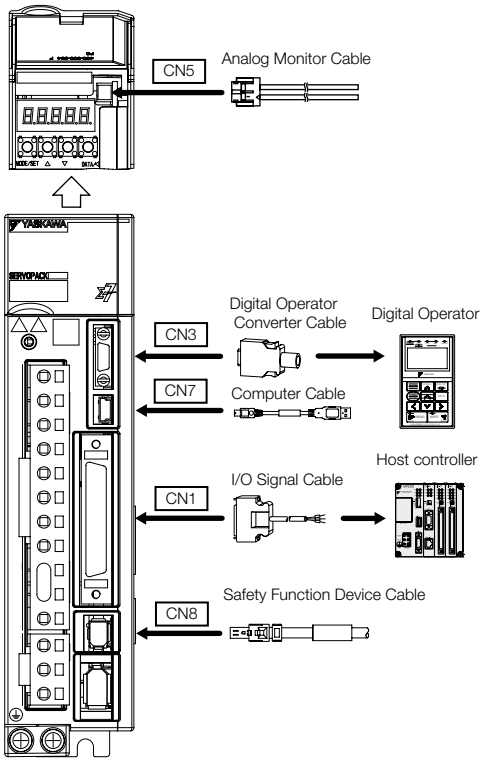

Altitude




Surrounding air temperature and altitude

# Selecting Cables SGD7S Analog Voltage/Pulse Train

## System Configurations



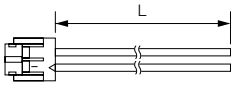
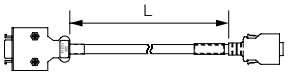
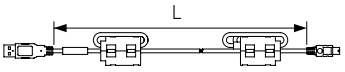
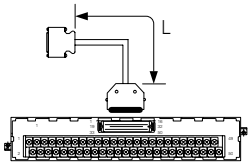
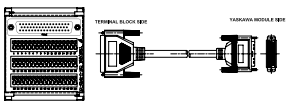
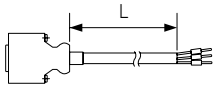
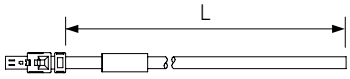
## Selection Table

Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN3 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-1-E | |
| | | Connector-Terminal Block Converter Unit (with cable & screw connectors) | 0.5 m | JUSP-TA50PG-E |  |
| | | | 1 m | JUSP-TA50PG-1-E | |
| | | | 2 m | JUSP-TA50PG-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable & screwless clamp connectors) | 0.5 m | CBK-U-MP2B-A5 | Terminal Block and 0.5 m Connection Cable  |
| | | | 1 m | CBK-U-MP2B-01 | |
| | | | 3 m | CBK-U-MP2B-03 | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI01-1-E |  |
| | | | 2 m | JZSP-CSI01-2-E | |
| | | | 3 m | JZSP-CSI01-3-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*2 | 1 m | JZSP-CVH03-01-E |  |
| | | | 3 m | JZSP-CVH03-03-E | |
| | | Connector Kit*3 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for Sigma-7-series SERVOPACKs.
*2. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*3. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

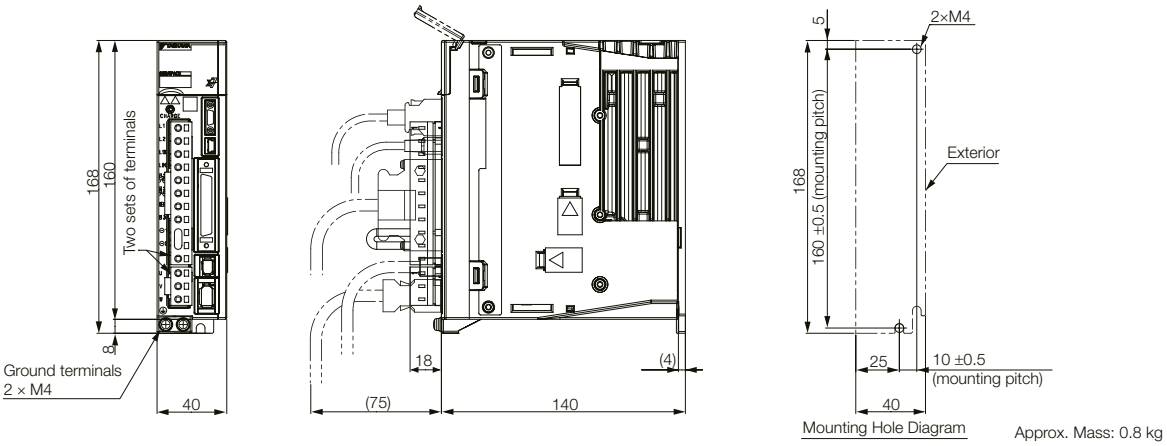
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm²) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

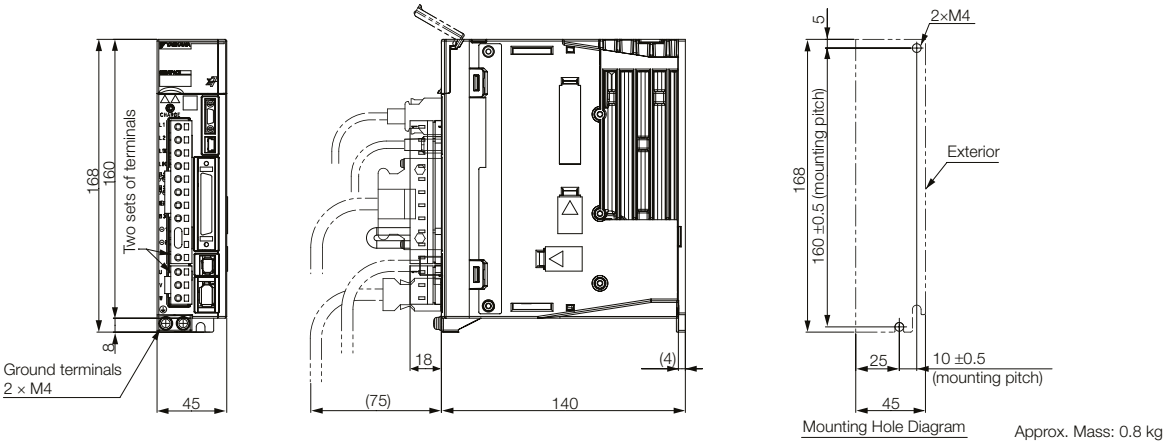
# SERVOPACK External Dimensions

### Three-phase & Single-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A



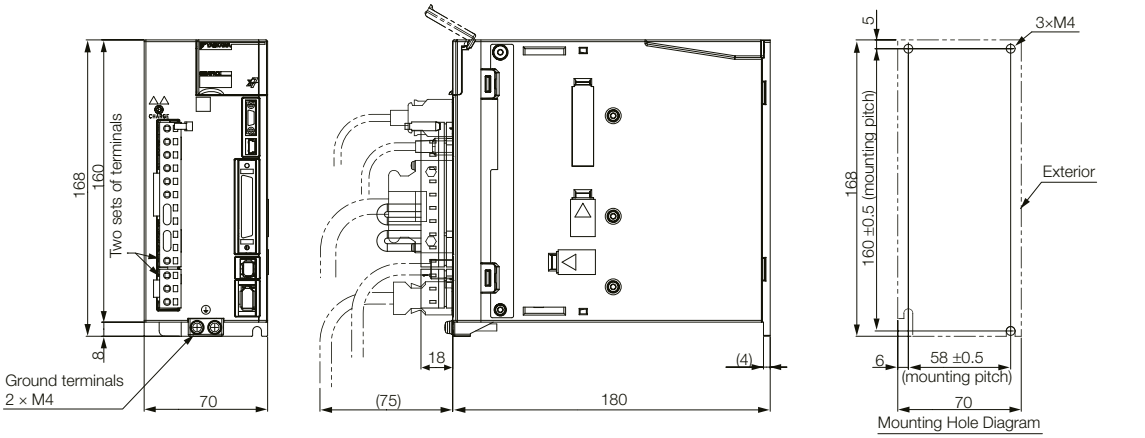

Approx. Mass: 0.8 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-2R8A



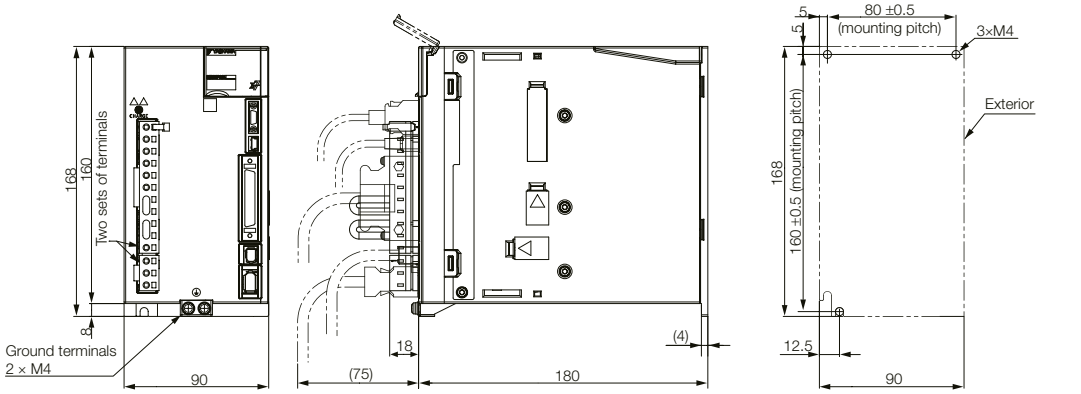

Approx. Mass: 0.8 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-3R8A, -5R5A, Three-phase 200 VAC: -7R6A




Approx. Mass: 1.6 kg

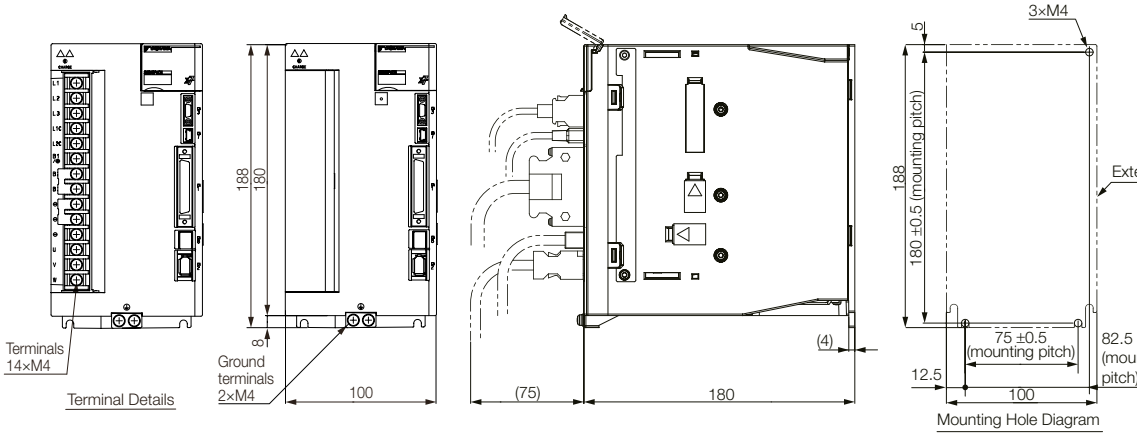
### Three-phase & Single-phase, 200 VAC: SGD7S-120A




Approx. Mass: 2.2 kg

Unit: mm

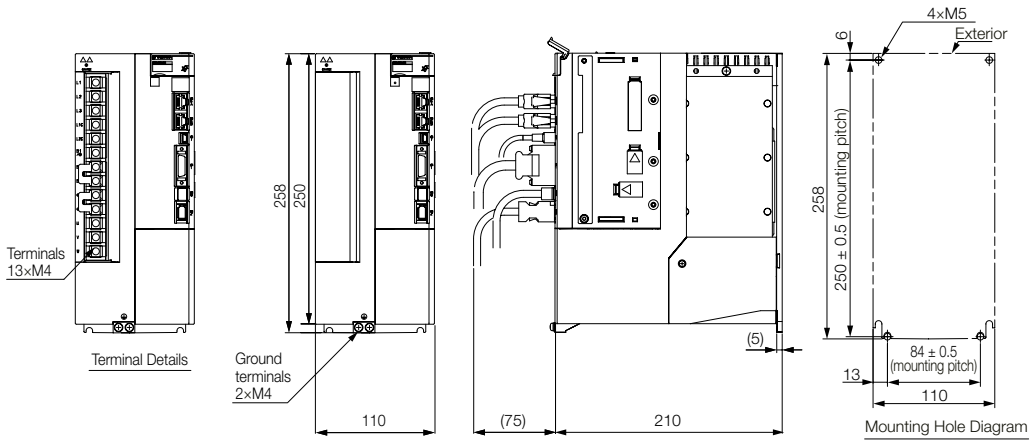
### Three-phase, 200 VAC: SGD7S-180A and -200A




Approx. Mass: 2.7

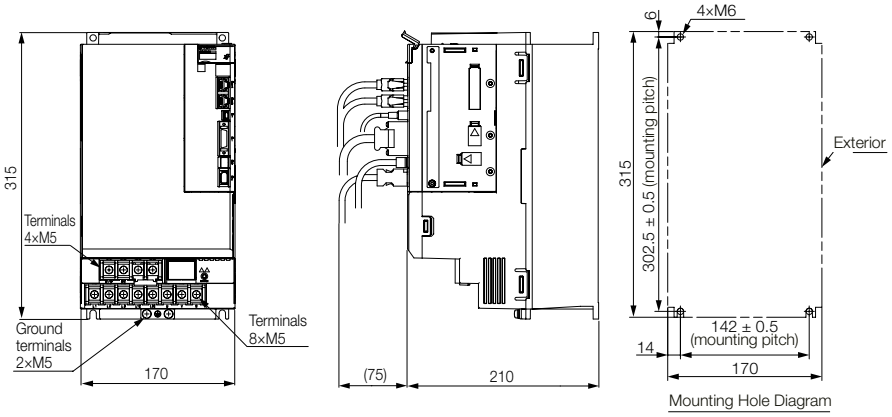
Unit: r

## Three-phase, 200 VAC: SGD7S-330A



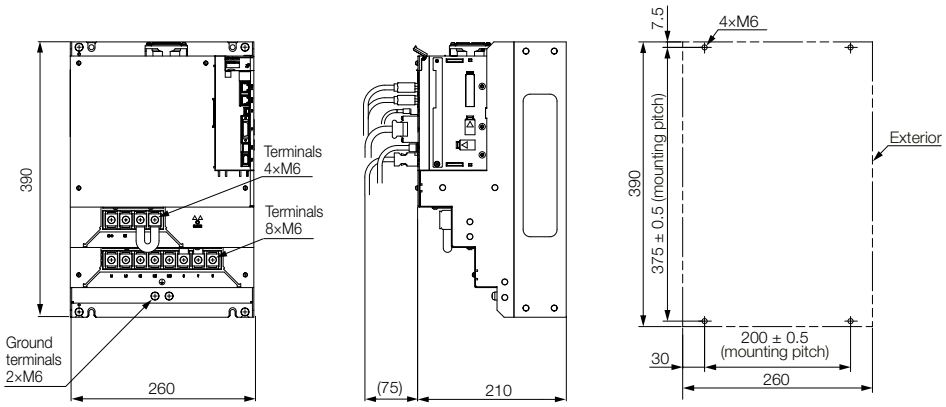

Approx. Mass: 4.4 kg

## Three-phase, 200 VAC: SGD7S-470A and -550A




Approx. Mass: 8.2 kg

## Three-phase, 200 VAC: SGD7S-590A and -780A




Approx. Mass: 15.5 kg
Unit: mm

# Model Designations

SGD7S - R70 A 10 A 001 000

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |
|---|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5*1 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120*2 | 1.5 kW |
| 180 | 2.0 kW |
| 200*3 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| 10 | MECHATROLINK-II communication Reference |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 001 | Rack-mounted | SGD7S-R70A to -330A |
| | Duct-ventilated | SGD7S-470A to -780A |
| 002 | Varnished | All models |
| 008 | Single-phase, 200 V power input | SGD7S-120A |
| 020*6 | No dynamic brake | SGD7S-R70A to -2R8A |
| | External dynamic brake resistor | SGD7S-3R8A to -780A |
| 00A | Varnished and single-phase power input | All models |

**11th ... 13th digit - FT/EX Specifications**

| Code | Specifications |
|---|---|
| None | None |
| F82*7 | Application function option for special motors, SGM7D motor drive |

Note:

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

Note:
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 11.6 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 28 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 16 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4.0 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.1 | 12.1 | 23.7 | 39.2 | 71.8 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | - | - | - | - | 8 | 16 |
| | Total Power Loss [W] | | 17.0 | 19.1 | 24.1 | 35.7 | 61.2 | 103.8 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | - | - | - | - | 40 | 12 |
| | | Capacity [W] | - | - | - | - | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.
Note: Readily available up to 1.5 kW. Others available on request.

### Three-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3.0 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1.0 | 1.3 | 1.6 | 2.3 | 3.2 | 4.0 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.0 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | | | | | | | | | | | |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

### Three-phase, 200 VAC continued

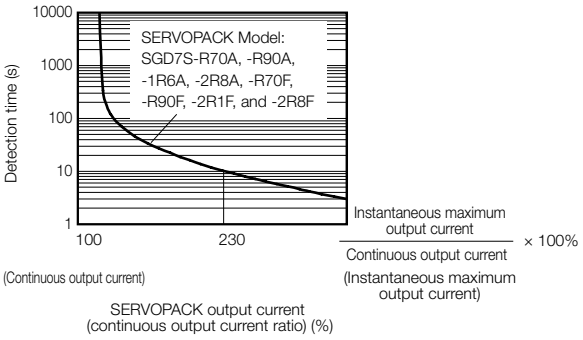
| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6.0 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78.0 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]*1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | Built-in Regenerative Resistor Power Loss [W] | | 180*2 | 180*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

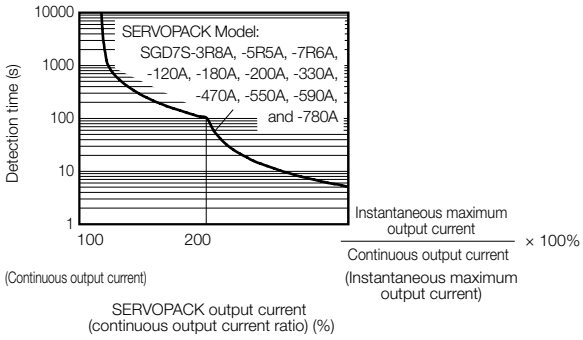
Note: Readily available up to 1.5 kW. Others available on request.

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

## SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C. An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

# Specifications

| Item | | | Specification |
|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Ambient Air Temperature*1 | | -5°C to 55°C<br>With derating, usage is possible between 55°C and 60°C. Refer to the following section for Derating Specifications. |
| | Storage Temperature | | -20°C to 85°C |
| | Ambient Air Humidity | | 95% relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95% relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 $m/s^2$ |
| | Shock Resistance | | 19.6 $m/s^2$ |
| | Protection Class | Class | SERVOPACK Model: SGD7S- |
| | | IP20 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A,<br>R70F, R90F, 2R1F, 2R8F |
| | | IP10 | 120A10A008, 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude*1 | | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m.<br>Refer to the following section for Derating specifications. |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | UL 61800-5-1, EN 50178, CSA C22.2 No.14, EN 61800-5-1, EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, EN 61800-3, IEC 61508-1 to 4, IEC 61800-5-2, IEC 62061, ISO 13849-1, and IEC 61326-3-1 |
| Mounting | | Mounting | SERVOPACK Model: SGD7S- |
| | | Base-mounted | All models |
| | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, R70F, R90F, 2R1F, 2R8F |
| | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*2 | | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) |
| | | | 0% of rated speed max. (for a voltage fluctuation of ±10%) |
| | | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) |
| | Torque Control Precision (Repeatability) | | ±1% |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |

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| Item | | | Specification |
|---|---|---|---|
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. |
| | Overheat Protection Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals That Can Be Allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals:<br>● P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>● /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>● /DEC (Origin Return Deceleration Switch) signal<br>● /EXT1 to /EXT3 (External Latch Input 1 to 3) signals<br>● FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: Servo Alarm (ALM) |
| | | Output Signals That Can Be Allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.)<br>Output Signals:<br>● /COIN (Positioning Completion) signal<br>● /V-CMP (Speed Coincidence Detection) signal<br>● /TGON (Rotation Detection) signal<br>● /S-RDY (Servo Ready) signal<br>● /CLT (Torque Limit Detection) signal<br>● /VLT (Speed Limit Detection) signal<br>● /BK (Brake) signal<br>● /WARN (Warning) signal<br>● /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | 41 to 5F hex (maximum number of slaves: 30)<br>Selected with the combination of a rotary switch (S2) and DIP switch (S3). |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |
| Displays/ Indicators | | | CHARGE, PWR, and COM indicators, and one-digit seven-segment display |
| MECHATROLINK-II Communications | Communications Protocol | | MECHATROLINK-II |
| | Station Address Settings | | 41 to 5F hex (maximum number of slaves: 30)<br>Selected with the combination of a rotary switch (S2) and DIP switch (S3). |
| | Baud Rate | | 10 Mbps, 4 Mbps<br>A DIP switch (S3) is used to select the baud rate. |
| | Transmission Cycle | | 250 µs or 0.5 ms to 4.0 ms (multiples of 0.5 ms) |
| | Number of Transmission Bytes | | 17 or 32 bytes/station<br>A DIP switch (S3) is used to select the number of transmission bytes. |
| Reference Method | Performance | | Position, speed, or torque control with MECHATROLINK-II communications |
| | Reference Input | | MECHATROLINK-I or MECHATROLINK-II commands (sequence, motion, data setting, data access, monitoring, adjustment, etc.) |
| MECHATROLINK-II Communications Setting Switches | | | Rotary switch (S2) positions: 16 |
| | | | Number of DIP switch (S3) pins: 4 |

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| Item | | Specification |
|---|---|---|
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to Built-In Regenerative Resistor. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3) and IEC61508 SIL3 |
| Option Module | | Fully-Closed Module and Safety Module<br>Note: You cannot use a Fully-Closed Module and a Safety Module together. |

*1. If you combine a Sigma-7-Series SERVOPACK with a Sigma-V-Series Option Module, the following Sigma-V-Series SERVOPACKs specifications must be used: a surrounding air temperature of 0°C to 55°C and an altitude of 1,000 m max. Also, the applicable range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

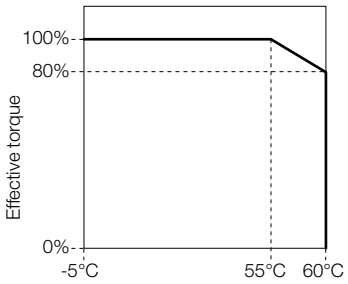
$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. Always perform risk assessment for the system and confirm that the safety requirements are met.

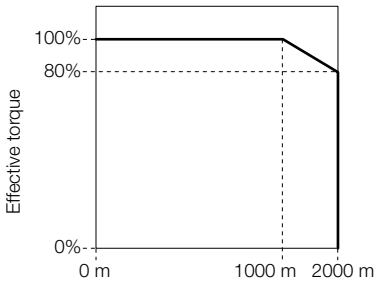
# Derating Specifications

If you use the SERVOPACK at a surrounding air temperature of 55°C to 60°C or at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graphs.

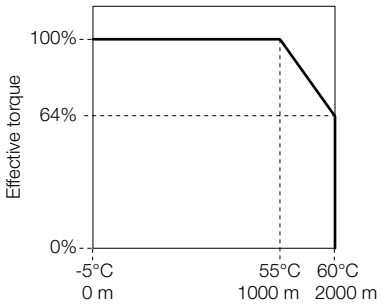
### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F




Surrounding air temperature

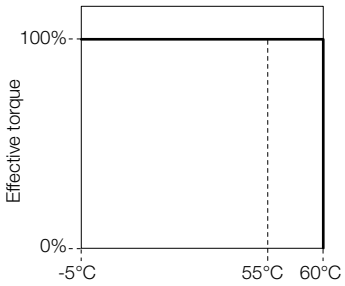



Altitude

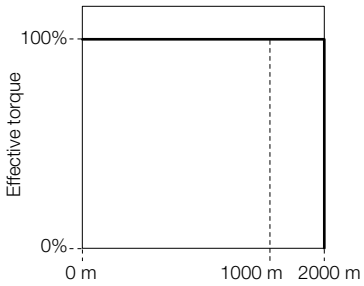



Surrounding air temperature and altitude

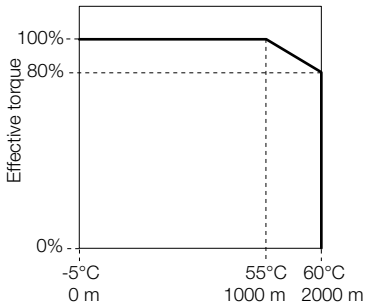
### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A




Surrounding air temperature



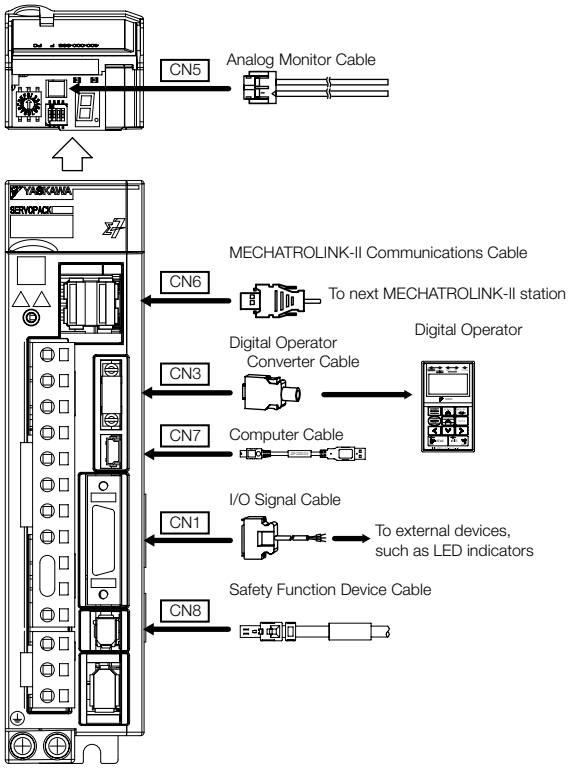

Altitude




Surrounding air temperature and altitude

# Selecting Cables SGD7S MECHATROLINK-II

## System Configurations

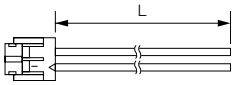
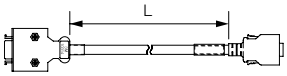
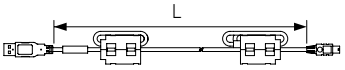



## Selection Table

Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables
  Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN3 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

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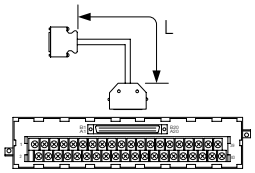
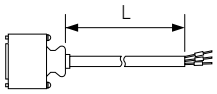
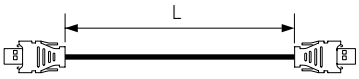
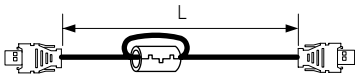
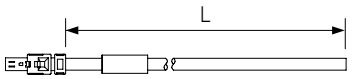
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |  |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |  |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN6 | MECHATROLINK-II Communications Cables | Cables with Connectors on Both Ends | 0.5 m | JEPMC-W6002-A5-E |  |
| | | | 1 m | JEPMC-W6002-01-E | |
| | | | 3 m | JEPMC-W6002-03-E | |
| | | | 5 m | JEPMC-W6002-05-E | |
| | | | 10 m | JEPMC-W6002-10-E | |
| | | | 20 m | JEPMC-W6002-20-E | |
| | | | 30 m | JEPMC-W6002-30-E | |
| | | | 40 m | JEPMC-W6002-40-E | |
| | | | 50 m | JEPMC-W6002-50-E | |
| | | Cables with Connectors on Both Ends (with ferrite cores) | 0.5 m | JEPMC-W6003-A5-E |  |
| | | | 1 m | JEPMC-W6003-01-E | |
| | | | 3 m | JEPMC-W6003-03-E | |
| | | | 5 m | JEPMC-W6003-05-E | |
| | | | 10 m | JEPMC-W6003-10-E | |
| | | | 20 m | JEPMC-W6003-20-E | |
| | | | 30 m | JEPMC-W6003-30-E | |
| | | | 40 m | JEPMC-W6003-40-E | |
| | | | 50 m | JEPMC-W6003-50-E | |
| | | Terminators | | JEPMC-W6022-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*2 | 1 m | JZSP-CVH03-01-E |  |
| | | | 3 m | JZSP-CVH03-03-E | |
| | | Connector Kit*3 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for Sigma-7-series SERVOPACKs.
*2. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*3. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

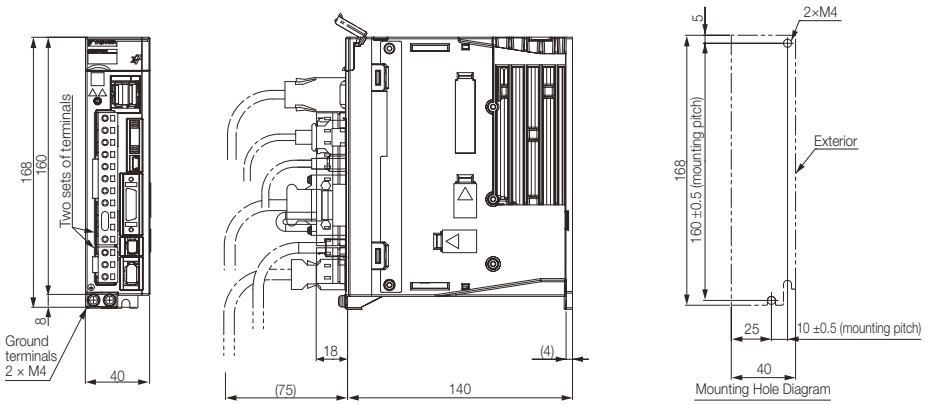
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm²) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

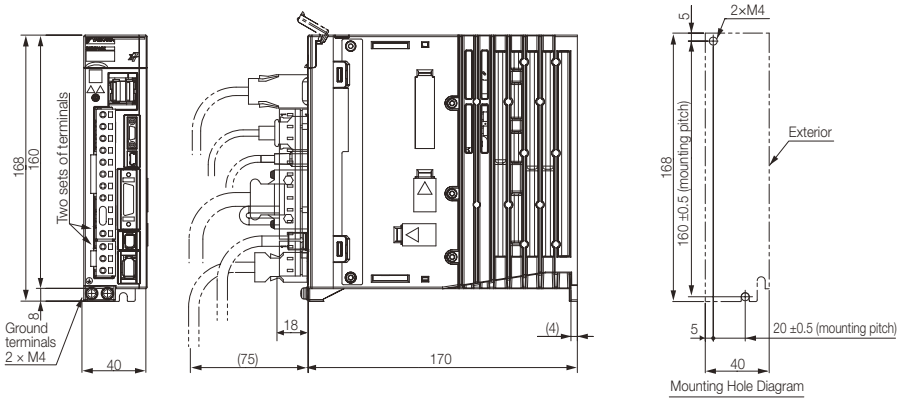
# SERVOPACK External Dimensions

## Three-phase & Single-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A



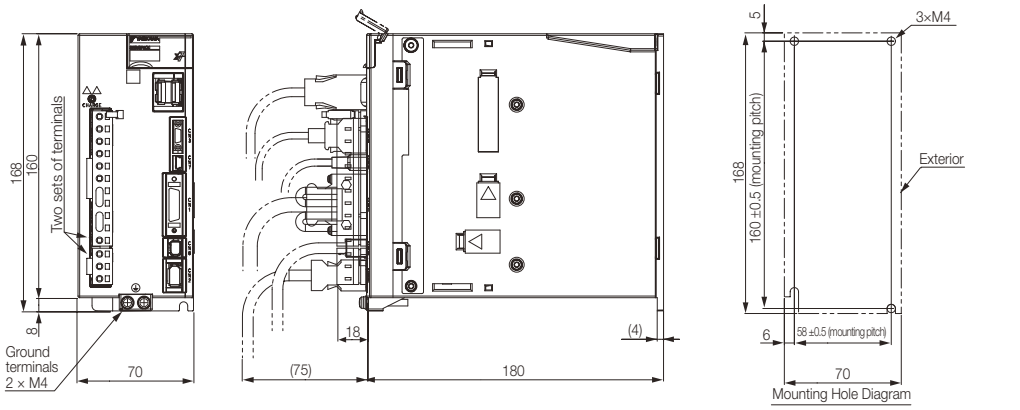

Approx. mass: 0.8 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-2R8A



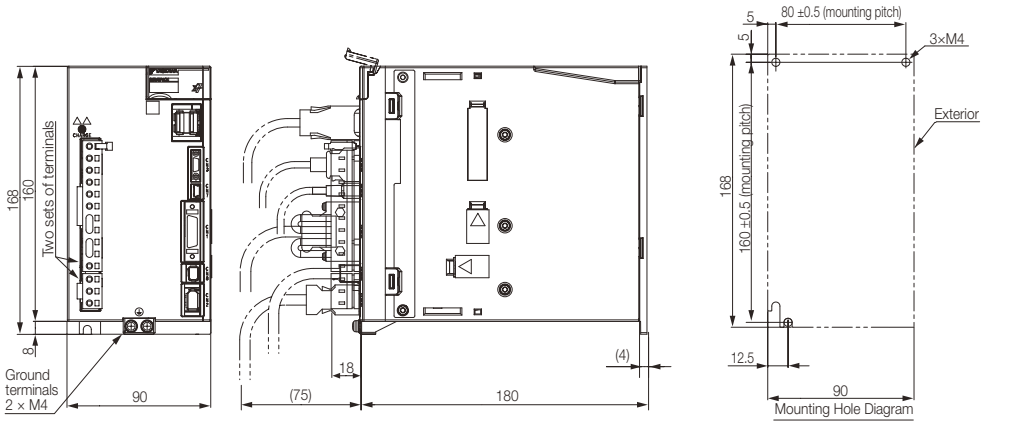

Approx. mass: 1.0 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-3R8A, -5R5A
### Three-phase, 200 VAC: -7R6A



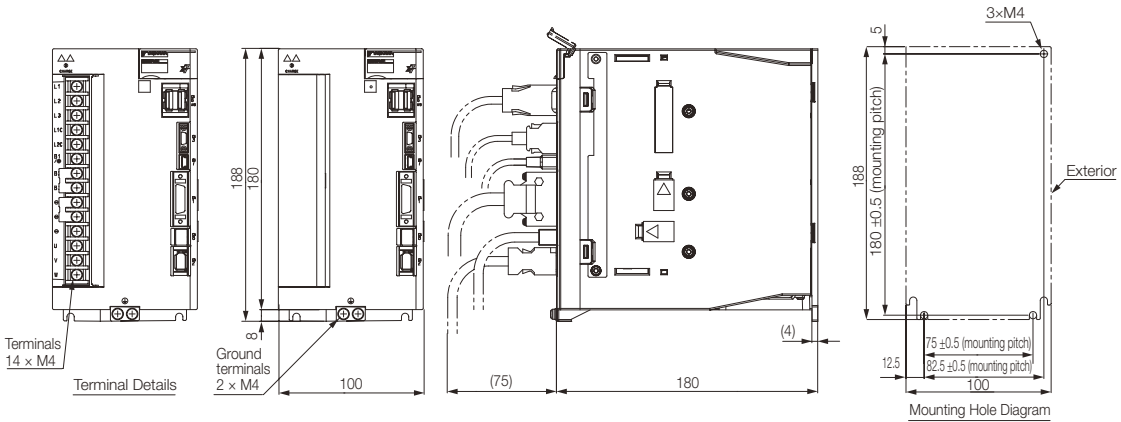

Approx. mass: 1.6 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-120A



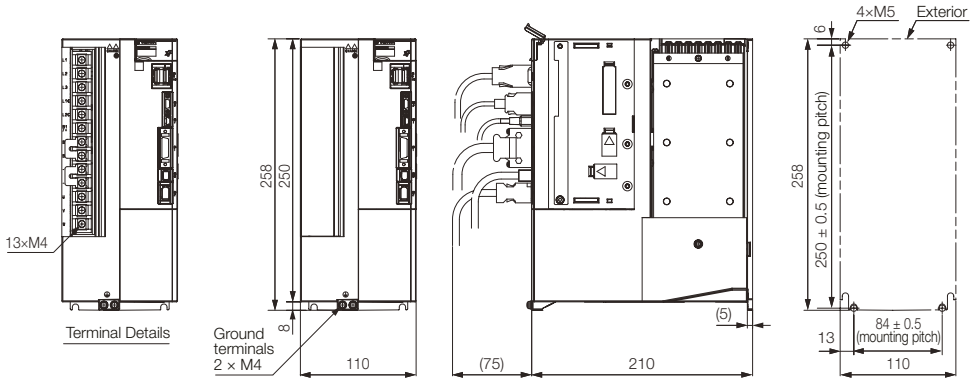

Approx. mass: 2.2 kg
Unit: mm

### Three-phase, 200 VAC: SGD7S-180A and -200A



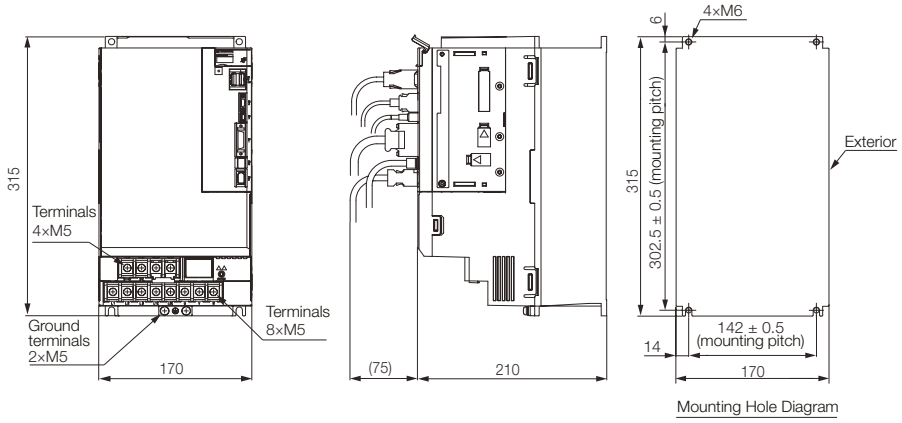

Approx. mass: 2.7 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-330A



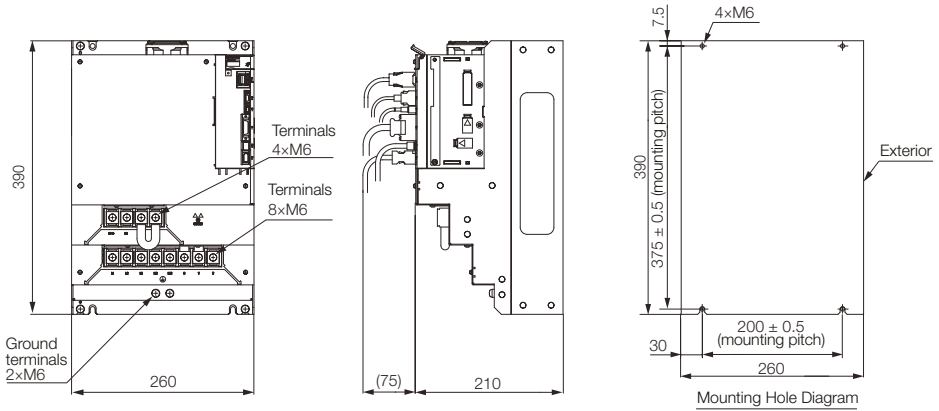

Approx. Mass: 4.4 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-470A and -550A




Approx. Mass: 8.2 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-590A and -780A




Approx. Mass: 15.5 kg
Unit: mm

# Model Designations

| SGD7S | - | R70 | A | 20 | A | 001 | 000 | |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series<br>Sigma-7S Models | | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5*1 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120*2 | 1.5 kW |
| 180 | 2.0 kW |
| 200*3 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| 20 | MECHATROLINK-III communication Reference |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 001 | Rack-mounted | SGD7S-R70A to -330A |
| | Duct-ventilated | SGD7S-470A to -780A |
| 002 | Varnished | All models |
| 008 | Single-phase, 200 V power input | SGD7S-120A |
| 020*6 | No dynamic brake | SGD7S-R70A to -2R8A |
| | External dynamic brake resistor | SGD7S-3R8A to -780A |
| 00A | Varnished and single-phase power input | All models |

**11th ... 13th digit - FT/EX Specifications**

| Code | Specifications |
|---|---|
| None | None |
| F82*7 | Application function option for special motors, SGM7D motor drive |

Note:

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

Note:
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 11.6 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 28 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 16 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4.0 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.1 | 12.1 | 23.7 | 39.2 | 71.8 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17.0 | 19.1 | 24.1 | 35.7 | 61.2 | 103.8 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

### Three-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84.0 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3.0 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1.0 | 1.3 | 1.6 | 2.3 | 3.2 | 4.0 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.0 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17.0 | 19.0 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

### Three-phase, 200 VAC continued

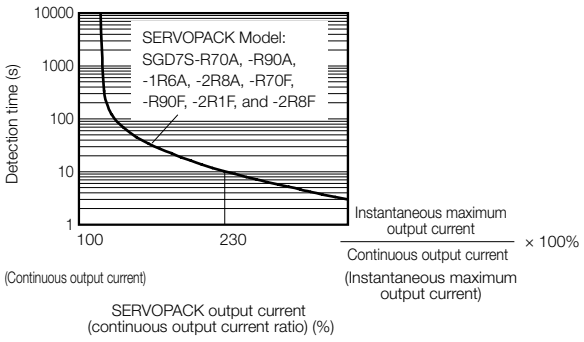
| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6.0 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78.0 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]* 1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | External Regenerative Resistor Unit Power Loss [W] | | 180*2 | 180*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| External Regenerative Resistor Unit | External Regenerative Resistor Unit | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

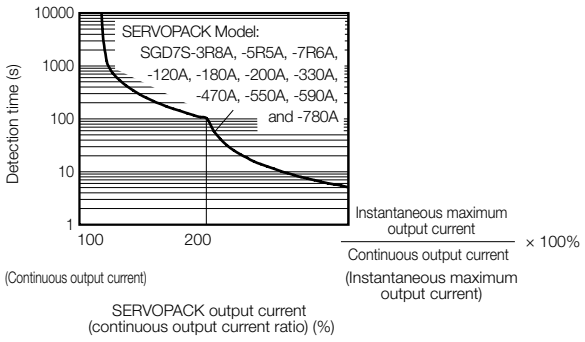
*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

Note: Readily available up to 1.5 kW. Others available on request.

# SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

# Specifications

| Item | | Specification | |
|---|---|---|---|
| Drive Method | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Ambient Air Temperature*1 | -5°C to 55°C<br>With derating, usage is possible between 55°C and 60°C. Refer to the following section for Derating Specifications. | |
| | Storage Temperature | -20°C to 85°C | |
| | Ambient Air Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | 4.9 m/s$^2$ | |
| | Shock Resistance | 19.6 m/s$^2$ | |
| | Protection Class | Class | SERVOPACK Model: SGD7S- |
| | | IP20 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, R70F, R90F, 2R1F, 2R8F |
| | | IP10 | 120A20A008, 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude*1 | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m.<br>Refer to the following section for Derating specifications. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | UL 61800-5-1 (E147823), CSA C22.2 No.274, EN ISO13849-1: 2015, EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, EN 61800-3 (Category C2, Second environment), EN 50178, EN 61800-5-1, IEC 60204-1, IEC 61508 series, IEC 62061, IEC 61800-5-2, and IEC 61326-3-1 | |
| Mounting | | Mounting | SERVOPACK Model: SGD7S- |
| | | Base-mounted | All models |
| | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, R70F, R90F, 2R1F, 2R8F |
| | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation*2 | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) | |
| | Torque Control Precision (Repeatability) | ±1% | |
| | Soft Start Time Setting | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |

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| Item | | | Specification |
|---|---|---|---|
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. |
| | Overheat Protection Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals That Can Be Allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 7<br>Input method: Sink inputs or source inputs Input Signals:<br>● P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>● /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>● /DEC (Origin Return Deceleration Switch) signal<br>● /EXT1 to /EXT3 (External Latch Input 1 to 3) signals<br>● FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: Servo Alarm (ALM) |
| | | Output Signals That Can Be Allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.)<br>Output Signals:<br>● /COIN (Positioning Completion) signal<br>● /V-CMP (Speed Coincidence Detection) signal<br>● /TGON (Rotation Detection) signal<br>● /S-RDY (Servo Ready) signal<br>● /CLT (Torque Limit Detection) signal<br>● /VLT (Speed Limit Detection) signal<br>● /BK (Brake) signal<br>● /WARN (Warning) signal<br>● /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |
| Displays/ Indicators | | | CHARGE, PWR, COM, L1, and L2 indicators, and one-digit seven-segment display |
| MECHATROLINK-III Communications | Communications Protocol | | MECHATROLINK-III |
| | Station Address Settings | | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | Baud Rate | | 100 Mbps |
| | Transmission Cycle | | 125 µs, 250 µs, 500 µs, 750 µs,<br>1.0 ms to 4.0 ms (multiples of 0.5 ms) |
| | Number of Transmission Bytes | | 32 or 48 bytes/station<br>A DIP switch (S3) is used to select the number of transmission bytes. |
| Reference Method | Performance | | Position, speed, or torque control with MECHATROLINK-III communications |
| | Reference Input | | MECHATROLINK-III commands (sequence, motion, data setting, data access, monitoring, adjustment, etc.) |
| | Profile | | MECHATROLINK-III standard servo profile |

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| Item | | Specification |
|---|---|---|
| MECHATROLINK-III Communications Setting Switches | | Rotary switch (S1 and S2) positions: 16<br>Number of DIP switch (S3) pins: 4 |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to Built-In Regenerative Resistor. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Option Module | | Fully-Closed Module and Safety Module<br>Note: You cannot use a Fully-Closed Module and a Safety Module together. |

*1. If you combine a S-7-Series SERVOPACK with a S-V-Series Option Module, the following S-V-Series SERVOPACKs specifications must be used: a surrounding air temperature of 0°C to 55°C and an altitude of 1,000 m max. Also, the applicable range cannot be increased by derating.
*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

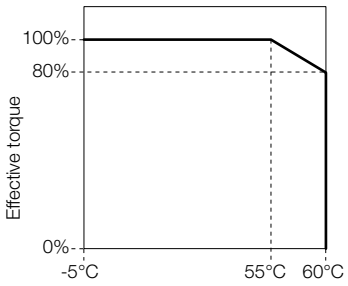
$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. Always perform risk assessment for the system and confirm that the safety requirements are met.

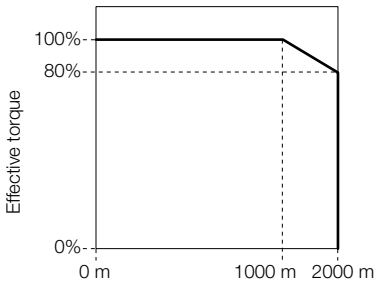
## Derating Specifications

If you use the SERVOPACK at a surrounding air temperature of 55°C to 60°C or at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graphs.

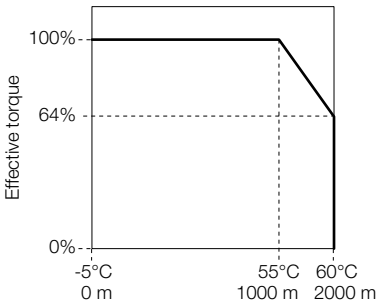
### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F




Surrounding air temperature

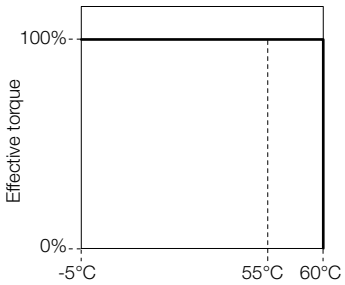



Altitude

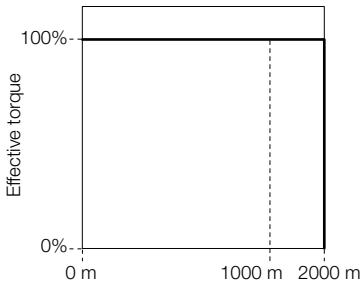



Surrounding air temperature and altitude

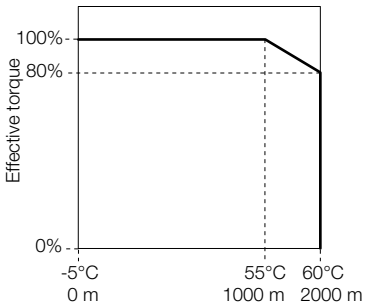
### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A




Surrounding air temperature



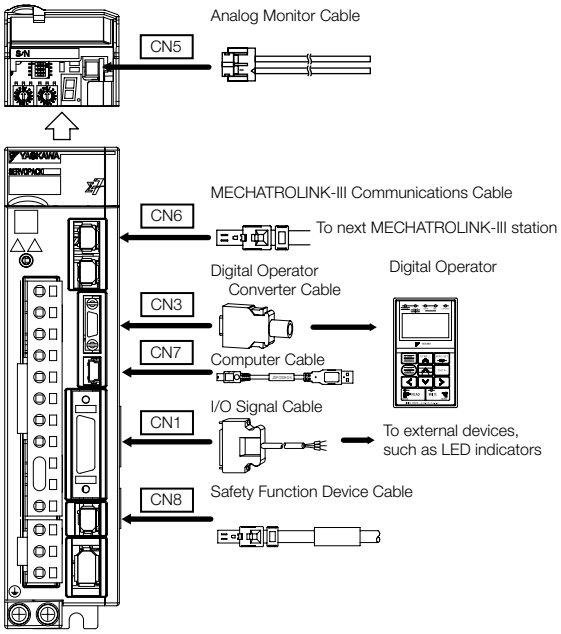

Altitude




Surrounding air temperature and altitude

# Selecting Cables SGD7S MECHATROLINK-III

## System Configurations



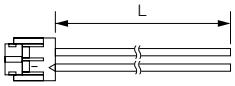
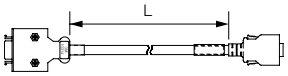
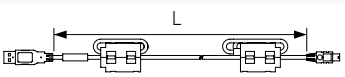

## Selection Table

**Important**

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN3 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| | | | | JZSP-CVS07-A3-E*2 | |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

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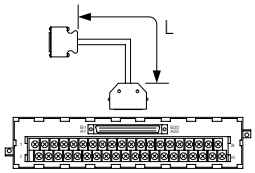
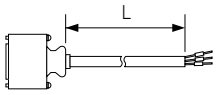
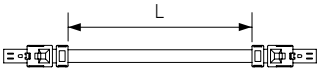
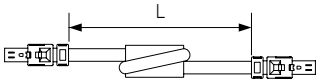
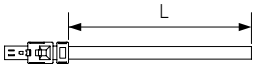
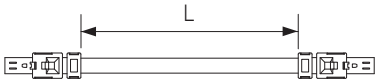
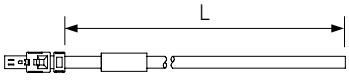
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |  |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |  |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN6 | MECHATROLINK-III Communications Cables | Cables with Connectors on both Ends | 0.2 m | JEPMC-W6012-A2-E |  |
| | | | 0.5 m | JEPMC-W6012-A5-E | |
| | | | 1 m | JEPMC-W6012-01-E | |
| | | | 2 m | JEPMC-W6012-02-E | |
| | | | 3 m | JEPMC-W6012-03-E | |
| | | | 4 m | JEPMC-W6012-04-E | |
| | | | 5 m | JEPMC-W6012-05-E | |
| | | | 10 m | JEPMC-W6012-10-E | |
| | | | 20 m | JEPMC-W6012-20-E | |
| | | | 30 m | JEPMC-W6012-30-E | |
| | | | 50 m | JEPMC-W6012-50-E | |
| | | Cables with Connectors on both Ends (with core) | 10 m | JEPMC-W6013-10-E |  |
| | | | 20 m | JEPMC-W6013-20-E | |
| | | | 30 m | JEPMC-W6013-30-E | |
| | | | 50 m | JEPMC-W6013-50-E | |
| | | Cable with loose Wires at one End | 0.5 m | JEPMC-W6014-A5-E |  |
| | | | 1 m | JEPMC-W6014-01-E | |
| | | | 3 m | JEPMC-W6014-03-E | |
| | | | 5 m | JEPMC-W6014-05-E | |
| | | | 10 m | JEPMC-W6014-10-E | |
| | | | 30 m | JEPMC-W6014-30-E | |
| | | | 50 m | JEPMC-W6014-50-E | |
| | MECHATROLINK-III / EtherCAT / PROFINET Communications Cables (RJ45)*3 | | 0.2 m | CM3R☐M0-00P2-E |  |
| | | | 0.5 m | CM3R☐M0-00P5-E | |
| | | | 1 m | JZSP-CM3R☐M0-01-E | |
| | | | 3 m | JZSP-CM3R☐M0-03-E | |
| | | | 5 m | JZSP-CM3R☐M0-05-E | |
| | | | 10 m | JZSP-CM3R☐M0-10-E | |
| | | | 20 m | JZSP-CM3R☐M0-20-E | |
| | | | 30 m | JZSP-CM3R☐M0-30-E | |
| | | | 40 m | JZSP-CM3R☐M0-40-E | |
| | | | 50 m | JZSP-CM3R☐M0-50-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*4 | 1 m | JZSP-CVH03-01-E-Gx |  |
| | | | 3 m | JZSP-CVH03-03-E-Gx | |
| | | Connector Kit*5 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for S-7-series SERVOPACKs.
*2. If you use a MECHATROLINK-III Communications Reference SERVOPACK, this Converter Cable is required to prevent the cable from disconnecting from the Digital Operator.
*3. This cable is available in two variants. The order number for these cables differs at the marked ☐, an „R" at this place is used for Cables with RJ45 Connectors on both ends, while an „M" is used for Cables with RJ45 Connector on One End and IMI Connector on the other End.
*4. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*5. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

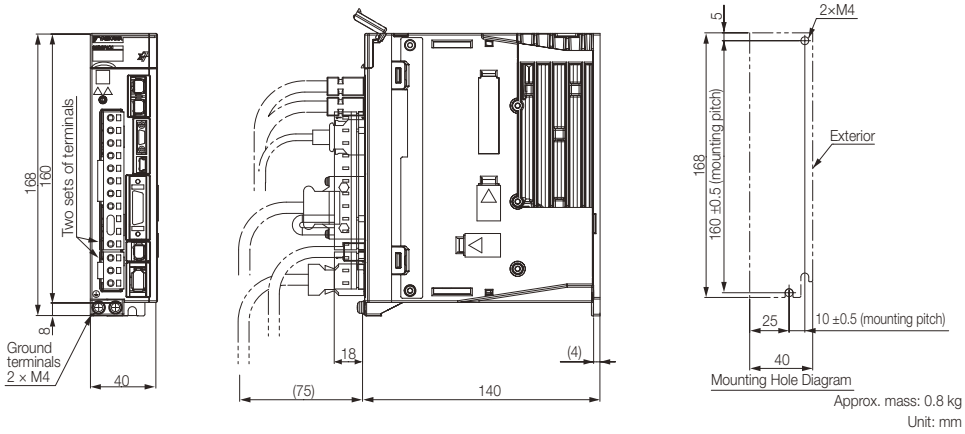
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm²) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

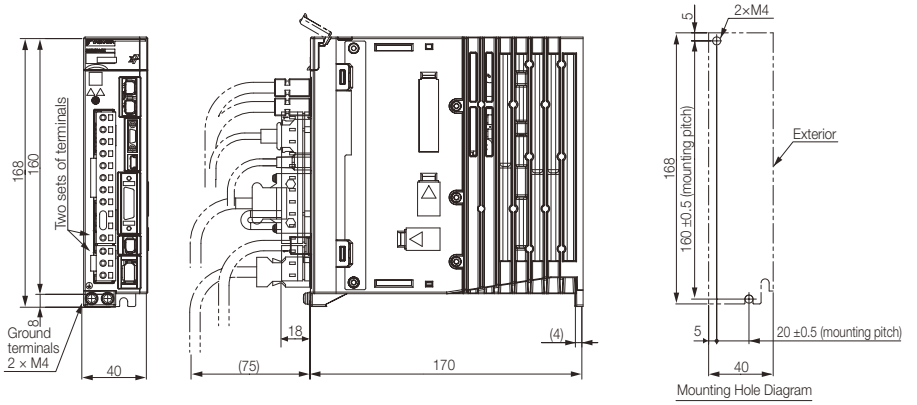
# SERVOPACK External Dimensions

## Three-phase & Single-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A



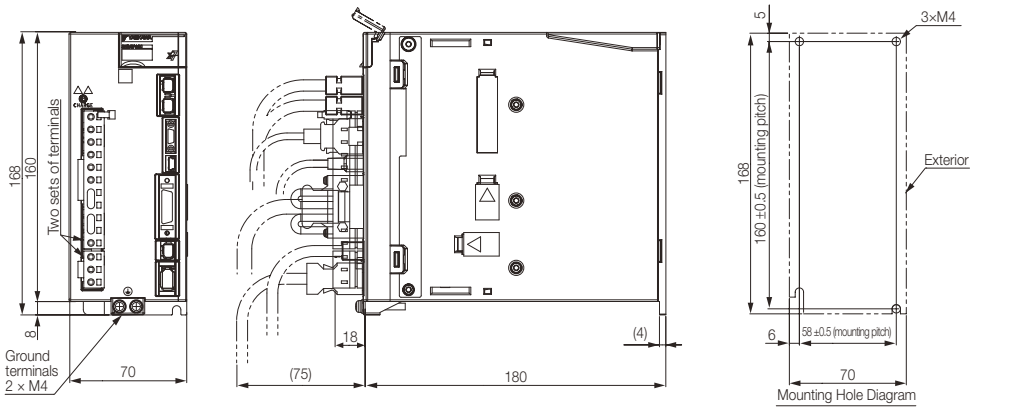

Approx. mass: 0.8 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-2R8A



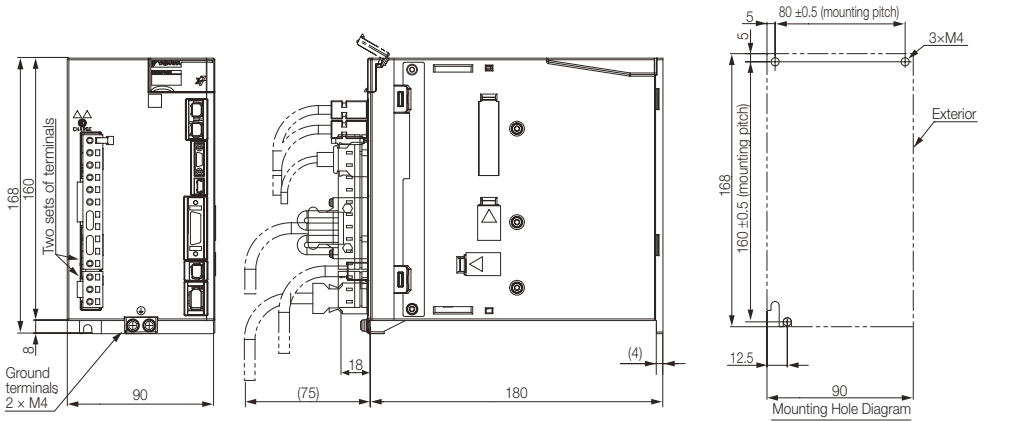

Approx. mass: 1.0 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-3R8A, -5R5A
### Three-phase, 200 VAC: -7R6A



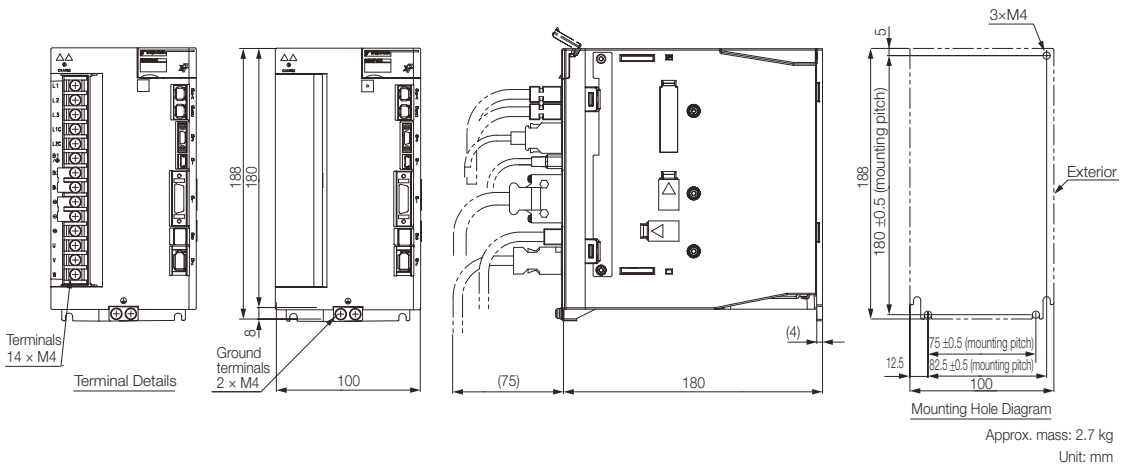

Approx. mass: 1.6 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-120A



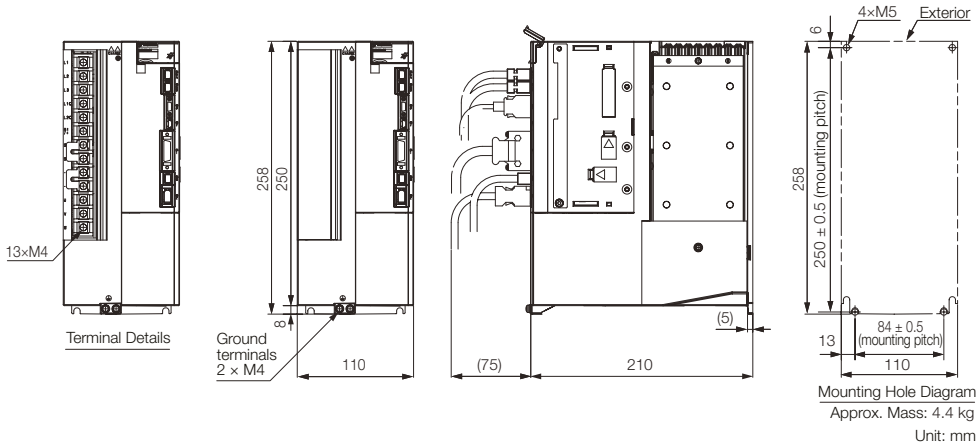

Approx. mass: 2.2 kg
Unit: mm

### Three-phase, 200 VAC: SGD7S-180A and -200A




Approx. mass: 2.7 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-330A

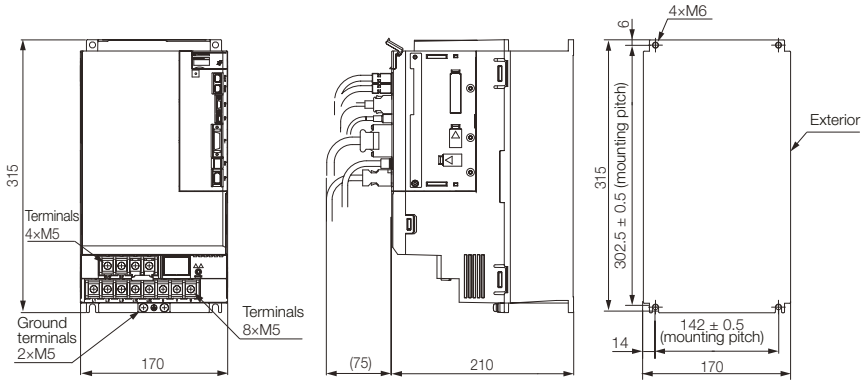



Mounting Hole Diagram

Approx. Mass: 4.4 kg

Unit: mm

## Three-phase, 200 VAC: SGD7S-470A and -550A

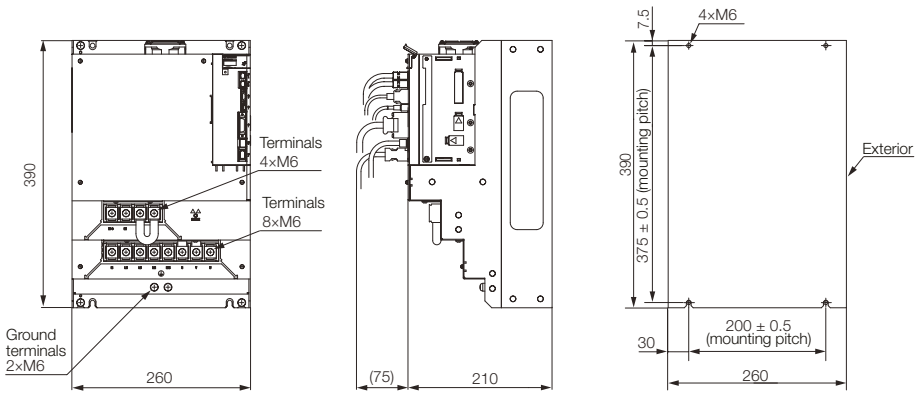



Mounting Hole Diagram

Approx. Mass: 8.2 kg

Unit: mm

## Three-phase, 200 VAC: SGD7S-590A and -780A




Mounting Hole Diagram

Approx. Mass: 15.5 kg

Unit: mm

# Sigma-7S MECHATROLINK-III with RJ45

## Model Designations

SGD7S - R70 A 30 A 001 000

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |
|---|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5*1 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120*2 | 1.5 kW |
| 180 | 2.0 kW |
| 200*3 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| 30 | MECHATROLINK-III communication Reference with RJ45 connector |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 001 | Rack-mounted | SGD7S-R70A to -330A |
| | Duct-ventilated | SGD7S-470A to -780A |
| 002 | Varnished | All models |
| 008 | Single-phase, 200 V power input | SGD7S-120A |
| 020*6 | No dynamic brake | SGD7S-R70A to -2R8A |
| | External dynamic brake resistor | SGD7S-3R8A to -780A |
| 00A | Varnished and single-phase power input | All models |

**11th ... 13th digit - FT/EX Specifications**

| Code | Specifications |
|---|---|
| None | None |
| F82*7 | Application function option for special motors, SGM7D motor drive |

Note:

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

Note:
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 11.6 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 28 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 16 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4.0 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.1 | 12.1 | 23.7 | 39.2 | 71.8 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17.0 | 19.1 | 24.1 | 35.7 | 61.2 | 103.8 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

### Three-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84.0 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3.0 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1.0 | 1.3 | 1.6 | 2.3 | 3.2 | 4.0 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.0 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17.0 | 19.0 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

### Three-phase, 200 VAC continued

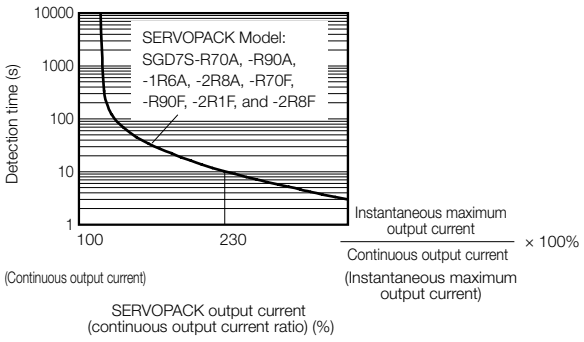
| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6.0 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78.0 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]* 1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | External Regenerative Resistor Unit Power Loss [W] | | 180*2 | 180*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| External Regenerative Resistor Unit | External Regenerative Resistor Unit | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

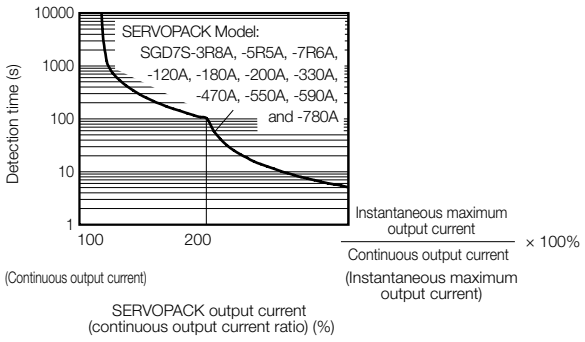
Note: Readily available up to 1.5 kW. Others available on request.

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

# SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

# Specifications

| Item | | Specification | |
|---|---|---|---|
| Drive Method | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Ambient Air Temperature*1 | -5°C to 55°C<br>With derating, usage is possible between 55°C and 60°C. Refer to the following section for Derating Specifications. | |
| | Storage Temperature | -20°C to 85°C | |
| | Ambient Air Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | 4.9 m/s$^2$ | |
| | Shock Resistance | 19.6 m/s$^2$ | |
| | Protection Class | Class | SERVOPACK Model: SGD7S- |
| | | IP20 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, R70F, R90F, 2R1F, 2R8F |
| | | IP10 | 120A20A008, 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude*1 | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m.<br>Refer to the following section for Derating specifications. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | UL 61800-5-1 (E147823), CSA C22.2 No.274, EN ISO13849-1: 2015, EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, EN 61800-3 (Category C2, Second environment), EN 50178, EN 61800-5-1, IEC 60204-1, IEC 61508 series, IEC 62061, IEC 61800-5-2, and IEC 61326-3-1 | |
| Mounting | | Mounting | SERVOPACK Model: SGD7S- |
| | | Base-mounted | All models |
| | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, R70F, R90F, 2R1F, 2R8F |
| | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation*2 | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) | |
| | Torque Control Precision (Repeatability) | ±1% | |
| | Soft Start Time Setting | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |

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| Item | | | Specification |
|---|---|---|---|
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. |
| | Overheat Protection Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals That Can Be Allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 7<br>Input method: Sink inputs or source inputs Input Signals:<br>● P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>● /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>● /DEC (Origin Return Deceleration Switch) signal<br>● /EXT1 to /EXT3 (External Latch Input 1 to 3) signals<br>● FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: Servo Alarm (ALM) |
| | | Output Signals That Can Be Allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.)<br>Output Signals:<br>● /COIN (Positioning Completion) signal<br>● /V-CMP (Speed Coincidence Detection) signal<br>● /TGON (Rotation Detection) signal<br>● /S-RDY (Servo Ready) signal<br>● /CLT (Torque Limit Detection) signal<br>● /VLT (Speed Limit Detection) signal<br>● /BK (Brake) signal<br>● /WARN (Warning) signal<br>● /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |
| Displays/ Indicators | | | CHARGE, PWR, COM, L1, and L2 indicators, and one-digit seven-segment display |
| MECHATROLINK-III Communications | Communications Protocol | | MECHATROLINK-III |
| | Station Address Settings | | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | Baud Rate | | 100 Mbps |
| | Transmission Cycle | | 125 µs, 250 µs, 500 µs, 750 µs,<br>1.0 ms to 4.0 ms (multiples of 0.5 ms) |
| | Number of Transmission Bytes | | 32 or 48 bytes/station<br>A DIP switch (S3) is used to select the number of transmission bytes. |
| Reference Method | Performance | | Position, speed, or torque control with MECHATROLINK-III communications |
| | Reference Input | | MECHATROLINK-III commands (sequence, motion, data setting, data access, monitoring, adjustment, etc.) |
| | Profile | | MECHATROLINK-III standard servo profile |

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| Item | | Specification |
|---|---|---|
| MECHATROLINK-III Communications Setting Switches | | Rotary switch (S1 and S2) positions: 16<br>Number of DIP switch (S3) pins: 4 |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to Built-In Regenerative Resistor. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Option Module | | Fully-Closed Module and Safety Module<br>Note: You cannot use a Fully-Closed Module and a Safety Module together. |

*1. If you combine a S-7-Series SERVOPACK with a S-V-Series Option Module, the following S-V-Series SERVOPACKs specifications must be used: a surrounding air temperature of 0°C to 55°C and an altitude of 1,000 m max. Also, the applicable range cannot be increased by derating.
*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

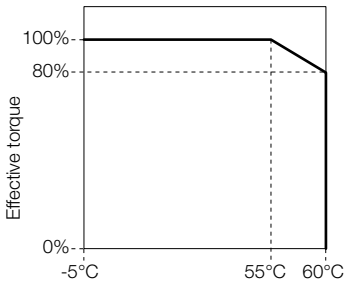
$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. Always perform risk assessment for the system and confirm that the safety requirements are met.

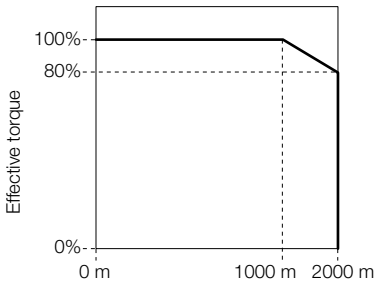
## Derating Specifications

If you use the SERVOPACK at a surrounding air temperature of 55°C to 60°C or at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graphs.

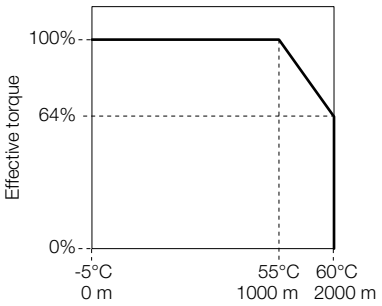
### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F




Surrounding air temperature

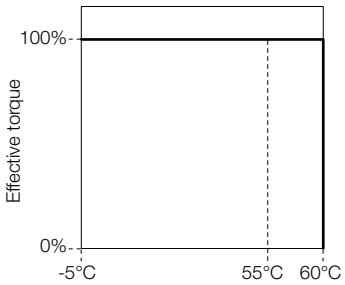



Altitude

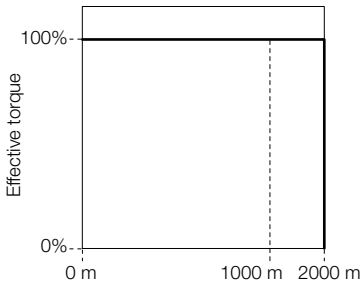



Surrounding air temperature and altitude

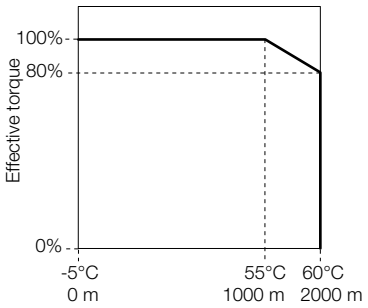
### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A




Surrounding air temperature



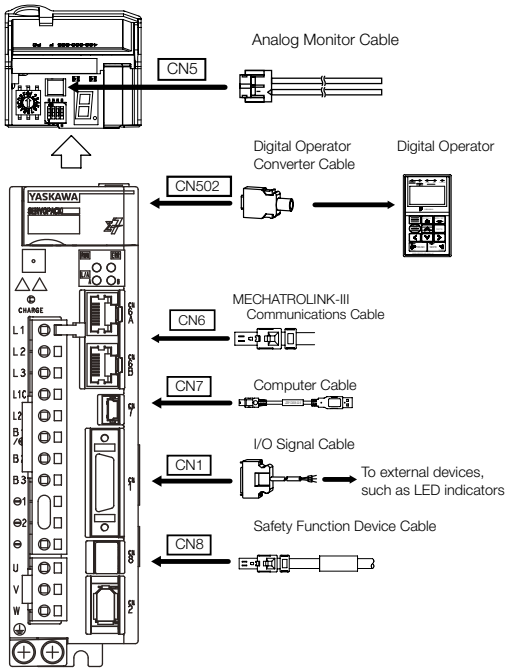

Altitude




Surrounding air temperature and altitude

# Selecting Cables SGD7S MECHATROLINK-III with RJ45

## System Configurations




## Selection Table

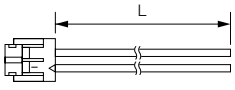
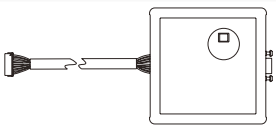
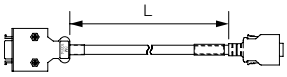
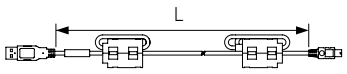
**Important**

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.

- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN502 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Serial Communications Connector | 0.3 m | JUSP-JC001-1 |  |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| | | | | JZSP-CVS07-A3-E*2 | |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

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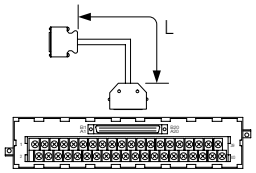
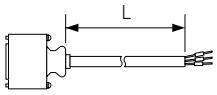
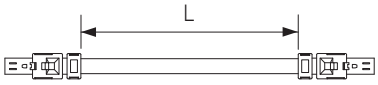
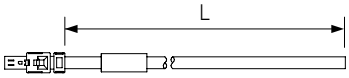
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |  |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |  |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN6 | MECHATROLINK-III / EtherCAT / PROFINET Communications Cables (RJ45)*3 | | 0.2 m | CM3R□M0-00P2-E |  |
| | | | 0.5 m | CM3R□M0-00P5-E | |
| | | | 1 m | JZSP-CM3R□M0-01-E | |
| | | | 3 m | JZSP-CM3R□M0-03-E | |
| | | | 5 m | JZSP-CM3R□M0-05-E | |
| | | | 10 m | JZSP-CM3R□M0-10-E | |
| | | | 20 m | JZSP-CM3R□M0-20-E | |
| | | | 30 m | JZSP-CM3R□M0-30-E | |
| | | | 40 m | JZSP-CM3R□M0-40-E | |
| | | | 50 m | JZSP-CM3R□M0-50-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*4 | 1 m | JZSP-CVH03-01-E-Gx |  |
| | | | 3 m | JZSP-CVH03-03-E-Gx | |
| | | Connector Kit*5 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for S-7-series SERVOPACKs.
*2. If you use a MECHATROLINK-III Communications Reference SERVOPACK, this Converter Cable is required to prevent the cable from disconnecting from the Digital Operator.
*3. This cable is available in two variants. The order number for these cables differs at the marked □, an „R“ at this place is used for Cables with RJ45 Connectors on both ends, while an „M“ is used for Cables with RJ45 Connector on One End and IMI Connector on the other End.
*4. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*5. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm$^2$) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm$^2$) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm$^2$) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

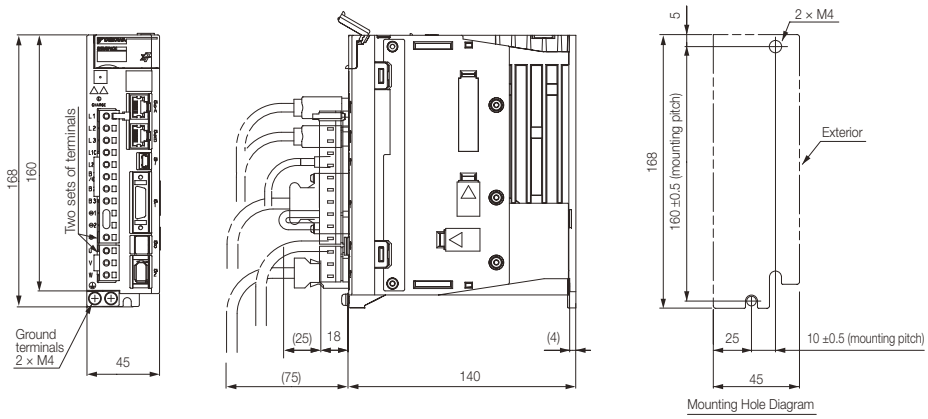
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm$^2$) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm$^2$) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm$^2$) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm$^2$) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm$^2$) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm$^2$) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm$^2$) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

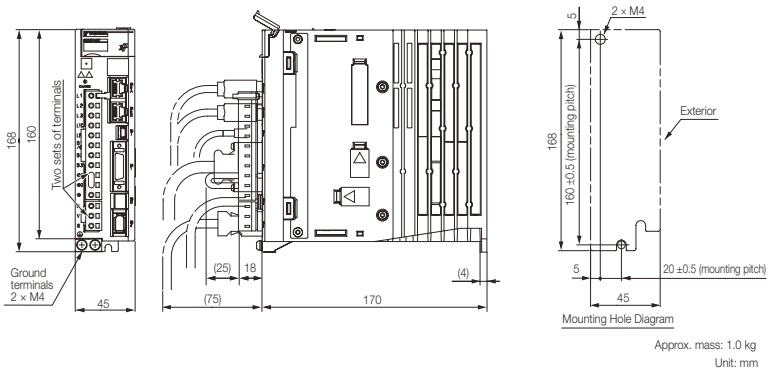
# SERVOPACK External Dimensions

### Three-phase & Single-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A



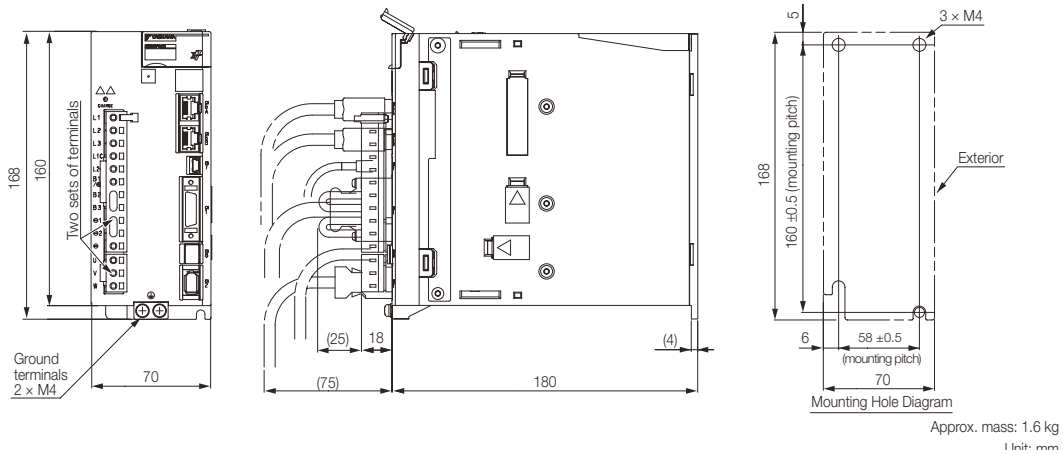

Approx. mass: 0.8 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-2R8A



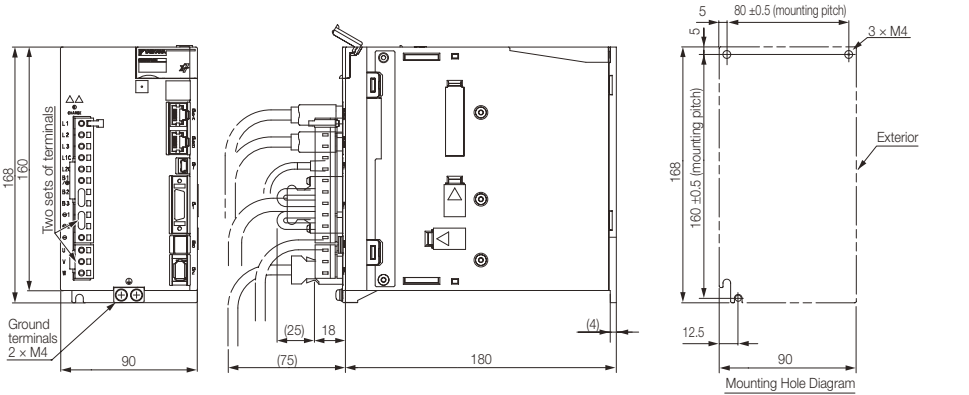

Approx. mass: 1.0 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-3R8A, -5R5A
### Three-phase, 200 VAC: -7R6A



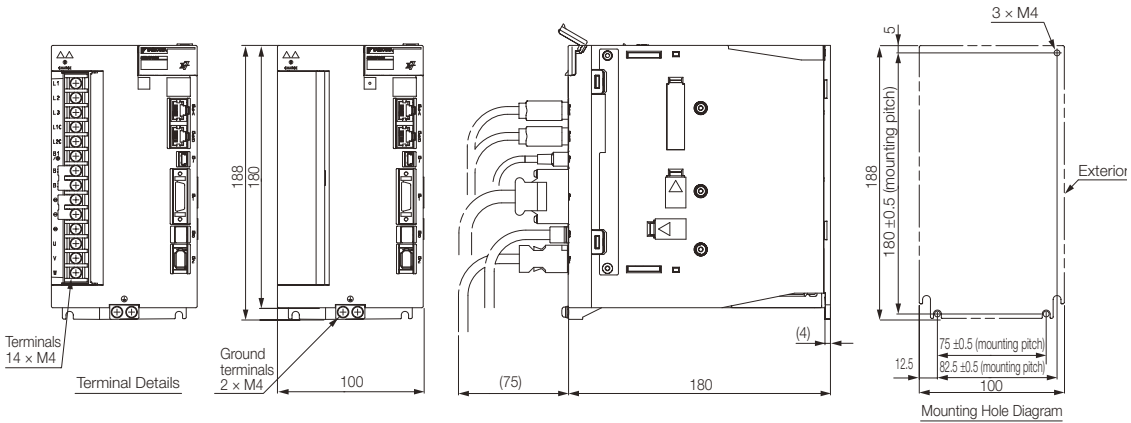

Approx. mass: 1.6 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7S-120A



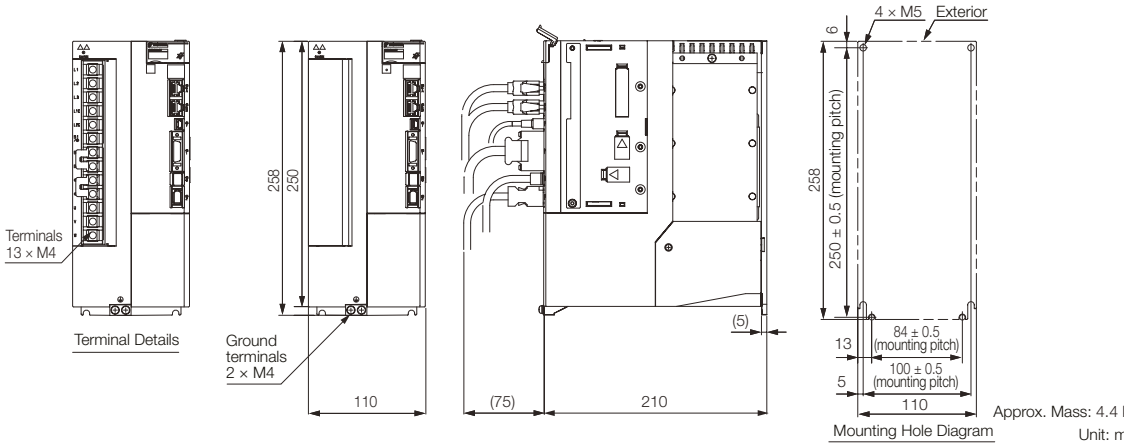

Approx. mass: 2.2 kg
Unit: mm

### Three-phase, 200 VAC: SGD7S-180A and -200A

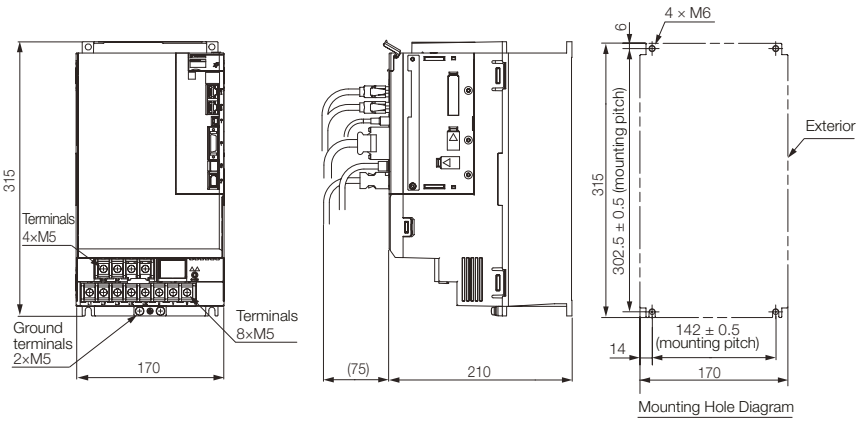



Approx. mass: 2.7 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-330A

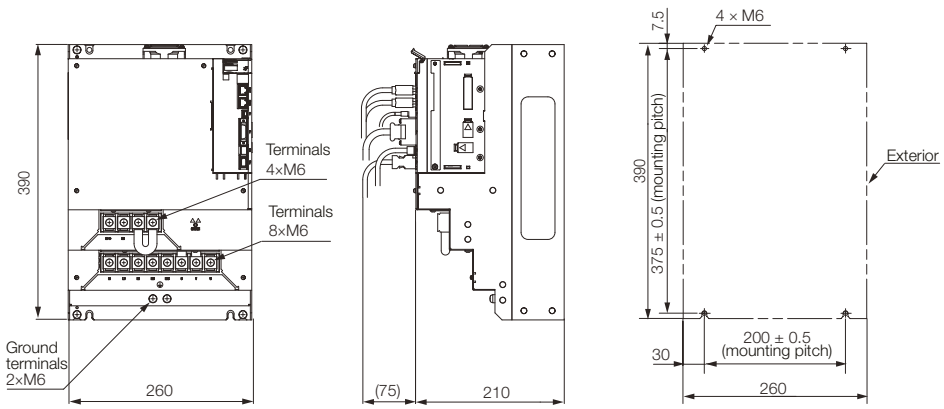



## Three-phase, 200 VAC: SGD7S-470A and -550A




Approx. Mass: 8.2 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-590A and -780A




Approx. Mass: 15.5 kg

# Model Designations

| SGD7S | - | R70 | A | A0 | A | 001 | 000 | |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series<br>Sigma-7S Models | | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5*1 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120*2 | 1.5 kW |
| 180 | 2.0 kW |
| 200*3 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| A0 | EtherCAT communication Reference |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 001 | Rack-mounted | SGD7S-R70A to -330A |
| | Duct-ventilated | SGD7S-470A to -780A |
| 002 | Varnished | All models |
| 008 | Single-phase, 200 V power input | SGD7S-120A |
| 020*6 | No dynamic brake | SGD7S-R70A to -2R8A |
| | External dynamic brake resistor | SGD7S-3R8A to -780A |
| 00A | Varnished and single-phase power input | All models |

**11th ... 13th digit - FT/EX Specifications**

| Code | Specifications |
|---|---|
| None | None |
| F82 | Application Function Option for special motors, SGM7D motor |

Note:

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

Note:
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 2 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 18.5 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 42 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 10 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4 |
| Power Loss* | Main Circuit Power Loss [W] | | 5 | 7.1 | 12.1 | 23.7 | 39.2 | 104.2 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17 | 19.1 | 24.1 | 35.7 | 61.2 | 136.2 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

## Three-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1 | 1.5 | 2 | 3 | 5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1 | 1.3 | 1.6 | 2.3 | 3.2 | 4 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5 | 7 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17 | 19 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]*1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | Built-in Regenerative Resistor Power Loss [W] | | 180*2 | 350*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| Regenerative Resistor | External Regenerative Resistor | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

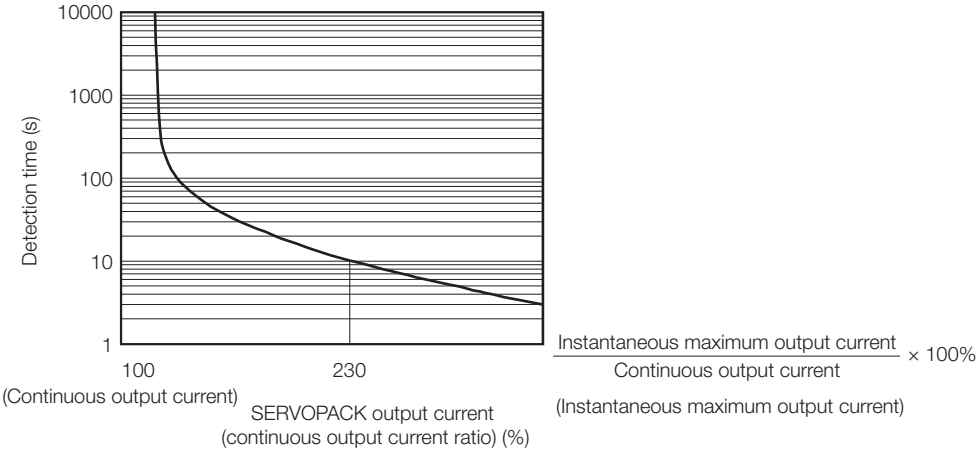
Note: Readily available up to 1.5 kW. Others available on request.

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

# SERVOPACK Overload Protection Characteristics

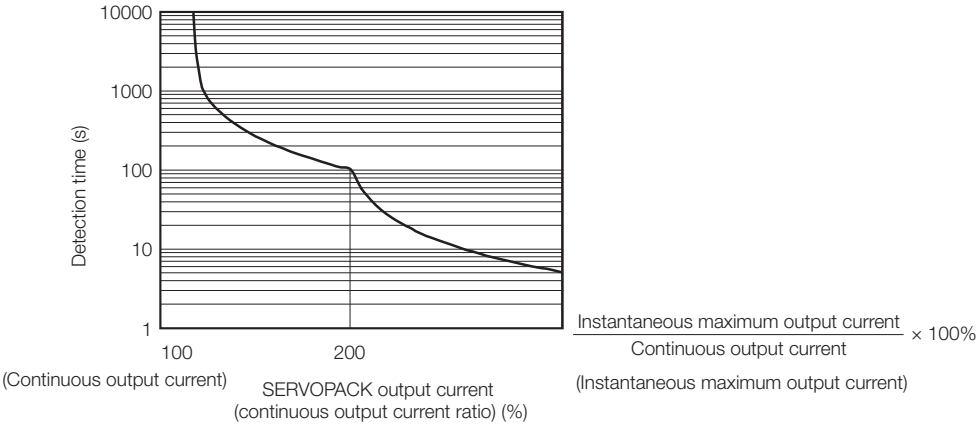
The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.

### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A and -780A




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

## Specifications

| Item | | Specification | |
|---|---|---|---|
| Control Method | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | Serial encoder: 20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Ambient Air Temperature*1 | -5°C to 55°C<br>With derating, usage is possible between 55°C and 60°C. Refer to the following section for Derating Specifications. | |
| | Storage Temperature | -20°C to 85°C | |
| | Ambient Air Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | 95% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | 4.9 $m/s^2$ | |
| | Shock Resistance | 19.6 $m/s^2$ | |
| | Degree of Protection | Degree | SERVPOACK Model: SGD7S- |
| | | IP 20 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A |
| | | IP 10 | 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude*1 | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m.<br>Refer to the following section for Derating specifications. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | UL 61800-5-1, EN50178, CSA C22.2 No.14, EN 61800-5-1, EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, and EN 61800-3 | |
| Mounting | | Mounting | SERVOPACK Model: SGD7S |
| | | Base-mounted | All Models |
| | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A |
| | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation*2 | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ± 25°C) | |
| | Torque Control Precision (Repeatability) | ±1% | |
| | Soft Start Time Setting | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |

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| Item | | | Specification |
|---|---|---|---|
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals<br>● P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>● /Probe1 (Probe 1 Latch Input) signal<br>● /Probe2 (Probe 2 Latch Input) signal<br>● /Home (Home Switch Input) signal<br>● /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>● FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>● /COIN (Positioning Completion) signal<br>● /V-CMP (Speed Coincidence Detection) signal<br>● /TGON (Rotation Detection) signal<br>● /S-RDY (Servo Ready) signal<br>● /CLT (Torque Limit Detection) signal<br>● /VLT (Speed Limit Detection) signal<br>● /BK (Brake) signal<br>● /WARN (Warning) signal<br>● /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN502) | Interfaces | A JUSP-JC001 Communications Unit is required to connect to a Digital Operator (JUSP-OP05A-1-E). |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB2.0 standard (12 Mbps). |
| Displays/Indicators | | | CHARGE, PWR, CN, RUN, ERR, and L/A (A and B) indicators, and onedigit seven-segment display |
| EtherCAT Communications Setting Switches | | | EtherCAT secondary address (S1 and S2), 16 positions |

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| Item | | Specification |
|---|---|---|
| EtherCAT Communications | Applicable Communications Standards | IEC 61158 Type 12, IEC 61800-7 CiA402 Drive Profile |
| | Physical Layer | 100BASE-TX (IEEE 802.3) |
| | Communications Connectors | CN6A (RJ45): EtherCAT signal input connector<br>CN6B (RJ45): EtherCAT signal output connector |
| | Cable | Category 5, 4 shielded twisted pairs<br>* The cable is automatically detected with AUTO MDIX. |
| | Sync Manager | SM0: Mailbox output, SM1: Mailbox input, SM2: Process data output, and SM3: Process data input |
| | FMMU | FMMU 0: Mapped in process data output (RxPDO) area.<br>FMMU 1: Mapped in process data input (TxPDO) area.<br>FMMU 2: Mapped to mailbox status. |
| | EtherCAT Commands (Data Link Layer) | APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, and FRMW (APRW, FPRW, BRW, and LRW commands are not supported.) |
| | Process Data | Assignments can be changed with PDO mapping. |
| | Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, and SDO information (TxPDO/RxPDO and remote TxPDO/RxPDO are not supported.) |
| | Distributed Clocks | Free-Run Mode and DC Mode (Can be switched.)<br>Applicable DC cycles: 125 µs to 4 ms in 125-µs increments |
| | Slave Information Interface | 256 bytes (read-only) |
| | Indicators | EtherCAT communications in progress: Link/Activity x 2<br>EtherCAT communications status: RUN x 1<br>EtherCAT error status: ERR x 1 |
| CiA402 Drive Profile | | • Homing Mode<br>• Profile Position Mode<br>• Interpolated Position Mode<br>• Profile Velocity Mode<br>• Profile Torque Mode<br>• Cyclic Synchronous Position Mode<br>• Cyclic Synchronous Velocity Mode<br>• Cyclic Synchronous Torque Mode<br>• Touch Probe Function<br>• Torque Limit Function |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to the following manual for details.<br>Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32) |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Fully-closed Modules and Safety Modules<br>Note: You cannot use a Fully-closed Module and a Safety Module together. |

Note:
*1. If you combine a Sigma-7-Series SERVOPACK with a Sigma-V-Series Option Module, the following Sigma-V-Series SERVOPACKs specifications must be used: a surrounding air temperature of 0°C to 55°C and an altitude of 1,000 m max. Also, the applicable surrounding range cannot be increased by derating.
*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

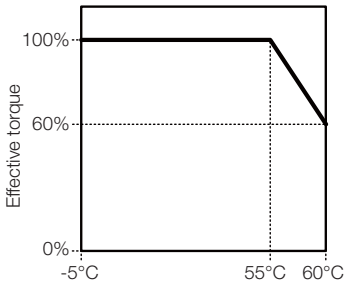
$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. Always perform risk assessment for the system and confirm that the safety requirements are met.

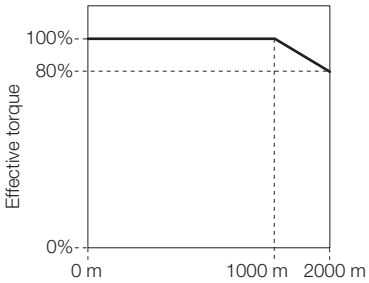
# Derating Specifications

If you use the SERVOPACK at a surrounding air temperature of 55°C to 60°C or at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graphs.

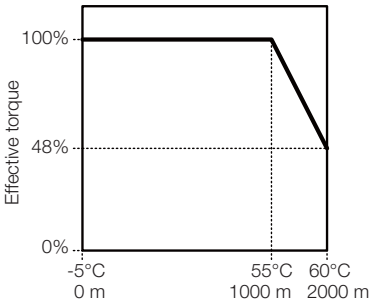
### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F




Surrounding air temperature

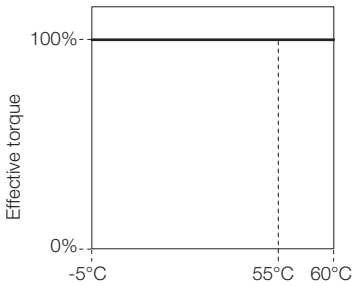



Altitude

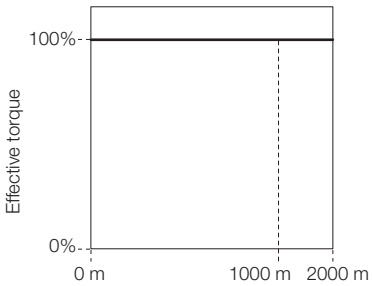



Surrounding air temperature and altitude

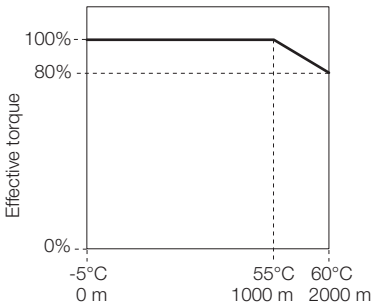
### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A




Surrounding air temperature



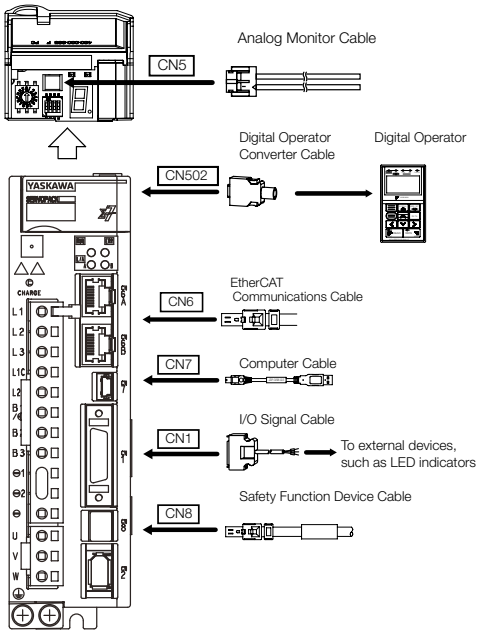

Altitude




Surrounding air temperature and altitude

# Selecting Cables SGD7S EtherCAT

### System Configurations



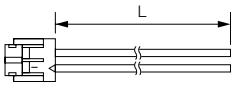
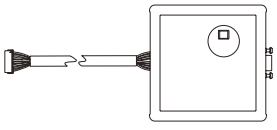
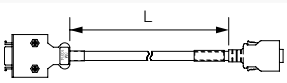
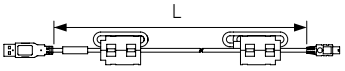

## Selection Table

Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN502 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Serial Communications Connector | 0.3 m | JUSP-JC001-1 |  |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| | | | | JZSP-CVS07-A3-E*2 | |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

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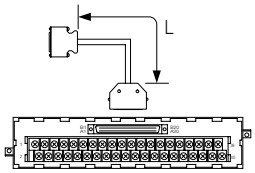
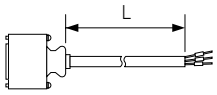
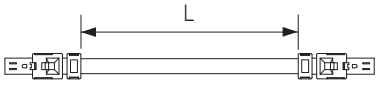
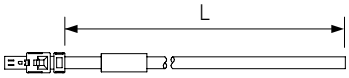
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |   |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |   |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN6 | MECHATROLINK-III / EtherCAT / PROFINET Communications Cables (RJ45)*3 | | 0.2 m | CM3R□M0-00P2-E |   |
| | | | 0.5 m | CM3R□M0-00P5-E | |
| | | | 1 m | JZSP-CM3R□M0-01-E | |
| | | | 3 m | JZSP-CM3R□M0-03-E | |
| | | | 5 m | JZSP-CM3R□M0-05-E | |
| | | | 10 m | JZSP-CM3R□M0-10-E | |
| | | | 20 m | JZSP-CM3R□M0-20-E | |
| | | | 30 m | JZSP-CM3R□M0-30-E | |
| | | | 40 m | JZSP-CM3R□M0-40-E | |
| | | | 50 m | JZSP-CM3R□M0-50-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*4 | 1 m | JZSP-CVH03-01-E-Gx |   |
| | | | 3 m | JZSP-CVH03-03-E-Gx | |
| | | Connector Kit*5 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for S-7-series SERVOPACKs.
*2. If you use a MECHATROLINK-III Communications Reference SERVOPACK, this Converter Cable is required to prevent the cable from disconnecting from the Digital Operator.
*3. This cable is available in two variants. The order number for these cables differs at the marked □, an „R“ at this place is used for Cables with RJ45 Connectors on both ends, while an „M“ is used for Cables with RJ45 Connector on One End and IMI Connector on the other End.
*4. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*5. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm$^2$) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm$^2$) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm$^2$) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

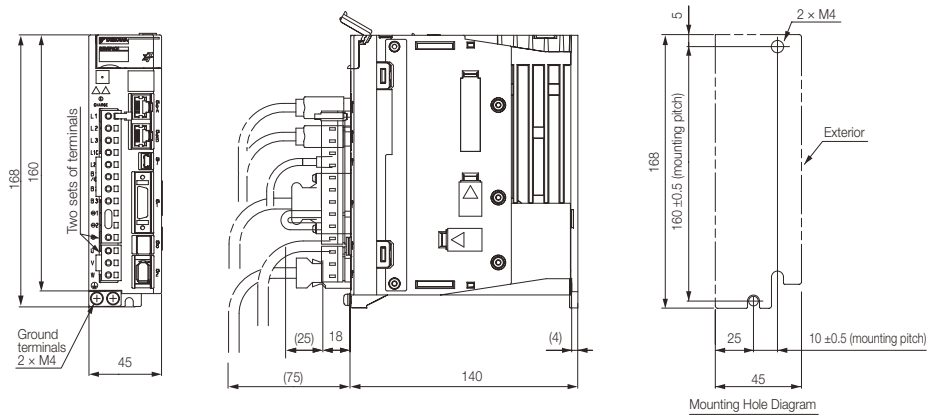
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm$^2$) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm$^2$) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm$^2$) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm$^2$) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm$^2$) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm$^2$) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm$^2$) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm$^2$) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

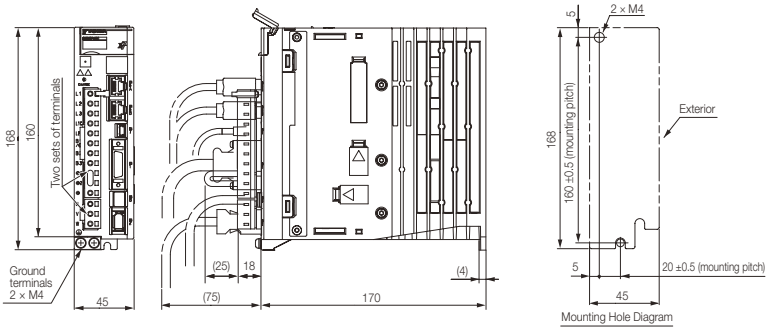
# SERVOPACK External Dimensions

## Three-phase & Single-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A



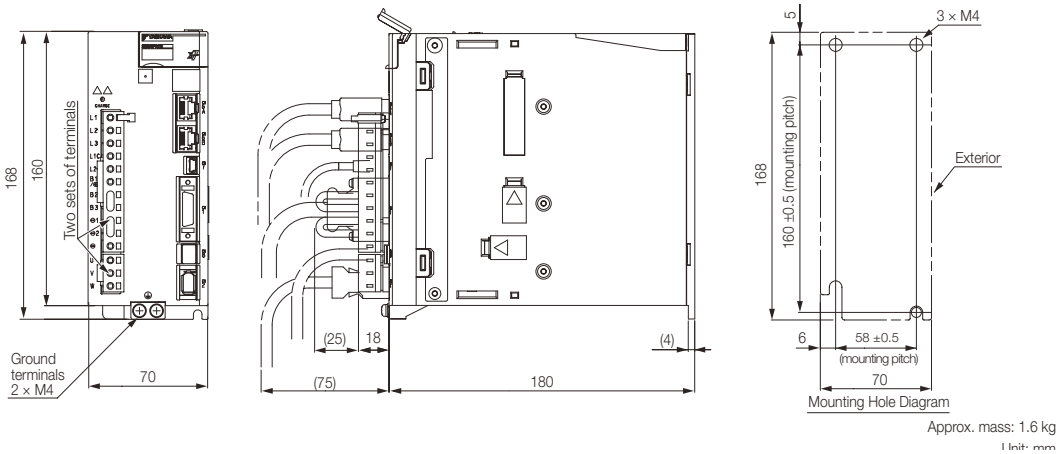

Approx. mass: 0.8 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-2R8A



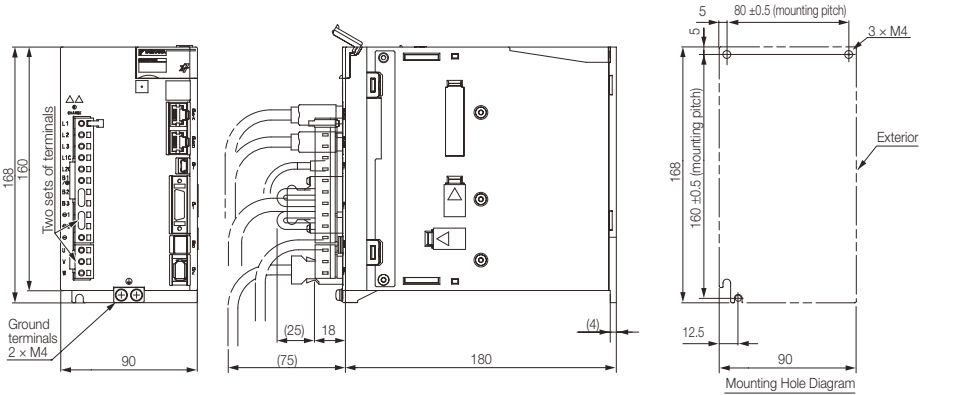

Approx. mass: 1.0 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-3R8A, -5R5A
## Three-phase. 200 VAC: -7R6A



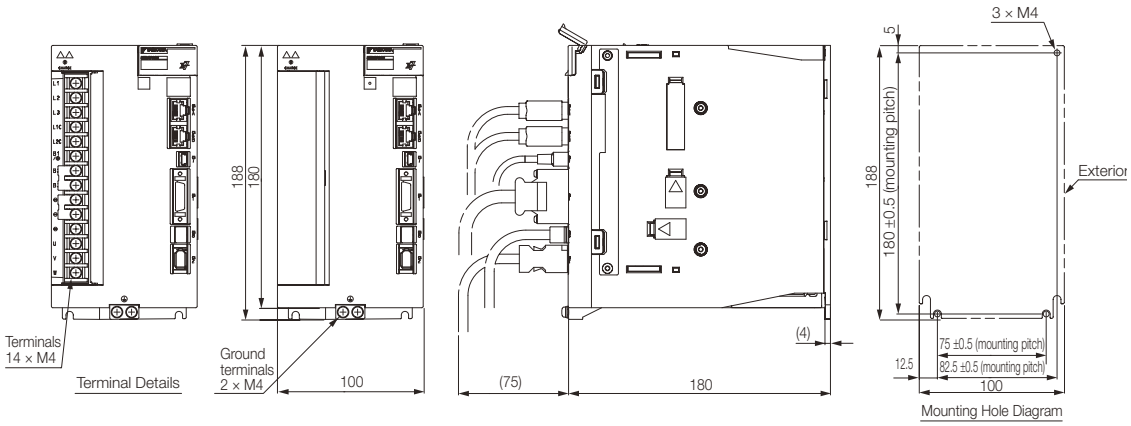

Approx. mass: 1.6 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-120A



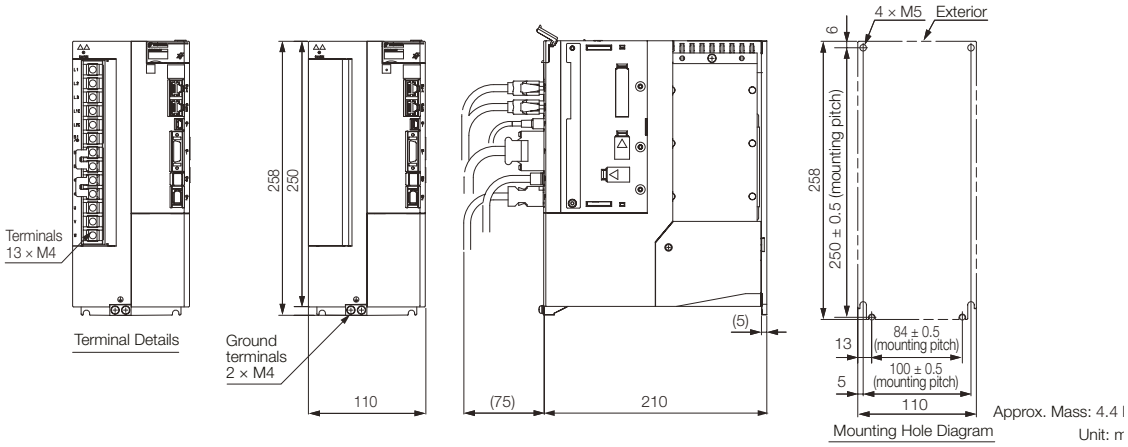

Approx. mass: 2.2 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-180A and -200A

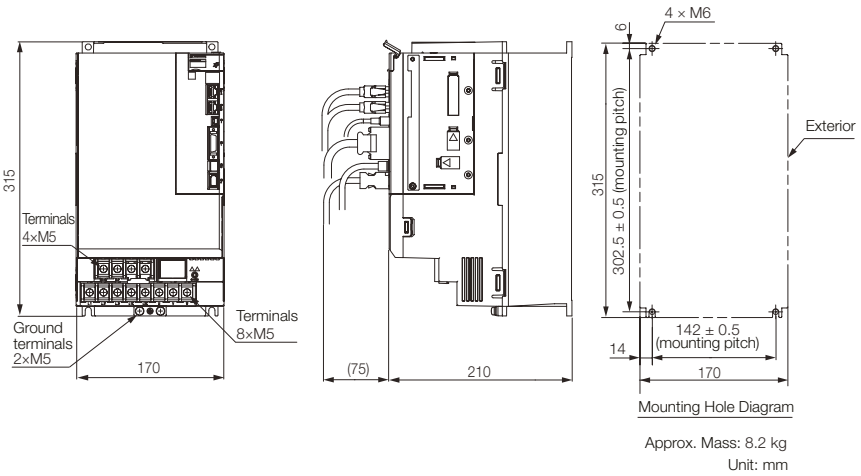



Approx. mass: 2.7 kg
Unit: mm

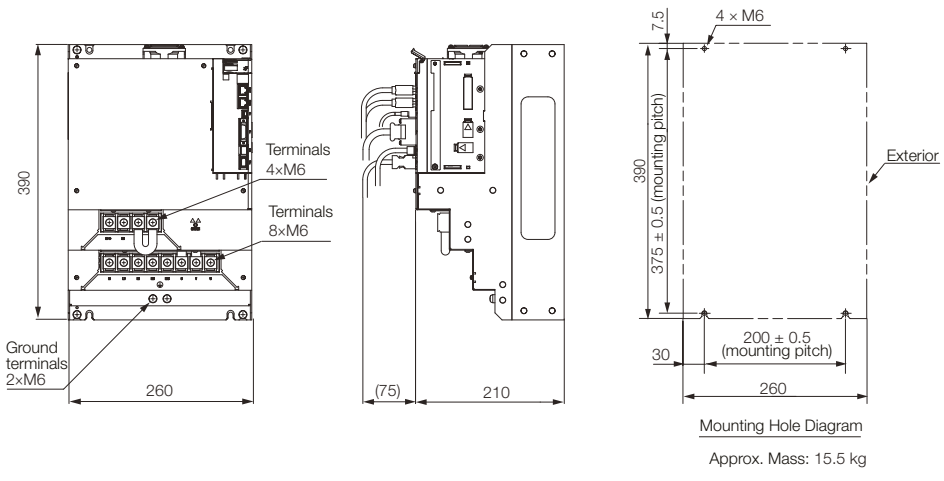
## Three-phase, 200 VAC: SGD7S-330A




## Three-phase, 200 VAC: SGD7S-470A and -550A




## Three-phase, 200 VAC: SGD7S-590A and -780A



# Model Designations

SGD7S - R70 A C0 A 008

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | digit |
|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 5R5*1 | 0.75 kW |
| 120*2 | 1.5 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| C0 | PROFINET communication Reference |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| 008 | Single-phase, 200 V power input | SGD7S-120A |

Note:

**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**

Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

Note:
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

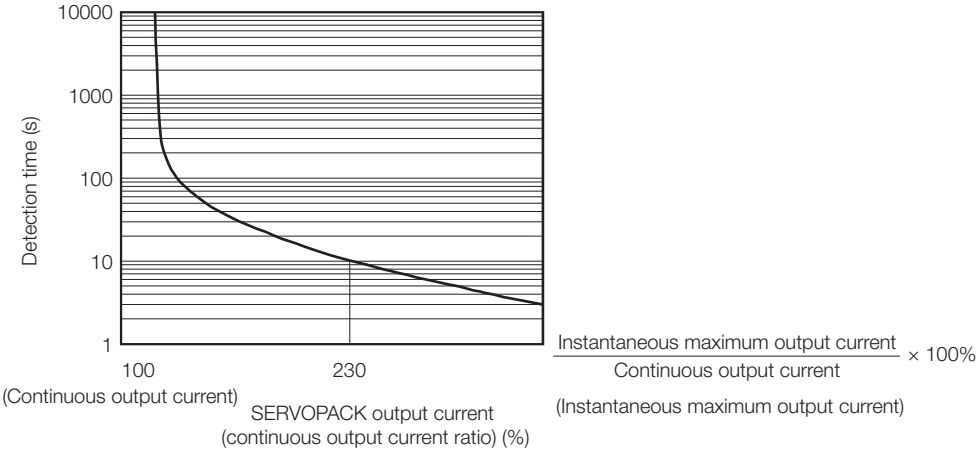
| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 2 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 18.5 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 42 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 10 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4 |
| Power Loss* | Main Circuit Power Loss [W] | | 5 | 7.1 | 12.1 | 23.7 | 39.2 | 104.2 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17 | 19.1 | 24.1 | 35.7 | 61.2 | 136.2 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

# SERVOPACK Overload Protection Characteristics

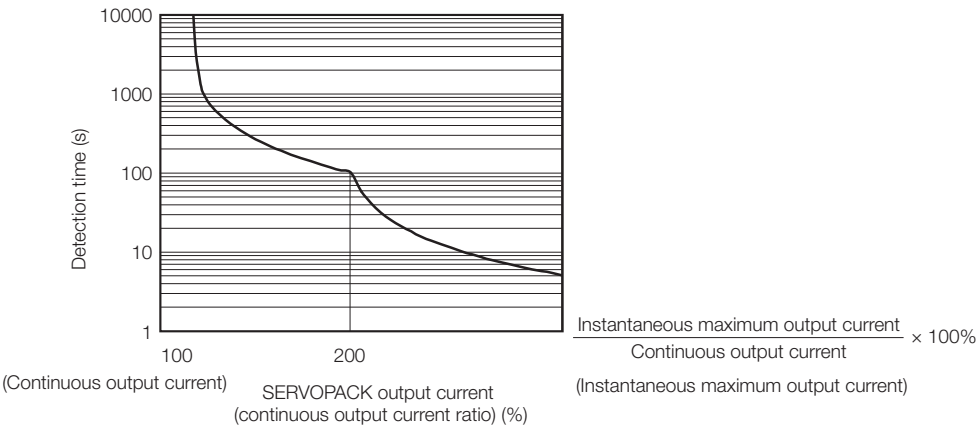
The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.

### SGD7S-R70A, -R90A, -1R6A, -2R8A




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

### SGD7S-5R5A, -120A




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

# Specifications using PROFINET Communication Reference

| Item | | | Specification |
|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | | Serial encoder: 24 bits (incremental encoder/absolute encoder) |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Surrounding Air Temperature*1 | | -5°C to 55°C (60°C with derating)<br>However, the range for the SGD7S-370D is -5°C to 40°C. |
| | Storage Temperature | | -20°C to 85°C |
| | Surrounding Air Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | | 95 % relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | | 4.9 $m/s^2$ |
| | Shock Resistance | | 19.6 $m/s^2$ |
| | Degree of Protection | | IP10 |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | | 1,000 m or less (above 1,000 m with derating) |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | | Refer to the section Compliance with UL Standards, EU Directives, and Other Safety Standards (in Combination with SERVOPACK). |
| Mounting | | | Base-mounted |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation*2 | | ±0.01 % of rated speed max. (for a load fluctuation of 0 % to 100 %) |
| | | | 0% of rated speed max. (for a voltage fluctuation of ±10 %) |
| | | | ±0.1 % of rated speed max. (for a temperature fluctuation of 25 °C ±25 °C) |
| | Torque Control Precision (Repeatability) | | ±1 % |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20 %<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /EXT1 (Probe 1 Latch Input) signal<br>• /EXT2 (Probe 2 Latch Input) signal<br>• /DEC (Home Switch Input) signal<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• /SI0 and /SI6 (General-Purpose Input) signals<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 5<br>(A photocoupler output (isolated) is used.)<br>Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN502) | Interfaces | Digital Operator (JUSP-OP05A-1-E) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+)<br>The software version of the SigmaWin+ must be version 7.28 or higher. |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps). |

Continued on next page.

Continued from previous page.

| Item | | Specification |
|---|---|---|
| Displays/Indicators | | CHARGE, PWR, RUN, ERR, and L/A (A and B) indicators, and one-digit seven-segment display |
| PROFINET Communications | Applicable Communications Standards | IEC 61158 Type 12, IEC 61800-7 PROFIdrive Profile, Ethernet PROFINET IO RT |
| | Physical Layer | 100BASE-TX (IEEE 802.3) |
| | Communications Connectors | CN6A (RJ45): PROFINET signal input connector<br>CN6B (RJ45): PROFINET signal output connector<br>Full-duplex, Auto-negotiation, Auto-crossover |
| | Cable | Category 5, 4 shielded twisted pairs<br>* The cable is automatically detected with AUTO MDIX. |
| | Baud Rate Setting | 100 MBit/s |
| | Supported Protocols | • RTC - Real time cyclic protocol - RT class 1 (unsynchronized)<br>• RTA - Real time acyclic protocol<br>• DCP - Discovery and configuration protocol<br>• CL-RPC - Connectionless remote procedure call<br>• LLDP - Link layer discovery protocol<br>• SNMP - Simple network management protocol |
| | Node Address Setting | DCP |
| | Indentification & Maintenance Functions | I&MO-3 |
| | Topology Recognition | LLDP, SNMP V1, MIB2 |
| | Power Supply | 5 V ± 5 %, 500 mA (max.) supplied internal from drive CN10 |
| | LED Indicator | Red (ERR), Green (RUN), PROFINET communicating (L/A) × 2 |
| | Node Type | Axis Drive Unit |
| | Acyclic Parameter Access | Read/Write Record |
| | Cyclic Messaging | Set of pre-defined standard telegram: ST1, ST2, ST7, ST8, ST9<br>Set of pre-defined manufacture telegram: Telegram number 100<br>Telegram mapping: Dynamic with max. 16 signal entries of free telegram number 999 |
| | Alarm Notification PDU | Optional |
| PROFIdrive Profile | Standard | IEC 61800-7-1/2/3 |
| | Motor Type / Axis Type | Servo / Rotary, Linear |
| | Profile Services | Cycle messaging, Acyclic parameter access mechanism, Identification & maintenance functions (I&M03), PROFIdrive parameters, Diagnostic and alarm mechanism, Fault buffer mechanism |
| | Application Classes | 1, 3 |
| | PROFIdrive Position and Velocity Modes | Motion profile type: Linear |
| | CIA402 Homing Modes | CIA402 Supported methods: 1-6, 17-22, 35, 33, 34<br>Motion profile type: Linear<br>Homing persistent in absolute motor encoder |
| | CIA402 Torque Mode | Torque Profile Type: Linear |
| Drive Profile | | • Homing Mode<br>• PROFIdrive Position Mode<br>• PROFIdrive Velocity Mode<br>• Profile Torque Mode<br>• Touch Probe Function<br>• Torque Limit Function |
| Analog Monitor (CN5) | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1 %): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | Built-in. Refer to the catalog for details. |
| Overtravel (OT) Prevention | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*3 | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | Fully-closed Modules, Option Module Safety |

*1. If you combine a Sigma-7 SERVOPACK with a Sigma-V Option Module, the surrounding air temperature specification of the Sigma-V SERVOPACKs must be used, i.e., 0 °C to 55 °C. Also, the applicable surrounding range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coeficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

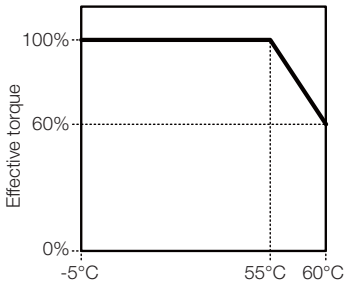
*3. The SGD7S-210D, -260D, -280D, and -370D do not have a dynamic brake (DB). If a dynamic brake is necessary, create an external dynamic brake circuit.

*4. Always perform risk assessment for the system and confirm that the safety requirements are met.

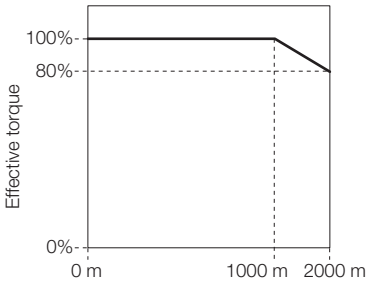
# Derating Specifications

If you use the SERVOPACK at a surrounding air temperature of 55°C to 60°C or at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graphs.

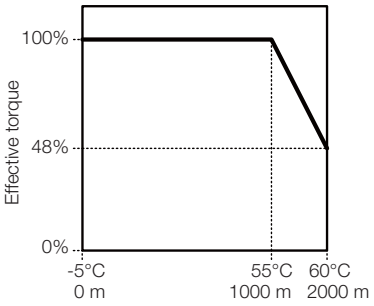
### SGD7S-R70A, -R90A, -1R6A, -2R8A




Surrounding air temperature

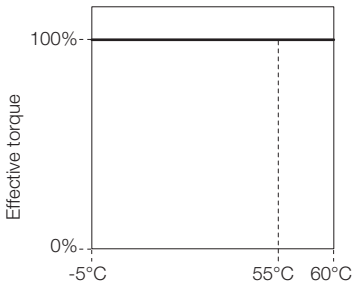



Altitude

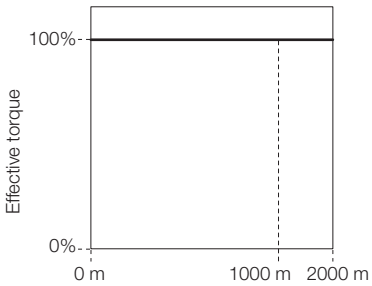



Surrounding air temperature and altitude

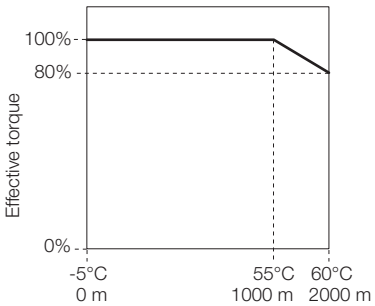
### SGD7S-5R5A, -120A




Surrounding air temperature



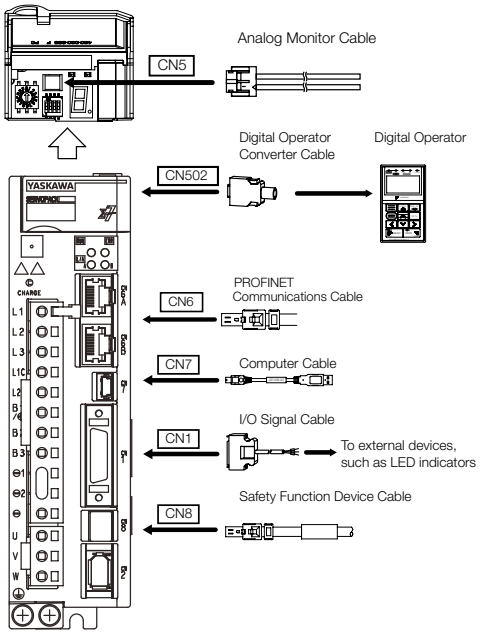

Altitude




Surrounding air temperature and altitude

# Selecting Cables SGD7S PROFINET

## System Configurations




## Selection Table

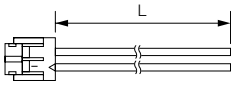
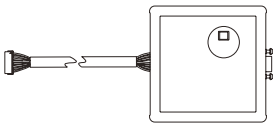
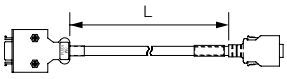
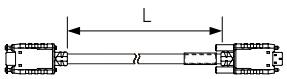
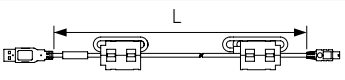
Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.

- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN502 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Serial Communications Connector | 0.3 m | JUSP-JC001-1 |  |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| | | | | JZSP-CVS07-A3-E*2 |  |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

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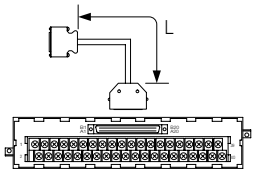
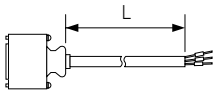
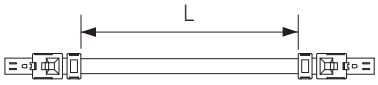
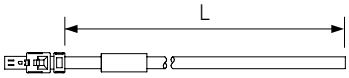
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |   |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |   |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN6 | MECHATROLINK-III / EtherCAT / PROFINET Communications Cables (RJ45)*3 | | 0.2 m | CM3R□M0-00P2-E |   |
| | | | 0.5 m | CM3R□M0-00P5-E | |
| | | | 1 m | JZSP-CM3R□M0-01-E | |
| | | | 3 m | JZSP-CM3R□M0-03-E | |
| | | | 5 m | JZSP-CM3R□M0-05-E | |
| | | | 10 m | JZSP-CM3R□M0-10-E | |
| | | | 20 m | JZSP-CM3R□M0-20-E | |
| | | | 30 m | JZSP-CM3R□M0-30-E | |
| | | | 40 m | JZSP-CM3R□M0-40-E | |
| | | | 50 m | JZSP-CM3R□M0-50-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*4 | 1 m | JZSP-CVH03-01-E-Gx |   |
| | | | 3 m | JZSP-CVH03-03-E-Gx | |
| | | Connector Kit*5 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for S-7-series SERVOPACKs.
*2. If you use a MECHATROLINK-III Communications Reference SERVOPACK, this Converter Cable is required to prevent the cable from disconnecting from the Digital Operator.
*3. This cable is available in two variants. The order number for these cables differs at the marked □, an „R“ at this place is used for Cables with RJ45 Connectors on both ends, while an „M“ is used for Cables with RJ45 Connector on One End and IMI Connector on the other End.
*4. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*5. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

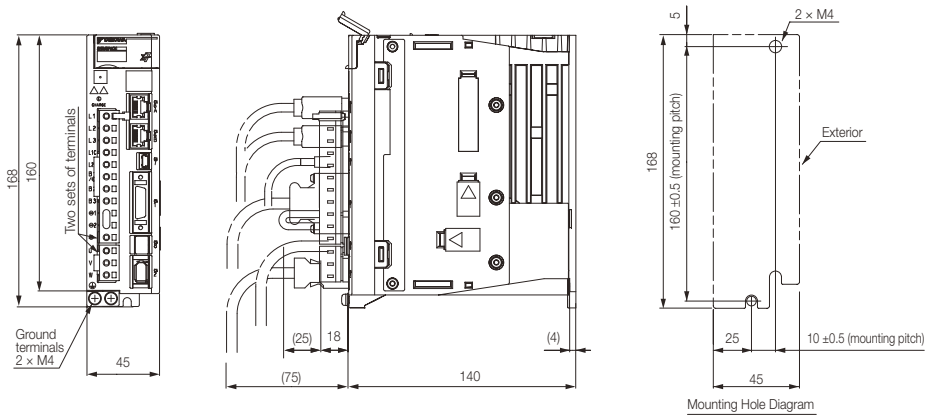
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm²) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

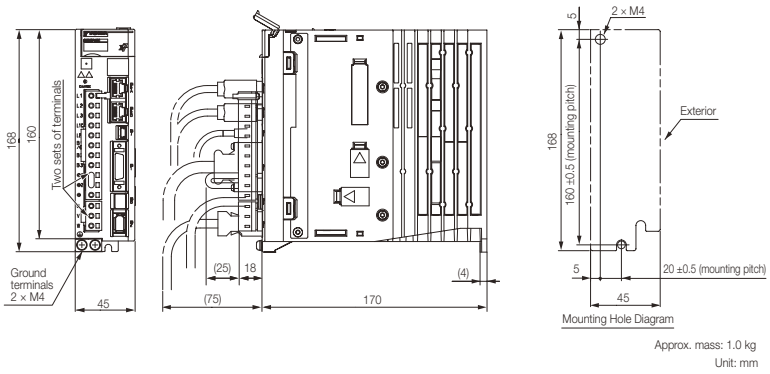
# SERVOPACK External Dimensions

## Three-phase & Single-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A



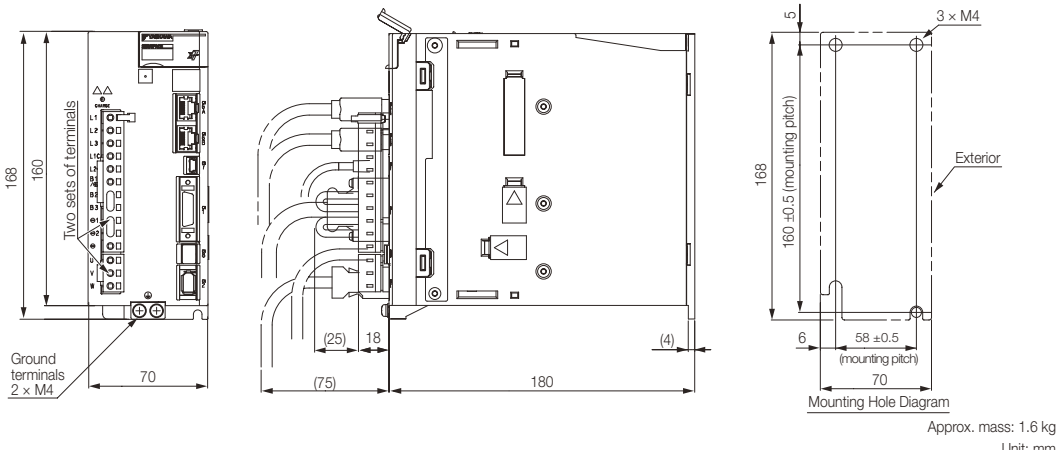

Approx. mass: 0.8 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-2R8A



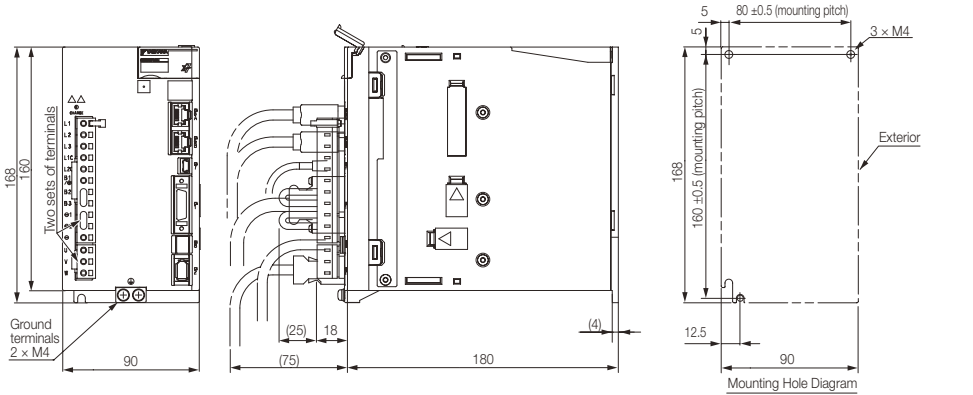

Approx. mass: 1.0 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-3R8A, -5R5A
## Three-phase. 200 VAC: -7R6A



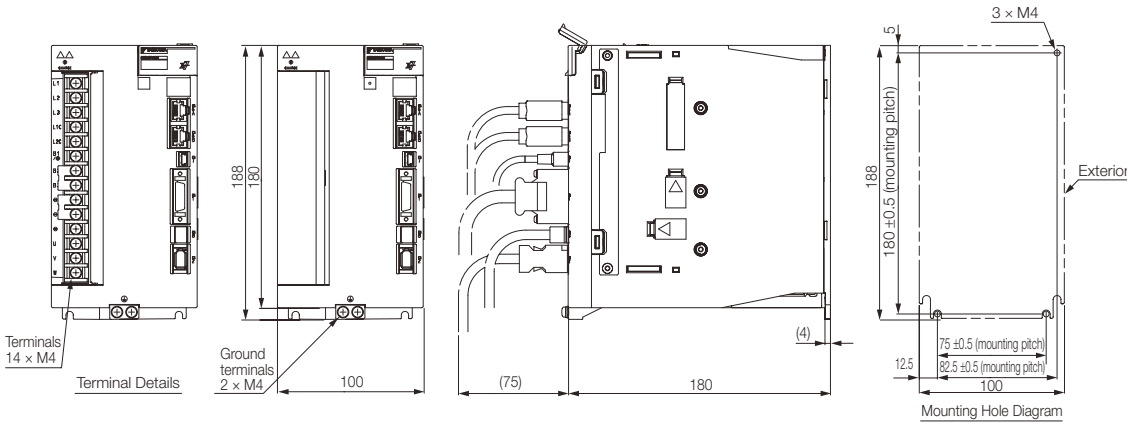

Approx. mass: 1.6 kg
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-120A



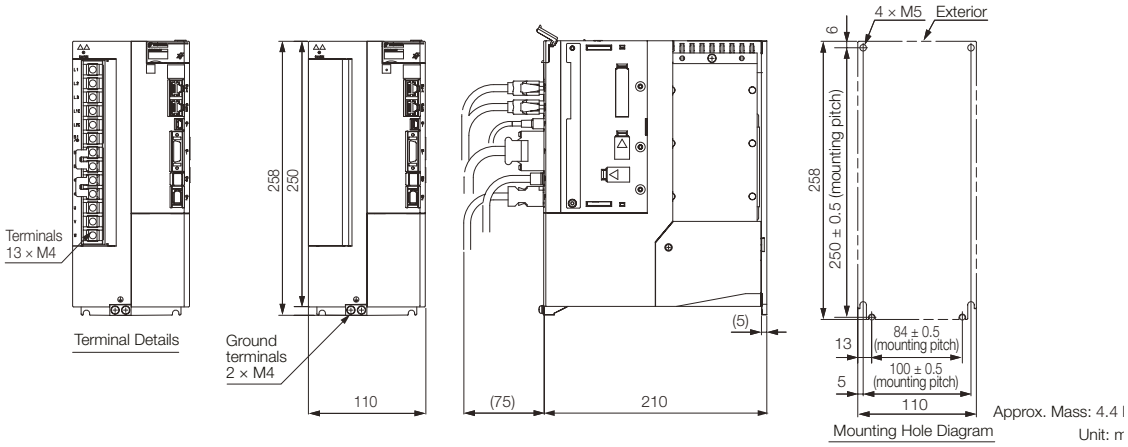

Approx. mass: 2.2 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-180A and -200A

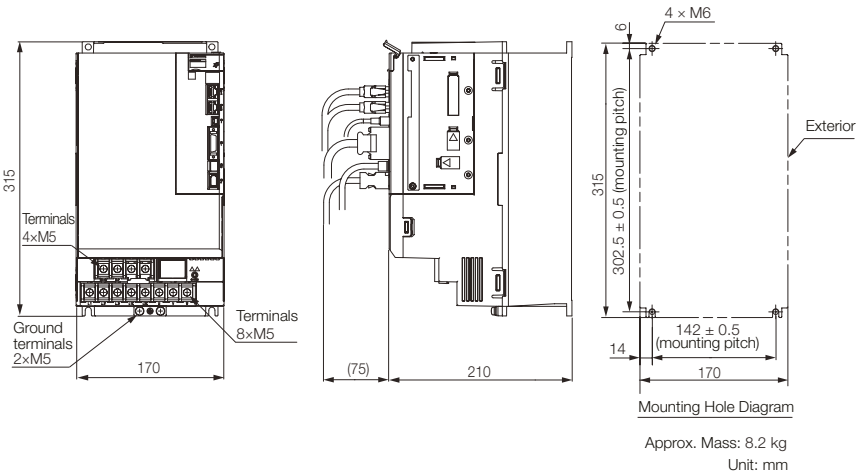



Approx. mass: 2.7 kg
Unit: mm

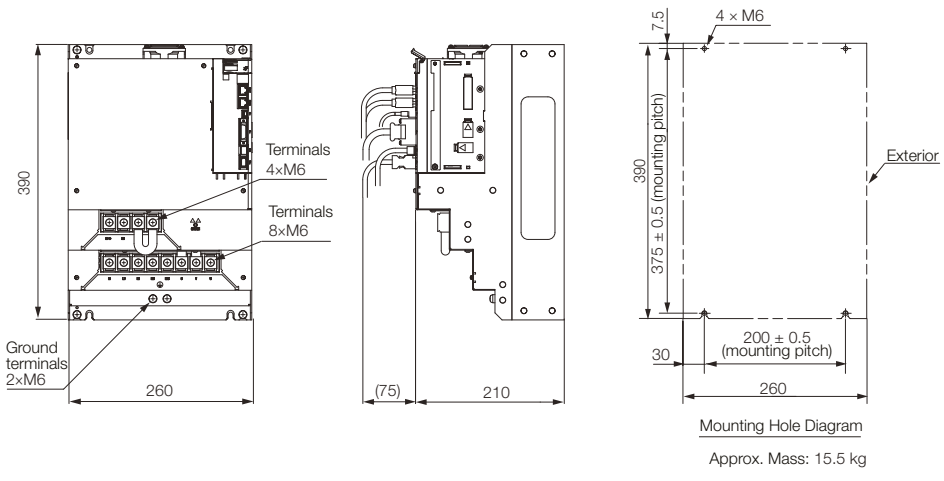
## Three-phase, 200 VAC: SGD7S-330A




## Three-phase, 200 VAC: SGD7S-470A and -550A




## Three-phase, 200 VAC: SGD7S-590A and -780A



# Model Designations

| SGD7W | - | 1R6 | A | 20 | A | 700 | 000 | |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series<br>Sigma-7W Models | | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |

**1st ... 3rd digit - Maximum Applicable Motor Capacity per Axis**

| Code | Specification |
|---|---|
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 5R5*1*2 | 0.75 kW |
| 7R6 | 1.0 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC, Three-phase |

**5th + 6th digit - Interface*3**

| Code | Specification |
|---|---|
| 20 | MECHATROLINK-III communication reference |

**7th digit - Design Revision Order**

| |
|---|
| A |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 700*4 | HWBB option | All models |

Note:
Additional accessories and software for SERVOPACKs is described in the Periphery section.

*1. You can use these models with either a single-phase or three-phase power supply input. For more information, please contact your YASKAWA representative.
*2. If you use the Servomotor with a single-phase 200-VAC power supply input, derate the load ratio to 65%.
An example is given below. If the load ratio of the first axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65%.
((90% + 40%)/2 = 65%)
*3. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*4. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7W/Sigma-7C SERVOPACK with Hardware Option Specifications HWBB Function Product Manual (Manual No.: SIEP S800001 72)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7W- | | | 1R6A | 2R8A | 5R5A*1 |
|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity per Axis [kW] | | | 0.2 | 0.4 | 0.75 |
| Continuous Output Current per Axis [A] | | | 1.6 | 2.8 | 5.5 |
| Instantaneous Maximum Output Current per Axis [A] | | | 5.9 | 9.3 | 16.9 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | |
| | Input Current [A]*2 | | 5.5 | 11 | 12 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | |
| | Input Current [A]*2 | | 0.25 | 0.25 | 0.25 |
| Power Supply Capacity [kVA]* 2 | | | 1.3 | 2.4 | 2.7 |
| Power Loss*2 | Main Circuit Power Loss [W] | | 24.1 | 43.6 | 54.1 |
| | Control Circuit Power Loss [W] | | 17 | 17 | 17 |
| | Built-in Regenerative Resistor Power Loss [W] | | 8 | 8 | 16 |
| | Total Power Loss [W] | | 49 | 69 | 87 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | 40 | 40 | 12 |
| | | Capacity [W] | 40 | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 12 |
| Overvoltage Category | | | III | | |

*1. If you use the SGD7W-5R5A with a single-phase 200-VAC power supply input, derate the load ratio to 65%. An example is given below.
If the load ratio of the first axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65%
((90% + 40%)/2 = 65%).
*2. This is the net value at the rated load. However, a load ratio of 65% was used for the SGD7W-5R5A.

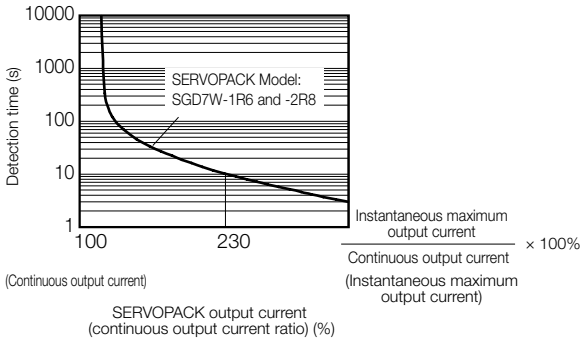
### Three-phase, 200 VAC

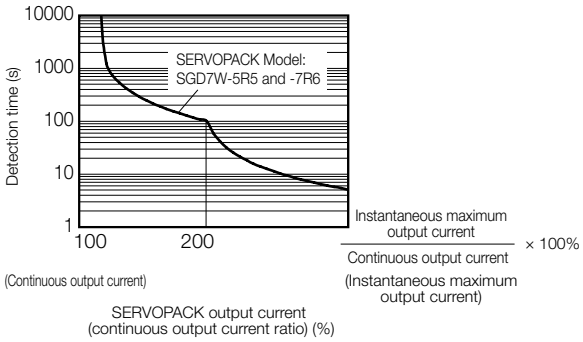
| Model SGD7W- | | | 1R6A | 2R8A | 5R5A | 7R6A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity per Axis [kW] | | | 0.2 | 0.4 | 0.75 | 1.0 |
| Continuous Output Current per Axis [A] | | | 1.6 | 2.8 | 5.5 | 7.6 |
| Instantaneous Maximum Output Current per Axis [A] | | | 5.9 | 9.3 | 16.9 | 17.0 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]* | | 2.5 | 4.7 | 7.8 | 11 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]* | | 0.25 | 0.25 | 0.25 | 0.25 |
| Power Supply Capacity [kVA]* | | | 1.0 | 1.9 | 3.2 | 4.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 24.0 | 43.3 | 78.9 | 94.2 |
| | Control Circuit Power Loss [W] | | 17 | 17 | 17 | 17 |
| | Built-in Regenerative Resistor Power Loss [W] | | 8 | 8 | 16 | 16 |
| | Total Power Loss [W] | | 49 | 68 | 112 | 127 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | 40 | 40 | 12 | 12 |
| | | Capacity [W] | 40 | 40 | 60 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 12 | 12 |
| Overvoltage Category | | | III | | | |

* This is the net value at the rated load.
Note: For more information on Three-phase models, please contact your YASKAWA representative.

# SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque (or effective force) within the continuous duty zone of the torque-motor speed characteristic (or force-motor speed characteristics) of the Servomotor.

## Specifications

| Item | | Specification |
|---|---|---|
| Control Method | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Ambient Air Temperature | -5°C to 55°C<br>With derating, usage is possible between 55°C and 60°C. Refer to the following section for Derating Specifications. |
| | Storage Temperature | -20°C to 85°C |
| | Ambient Air Humidity | 95% relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | 95% relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | 4.9 $m/s^2$ |
| | Shock Resistance | 19.6 $m/s^2$ |
| | Protection Class | IP 20 |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m.<br>Refer to the following section for Derating specifications. |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity |
| Applicable Standards | | UL 61800-5-1 (E147823), CSA C22.2 No.274, EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, EN 61800-3 (Category C2, Second environment), EN 50178, and EN 61800-5-1 |
| Mounting | | Base-mounted or rack-mounted |
| Performance | Speed Control Range | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation* | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) |
| | | 0% of rated speed max. (for a voltage fluctuation of ±10%) |
| | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ± 25°C) |
| | Torque Control Precision (Repeatability) | ±1% |
| | Soft Start Time Setting | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |

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| Item | | | Specification |
|---|---|---|---|
| I/O Signals | Overheat Protection Input | | Number of input points: 2<br>Input voltage range: 0 V to +5 V |
| | Sequence Input Signals | Input Signals That Can Be Allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 12<br>Input method: Sink inputs or source inputs Input Signals<br>● P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>● /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>● /DEC (Origin Return Deceleration Switch) signal<br>● /EXT1 to /EXT3 (External Latch Input 1 to 3) signals<br>● FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 2<br>Output signal: Servo Alarm (ALM) |
| | | Output Signals That Can Be Allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.)<br>Output Signals:<br>● /COIN (Positioning Completion) signal<br>● /V-CMP (Speed Coincidence Detection) signal<br>● /TGON (Rotation Detection) signal<br>● /S-RDY (Servo Ready) signal<br>● /CLT (Torque Limit Detection) signal<br>● /VLT (Speed Limit Detection) signal<br>● /BK (Brake) signal<br>● /WARN (Warning) signal<br>● /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | USB Communications (CN7) | Interface | Personal Computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB2.0 standard (12 Mbps). |
| Displays/ Indicators | | | CHARGE, PWR, COM, L1, and L2 indicators, and one-digit seven-segment displays |
| MECHATROLINK-III Communications | Communications Protocol | | MECHATROLINK-III |
| | Station Address Settings | | 03 to EF hex (maximum number of slaves: 62)<br>The rotary switches (S1 and S2) are used to set the station address. |
| | Extended Address Setting | | Axis 1: 00 hex, Axis 2: 01 hex |
| | Baud Rate | | 100 Mbps |
| | Transmission Cycle | | 250 µs, 500 µs, 750 µs, 1.0 ms to 4.0 ms (multiples of 0.5 ms) |
| | Number of Transmission Bytes | | 32 or 48 bytes/station<br>A DIP switch (S3) is used to select the baud rate. |
| Reference Method | Performance | | Position, speed, or torque control with MECHATROLINK-III communications |
| | Reference Input | | MECHATROLINK-III commands (sequence, motion, data setting, data access, monitoring, adjustment, etc.) |
| | Profile | | MECHATROLINK-III standard servo profile |
| MECHATROLINK-III Communications Setting Switches | | | Rotary switch (S1 and S2) positions: 16<br>Number of DIP switch (S3) pins: 4 |

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| Item | Specification |
|---|---|
| Analog Monitor (CN5) | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | Built-in |
| Overtravel (OT) Prevention | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | Gain adjustment, alarm history, jogging, origin search, etc. |
| Option Modules | Option Modules canot be attached. |

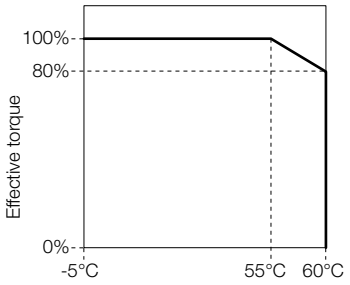
* The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

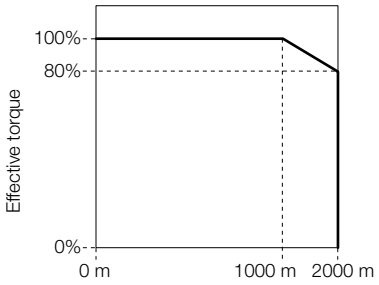
# Derating Specifications

If you use the SERVOPACK at a surrounding air temperature of 55°C to 60°C or at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graphs.

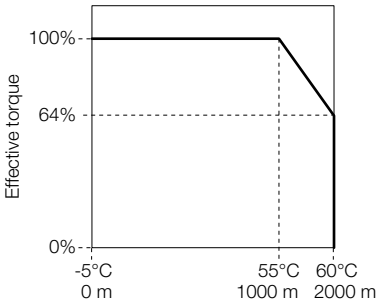
### SGD7W-1R6A, -2R8A, -5R5A, and -7R6A




Surrounding air temperature



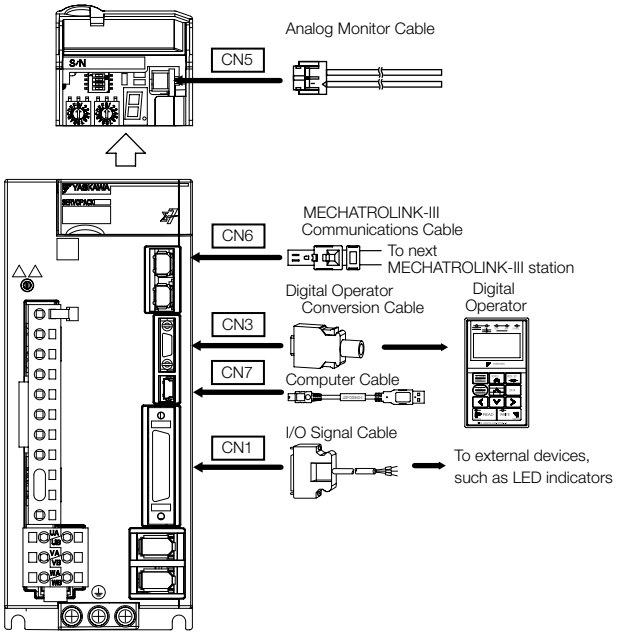

Altitude




Surrounding air temperature and altitude

# Selecting Cables SGD7W MECHATROLINK-III

## System Configurations

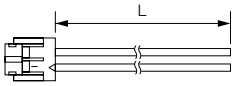
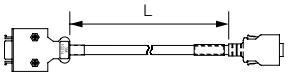
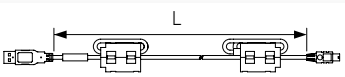



## Selection Table

Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables
  Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN3 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| | | | | JZSP-CVS07-A3-E*2 | |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

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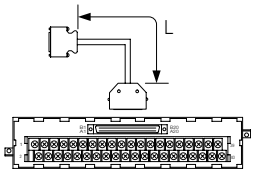
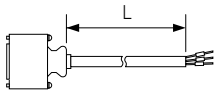
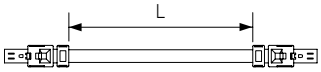
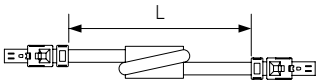
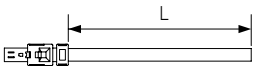
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | DP9420007-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA36P-E |   |
| | | | 1 m | JUSP-TA36P-1-E | |
| | | | 2 m | JUSP-TA36P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI03-1-E |   |
| | | | 2 m | JZSP-CSI03-2-E | |
| | | | 3 m | JZSP-CSI03-3-E | |
| CN6 | MECHATROLINK-III Communications Cables | Cables with Connectors on both Ends | 0.2 m | JEPMC-W6012-A2-E |   |
| | | | 0.5 m | JEPMC-W6012-A5-E | |
| | | | 1 m | JEPMC-W6012-01-E | |
| | | | 2 m | JEPMC-W6012-02-E | |
| | | | 3 m | JEPMC-W6012-03-E | |
| | | | 4 m | JEPMC-W6012-04-E | |
| | | | 5 m | JEPMC-W6012-05-E | |
| | | | 10 m | JEPMC-W6012-10-E | |
| | | | 20 m | JEPMC-W6012-20-E | |
| | | | 30 m | JEPMC-W6012-30-E | |
| | | | 50 m | JEPMC-W6012-50-E | |
| | | Cables with Connectors on both Ends (with core) | 10 m | JEPMC-W6013-10-E |   |
| | | | 20 m | JEPMC-W6013-20-E | |
| | | | 30 m | JEPMC-W6013-30-E | |
| | | | 50 m | JEPMC-W6013-50-E | |
| | | Cable with loose Wires at one End | 0.5 m | JEPMC-W6014-A5-E |   |
| | | | 1 m | JEPMC-W6014-01-E | |
| | | | 3 m | JEPMC-W6014-03-E | |
| | | | 5 m | JEPMC-W6014-05-E | |
| | | | 10 m | JEPMC-W6014-10-E | |
| | | | 30 m | JEPMC-W6014-30-E | |
| | | | 50 m | JEPMC-W6014-50-E | |

*1. This Converter Cable is required to use the S-III-series Digital Operator (JUSP-OP05A) for S-7-series SERVOPACKs.
*2. If you use a MECHATROLINK-III Communications Reference SERVOPACK, this Converter Cable is required to prevent the cable from disconnecting from the Digital Operator.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

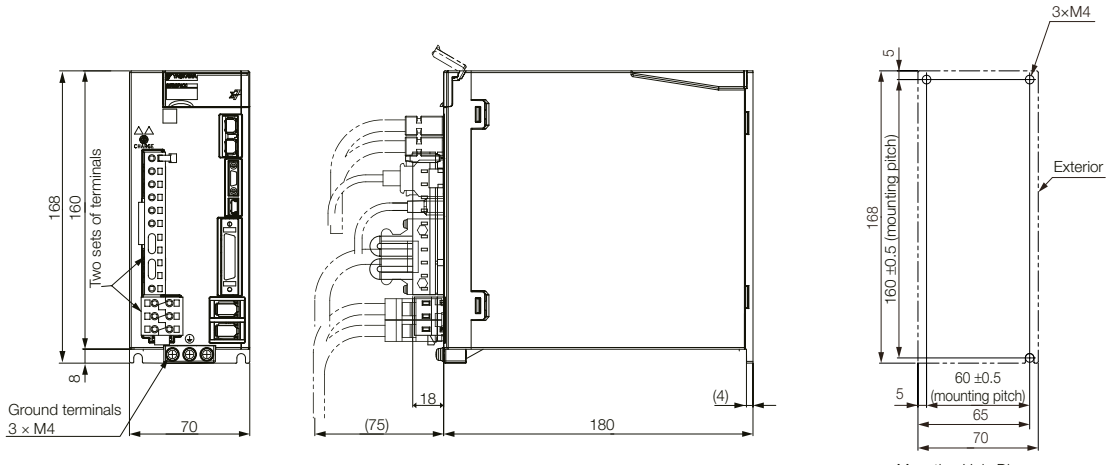
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm²) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

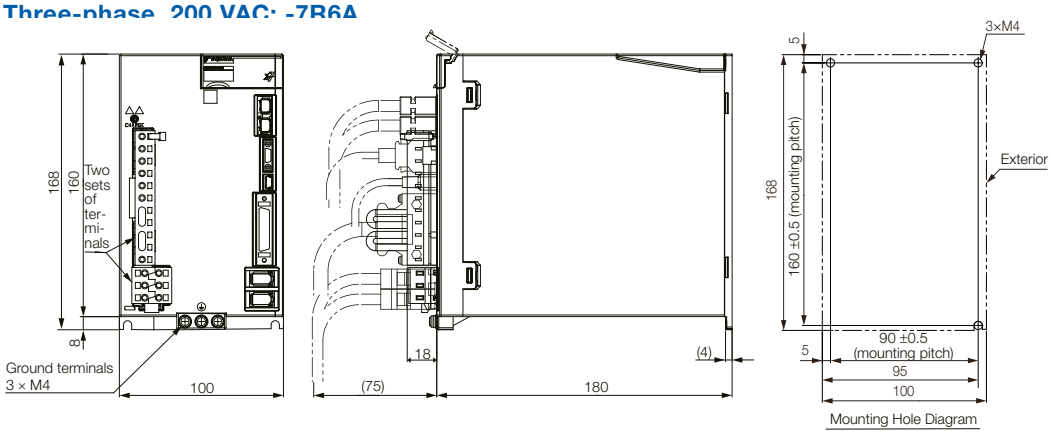
# SERVOPACK External Dimensions SGD7W

## Three-phase & Single-phase, 200 VAC: SGD7W-1R6A and -2R8A




## Three-phase & Single-phase, 200 VAC: SGD7W-5R5A

## Three-phase, 200 VAC: -7R6A




Mounting Hole Diagram

Approx. Mass: 2.3 kg

Unit: mm

# Model Designations

| SGD7C | - | 1R6 | A | MA | A | 700 | |
|---|---|---|---|---|---|---|---|
| Sigma-7 Series SERVOPACKs | | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | digit |

**1st ... 3rd digit - Maximum Applicable Motor Capacity per Axis**

| Code | Specifications |
|---|---|
| 1R6[*1] | 0.2 kW |
| 2R8[*1] | 0.4 kW |
| 5R5[*1 *2] | 0.75 kW |
| 7R6 | 1.0 kW |

**4th digit - Voltage**

| Code | Specifications |
|---|---|
| A | 200 VAC single/three-phase[*1] |

**5th + 6th digit - Interface**

| Code | Specifications |
|---|---|
| MA | Bus connection reference |

**7th digit - Design Revision Order**

| Code | Specifications |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 700[*4] | HWBB option | All models |

Note:
Additional accessories and software for SERVOPACKs is described in the Periphery section.

*1. You can use these models with either a single-phase or three-phase power supply input.
*2. If you use the Servomotor with a single-phase 200-VAC power supply input, derate the load ratio to 65%. An example is given below.
If the load ratio of the first axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65%. ((90% + 40%)/2 = 65%)
*3. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*4. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7W/Sigma-7C SERVOPACK with Hardware Option Specifications HWBB Function Product Manual (Manual No.: SIEP S800001 72)

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7C- | | | 1R6A | 2R8A | 5R5A*1 |
|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity per Axis [kW] | | | 0.2 | 0.4 | 0.75 |
| Continuous Output Current per Axis [A] | | | 1.6 | 2.8 | 5.5 |
| Instantaneous Maximum Output Current per Axis [A] | | | 5.9 | 9.3 | 16.9 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | |
| | Input Current [A]*2 | | 5.5 | 11 | 12 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | |
| | Input Current [A]*2 | | 0.25 | | |
| Power Supply Capacity [kVA]*2 | | | 1.3 | 2.4 | 2.7 |
| Power Loss*2 | Main Circuit Power Loss [W] | | 24.1 | 43.6 | 54.1 |
| | Control Circuit Power Loss [W] | | 17 | | |
| | Built-in Regenerative Resistor Power Loss [W] | | 8 | | 16 |
| | Total Power Loss [W] | | 49 | 69 | 87 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | 40 | | 12 |
| | | Capacity [W] | 40 | | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | | 12 |
| Overvoltage Category | | | III | | |

*1. If you use the SGD7C-5R5A with a single-phase 200-VAC power supply input, derate the load ratio to 65%. An example is given below. If the load ratio of the first axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65% ((90% + 40%)/2 = 65%).
*2. This is the net value at the rated load. However, a load ratio of 65% was used for the SGD7W-5R5A.

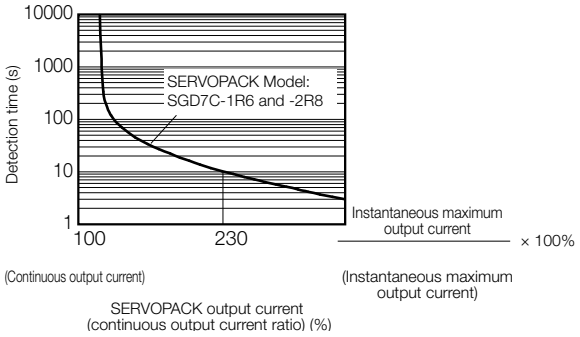
### Three-phase, 200 VAC

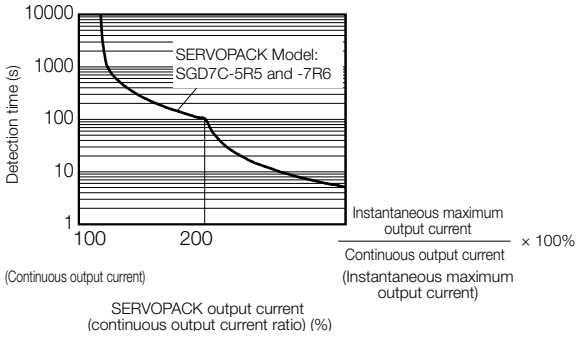
| Model SGD7C- | | | 1R6A | 2R8A | 5R5A | 7R6A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity per Axis [kW] | | | 0.2 | 0.4 | 0.75 | 1.0 |
| Continuous Output Current per Axis [A] | | | 1.6 | 2.8 | 5.5 | 7.6 |
| Instantaneous Maximum Output Current per Axis [A] | | | 5.9 | 9.3 | 16.9 | 17.0 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]* | | 2.5 | 4.7 | 7.8 | 11 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]* | | 0.25 | | | |
| Power Supply Capacity [kVA]* | | | 1.0 | 1.9 | 3.2 | 4.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 24.0 | 43.3 | 78.9 | 94.2 |
| | Control Circuit Power Loss [W] | | 17 | | | |
| | Built-in Regenerative Resistor Power Loss [W] | | 8 | | 16 | |
| | Total Power Loss [W] | | 49 | 68 | 112 | 127 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | 40 | | 12 | |
| | | Capacity [W] | 40 | | 60 | |
| | Minimum Allowable External Resistance [Ω] | | 40 | | 12 | |
| Overvoltage Category | | | III | | | |

*This is the net value at the rated load.

# SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque (or effective force) within the continuous duty zone of the torque-motor speed characteristic (or force-motor speed characteristics) of the Servomotor.

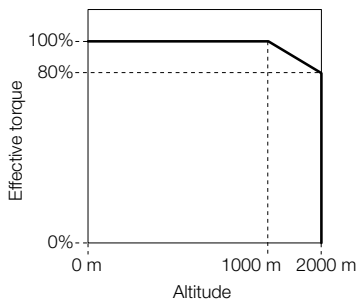
## General Specifications

| Item | | Specification |
|---|---|---|
| Control Method | | IGBT-based PWM control, sine wave current drive |
| Feedback | With Rotary Servomotor | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) |
| Environmental Conditions | Ambient Air Temperature | 0°C to 55°C |
| | Storage Temperature | -20°C to 85°C |
| | Ambient Air Humidity | 10 % to 95% relative humidity max. (with no freezing or condensation) |
| | Storage Humidity | 10 % to 95% relative humidity max. (with no freezing or condensation) |
| | Vibration Resistance | 4.9 $m/s^2$ |
| | Shock Resistance | 19.6 $m/s^2$ |
| | Degree of Protection | IP 20 |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. |
| | Altitude | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m.<br>Refer to the Derating Specifications section. |
| | Power Frequency Magnetic Field | 30 A/m (50 Hz/60 Hz), IEC 61000-4-8, Level 4 |
| | Others | Must be no exposure to electrostatic noise or radiation. |
| Applicable Standards | | UL 61800-5-1 (E147823), CSA C22.2 No.274, EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4, EN 61800-3 (Category C2, Second environment), EN 50178, and EN 61800-5-1 |
| Mounting | | Base-mounted or rack-mounted |

# Derating Specifications

If you use the SERVOPACK at an altitude of 1,000 m to 2,000 m, you must apply the derating rates given in the following graph.

### SGD7C-1R6A, -2R8A, -5R5A, and -7R6A



## Servo Section Specifications

| Item | | | Specification |
|---|---|---|---|
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) |
| | Coefficient of Speed Fluctuation* | | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) |
| | | | 0% of rated speed max. (for a load fluctuation of ±10%) |
| | | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) |
| | Torque Control Precision (Repeatability) | | ±1% |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) |
| I/O Signals | Overheat Protection Input | | Number of input points: 2<br>Input voltage range (0 V to 5 V) |
| | Sequence Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 12<br>Input method: Sink inputs or source inputs<br>Input Signals:<br>• P-OT (Forward Drive Prohibit Input) and N-OT (Reverse Drive Prohibit Input) signals<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• /DEC (Origin Return Deceleration Switch) signal<br>• /EXT1 to /EXT3 (External Latch Input 1 to 3) signals<br>• FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| | Sequence Output Signals | Fixed Outputs | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 2<br>Output signal: ALM (Servo Alarm Output) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of outputs points: 5<br>(Photocoupler outputs (isolated) are used.)<br>Output Signals:<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | USB Communications (CN7) | Interface | Personal computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB 2.0 standard (12 Mbps) |
| Displays/Indicators | | | CHARGE and PWR indicators, and two, one-digit seven-segment displays |
| Reference Method | | | Reference with built-in controller |
| Dynamic Brake (DB) | | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF |
| Regenerative Processing | | | Built-in |
| Overtravel (OT) Prevention | | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit Input) or N-OT (Reverse Drive Prohibit Input) signal |
| Protective Functions | | | Overcurrent, overvoltage, undervoltage, overload, regeneration error, etc. |
| Utility Functions | | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Applicable Option Modules | | | None |

* The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

# Controller Section Specifications

## Hardware Specifications

| Item | Specification |
|---|---|
| Flash Memory | Capacity: 24 MB (15 MB of user memory) |
| SDRAM | Capacity: 256 MB |
| MRAM | Capacity: 4 MB |
| Calendar | Seconds, minutes, hour, day, week, month, year, day of week, and timing |
| Ethernet | One port, 10Base-T or 100Base-TX |
| MECHATROLINK | • MECHATROLINK-III, 1 circuit with 1 port<br>• Master |
| USB | • USB 2.0, Type A host, 1 port<br>• Compatible devices: USB storage |
| Indicators and Displays | • Seven-segment display<br>• Status indicators<br>• USB Status Indicator<br>• Ethernet status indicators |
| Switches | • DIP switches: Mode switches<br>• STOP/SAVE switch |
| Connectors | • MECHATROLINK-III connector (CN6)<br>• USB connector (CN10)<br>• Ethernet connector (CN12)<br>• Controller Section I/O connector (CN13) |

## Performance Specifications

| Item | | Specification | Remarks |
|---|---|---|---|
| Number of controlled Axes | SVC4 | 4 axes<br>1 circuit | Circuit number selected from 1 to 16. |
| | SVD | 2 axes | Circuit number selected from 1 to 16. |
| | SVR4 | 4 axes<br>1 circuit | Circuit number selected from 1 to 16. |
| | Maximum Number of controlled Axes | 6 axes | – |
| Scan Time Settings | H Scan | 0.5 ms to 32.0 ms (in 0.25-ms increments) | Refer to the following manual for details.<br>Sigma-7-Series Sigma-7C SERVOPACK Product Manual (Manual No.: SIEP S800002 04) |
| | L Scan | 2.0 ms to 300 ms (in 0.5-ms increments) | – |
| | H Scan Default | 4 ms | – |
| | L Scan Default | 200 ms | – |
| Peripheral Devices | Calendar | Supported | – |
| | Communications Interface | Ethernet | – |
| | USB | Supported | – |
| Memory Capacity | DRAM | 256 MB with ECC | – |
| | MRAM | 4 MB | Up to 1 MB can be used to back up table data. |
| | Program Capacity | 15 MB | Total capacity including definition data, ladder programs, table data, etc. |
| Ladder Programs | Number of Startup Drawings (DWG.A) | 64 | Number of steps per drawing: 4,000 |
| | Number of Interrupt Drawings (DWG.I) | 64 | |
| | Number of High-Speed Scan Drawings (DWG.H) | 1,000 | |
| | Number of Low-Speed Scan Drawings (DWG.L) | 2,000 | |
| | Number of User Function Drawings | 2,000 | |

Continued on next page.

Continued from previous page.

| Item | | | Specification | Remarks |
|---|---|---|---|---|
| Motion Programs | Number of Programs | | 512 | Total of all programs listed below:<br>• Motion main programs<br>• Motion subprograms<br>• Sequence main programs<br>• Sequence subprograms |
| | Number of Groups | | 16 | – |
| | Number of Tasks | | 32 | – |
| | Number of Nesting Levels for IF Instructions | | 8 | – |
| | Number of Nesting Levels for MSEE Instructions | | 8 | – |
| | Number of Parallel Forks per Task | | 8 | Select from the following four options:<br>• Main: 4 forks, Sub: 2 forks<br>• Main: 8 forks<br>• Main: 2 forks, Sub: 4 forks<br>• Sub: 8 forks |
| | Number of Simultaneously Controlled Axes per Task | | 10 axes | – |
| Registers | S Registers | | 64 Kwords | – |
| | M Registers | | 1 Mword | – |
| | G Registers | | 2 Mwords | – |
| | I/O Registers | | 64 Kwords | – |
| | Motion Registers | | 32 Kwords | – |
| | C Registers | | 16 Kwords | – |
| | # Registers | | 16 Kwords | – |
| | D Registers | | 16 Kwords | – |
| Data Types | Bit (B) | | Supported | 0 or 1 |
| | Integer (W) | | Supported | -32,768 to 32,767 |
| | Double-Length Integer (L) | | Supported | -2,147,483,648 to 2,147,483,647 |
| | Quadruple-Length Integer (Q) | | Supported | -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 |
| | Single-Precision Real Number (F) | | Supported | ± (1.175E-38 to 3.402E+38) or 0 |
| | Double-Precision Real Number (D) | | Supported | ±(2.225E-308 to 1.798E+308) or 0 |
| | Addresses (A) | | Supported | 0 to 16,777,214 |
| Index Registers | Subscript i | | Supported | Special registers for offsetting addresses.<br>Subscripts i and j function identically. |
| | Subscript j | | Supported | |
| | Array Registers | | Supported | Used to handle registers as arrays. |
| Data Tracing | Number of Groups | | 4 | – |
| | Trace Memory | | 256 Kwords total in 4 groups | – |
| | Traceable Data Points | | 16 points per group | – |
| | Trigger Types | | >, <, =, <>, >=, <= and differential detection of the above conditions | – |
| Data Logging | Number of Groups | | 4 | – |
| | Log Storage Location | | Built-in RAM disk or USB memory device | – |
| | Log File Formats | | CSV file format or binary file format | – |
| | Data Logging Points | | 64 points per group | – |
| | Number of Log Files | Built-in RAM Disk | 1 to 4,000 | – |
| | | USB Memory | 1 to 32,767 or unlimited | The ultimate upper limit is 10,000 files even if unlimited is selected. |
| | Trigger Types | | >, <, =, <>, >=, <= | – |

## Communications Function Module Specifications

| Item | | | Specification | Remarks |
|---|---|---|---|---|
| Abbreviation | | | 218IFD | |
| Commission Items | Transmission Interface | | 10Base-T/100Base-TX | – |
| | Number of Communications Ports (Connectors) | | 1 | – |
| | Transmission Protocols | | TCP/UDP/IP/ARP/ICMP/IGMP | – |
| Ethernet Communications | Maximum Number of Communications Connections | | 20 + 2 (I/O message communications) | – |
| | Maximum Number of Communications Channels | | 10 + 2 (I/O message communications) | – |
| | Automatic Reception | | Supported | Not supported for no-protocol communications. |
| | Maximum Number of Automatic Reception Connections | | 10 | – |
| | Automatic Reception Status Monitor | | Supported | – |
| | Maximum Size of Message Communications | MEMOBUS | Write: 100 words<br>Read: 125 words | – |
| | | Extended MEMOBUS | Write: 2,043 words<br>Read: 2,044 words | – |
| | | MELSEC (A-Compatible 1E) | Write: 256 words<br>Read: 256 words | – |
| | | MELSEC (QnA-Compatible 3E) | Write: 960 words<br>Read: 960 words | – |
| | | MODBUS/TCP | Write: 100 words<br>Read: 125 words | – |
| | | OMRON | Write: 996 words<br>Read: 999 words | – |
| | | TOYOPUC | Write: 1,022 words | – |
| | | No-protocol | Write: 2,046 words | – |
| | Maximum Size of I/O Message Communications | MEMOBUS | Write: 100 words<br>Read: 125 words | – |
| | | Extended MEMOBUS | Write: 1,024 words<br>Read: 1,024 words | – |
| | | MELSEC (A-Compatible 1E) | Write: 256 words<br>Read: 256 words | – |
| | | MELSEC (QnA-Compatible 3E) | Write: 256 words<br>Read: 256 words | – |
| | | MODBUS/TCP | Write: 100 words<br>Read: 125 words | – |
| | | OMRON | Write: 996 words<br>Read: 999 words | – |
| | | Execution Conditions | You can select controls (start/stop) from a ladder program | – |
| | | Execution Status Monitor | Supported | – |
| | MotomanSync-MP | | Supported | – |
| | FTP Server | | Supported | – |
| | FTP Client | | Supported | – |
| | Receive Buffer Mode Selection for Noprotocol Communications | | Supported | – |
| | Engineering Tools | Communications Platform | Ethernet | – |
| | | Controller Searches | Supported | – |
| | | Supported Engineering Tools | MPE720 Ver.7 and SigmaWin+ Ver.7 | – |

## Motion Control Function Module Specifications

| Module | Item | | Specification |
|---|---|---|---|
| SVD | Number of Controlled Axes*1 | | 2 |
| | Reference Update Cycle (High-Speed Scan Cycle Performed by the CPU) | | 500 µs to 32.0 ms |
| | Register Ranges | | Registers for two axes are assigned from the registers for each circuit. Refer to the following manual for details. Sigma-7-Series Sigma-7C SERVOPACK Motion Control User's Manual (Manual No.: SIEP S800002 03) |
| SVC4 | Number of Controlled Axes*1 | | 4 |
| | Reference Update Cycle (High-Speed Scan Cycle Performed by the CPU) | | 500 µs to 32.0 ms |
| | Register Ranges | | Registers for four axes are assigned from the registers for each circuit. Refer to the following manuals for details. Sigma-7-Series Sigma-7C SERVOPACK Motion Control User's Manual (Manual No.: SIEP S800002 03) |
| | MECHATROLINK-III communications | Communications Interface | Master |
| | | Communications Cycle (Reference Update Cycle) | 500 µs to 32.0 ms |
| | | Transmission Cycle*2 | 125 µs, 250 µs, 500 µs, or 1 ms |
| | | Communications Cable | MECHATROLINK-III Communications Cable |
| | | Maximum Number of Connectable Stations | 8 |
| | | Topology | Cascade connections, star connections, or mixed star-cascade connections |
| | | Terminating Resistance | Not required |
| | | Connectable Slave Devices | SERVOPACKs, Stepping Motor Drivers, Inverters, I/O Modules, and Machine Controllers that support MECHATROLINK-III communications |
| | | Supported Profiles | MECHATROLINK-III Servo Standard, MECHATROLINK-III I/O Standard, MECHATROLINK-III Inverter Standard, and MECHATROLINK-III Stepping Motor Standard |
| SVR4 | Number of Controlled Axes*1 | | 4 |
| | Reference Update Cycle (High-Speed Scan Cycle Performed by the CPU) | | 500 µs to 32.0 ms |
| | Register Ranges | | Registers for four axes are assigned from the registers for each circuit. Refer to the following manuals for details. Sigma-7-Series Sigma-7C SERVOPACK Motion Control User's Manual (Manual No.: SIEP S800002 03) |

*1. A maximum of six axes can be controlled with the Motion Control Function Module in a Sigma-7C SERVOPACK.
Do not control more than a total of six axes with one Motion Control Function Module.
*2. The transmission cycle is the cycle in which the SVC4 and the slave devices perform communications on the MECHATROLINIK-III transmission path.

# M-EXECUTOR Specifications

## Registerable Programs

| Program Type | | Number of Registered Programs |
|---|---|---|
| Motion Programs | | 32* |
| Sequence Programs | Startup | 1 |
| | Interrupt | Not possible |
| | H scan | 32* |
| | L scan | 32* |

* The combined total of motion programs and sequence programs must not exceed 32.

## Program Control Methods

You can use the following control methods for the programs that are registered in the M-EXECUTOR:

| Item | Motion Programs | Sequence Programs |
|---|---|---|
| Execution Method | Sequential execution | Startup: Event execution<br>H scan: Scan execution<br>L scan: Scan execution |
| System Work | The same number is used for the definition number and system work number.<br>Definition Number: System Work Number<br>No.1: 1<br>No.2: 2<br>...: ...<br>No.32: 32 | |
| Program Designation Method | Direct designation or indirect designation | Direct designation |
| Program Execution Method | Register the program in the definitions and start execution by turning ON the start signal. | Execution is started when the program is registered in the definitions. |
| Interpolation Override Setting | Supported | Not supported |
| I/O Link Definitions | Supported | Not supported |
| Motion Program Status reporting in S Registers | Supported | |
| Number of Parallel Forks | Up to 8<br>Main: 4 forks, Sub: 2 forks<br>Main: 8 forks<br>Main: 2 forks, Sub:4 forks<br>Sub: 8 forks | No forks |
| Error Diagram Execution when an Operation Error occurs | Supported | |

# USB Memory Specifications

| Item | Specification | Remarks |
|---|---|---|
| Supported Media | USB memory device | Refer to the „Recommended USB Memory Device“ section for details. |
| Applicable FAT | FAT16/32 | – |
| Maximum Number of Nested Directories | 10 | – |
| File Information | Last update timestamp supported | Uses the calendar in the Controller Section. Refer to the following manual for details.<br>Sigma-7-Series Sigma-7C SERVOPACK Product Manual<br>(Manual No.: SIEP S800002 04) |
| Maximum Length for File Name and Directory Names | 256 characters | – |
| Current Directory Function | 16 | – |
| Maximum Number of Simultaneously Open Files | 16 | – |
| Formatting | Not supported | Use a formatted USB memory device. |

## Recommended USB Memory Device

The following USB memory device is recommended. It can be purchased from YASKAWA.

| Model | Specification | Manufacturer |
|---|---|---|
| SFU24096D1BP1TO-C-QT-111-CAP | 4-GB USB memory | Swissbit Japan Inc. |

# IO16 Function Module Specifications

The following table gives the specifications of the IO16 Function Module. There are 16 digital inputs and 16 digital outputs in the IO16 Function Module.

| Item | Specification | |
|---|---|---|
| Digital Inputs | Number of Inputs | 16 |
| | Input Method | Sink/source |
| | Isolation Method | Photocouplers |
| | Input Voltage | 24 VDC ±20% |
| | Input Current | 5 mA (typical) |
| | ON Voltage/Current | 15 V min./2 mA min. |
| | OFF Voltage/Current | 5 V max./1 mA max. |
| | ON/OFF Time | 0.01 ms + Digital filter setting |
| | Digital Filter Setting | 0 to 65,535 µs |
| | Number of Commons | 2 (8 points per common) |
| | Others | DI_00 is also used for interrupt signals<br>DI_01 is also used as the pulse latch input |
| Digital Outputs | Number of Outputs | 16 |
| | Output Method | Transistor open-collector sink outputs |
| | Isolation Method | Photocouplers |
| | Output Voltage | 24 VDC (20 V to 30 V) |
| | Output Current | 50 mA max. |
| | Leakage Current When OFF | 0.1 mA max. |
| | ON/OFF Time | 0.01 µs (for output current of 85 mA) |
| | Number of Commons | 2 (8 points per common) |
| | Output Protection | Thermistor (automatic recovery after blow out) |
| | Others | DO_00 is also used as the Match Output |

## Counter Specifications

The following table gives the specifications of counter. The counter uses a pulse input on one channel.

| Item | Specification | |
|---|---|---|
| Pulse Input | Number of Inputs | 1 (phase A, B, or Z input) |
| | Input Circuits | Phases A and B: 5-V differential input, not isolated, maximum frequency: 4 MHz<br>Phase Z: 5-V, 12-V, or 24-V photocoupler input, maximum frequency: 500 kHz |
| | Input Modes | Phases A and B, sign, and incrementing/decrementing |
| | Latch Input | Pulses are latched for phase Z or DI_01.<br>Response Times for Phase-Z Input<br>ON: 1 µs max.<br>OFF: 1 µs max.<br>Response Times for DI_01 Input<br>ON: 60 µs max.<br>OFF: 0.5 ms max. |
| | Other Functions | Match detection, counter preset and clear, electronic gear conversion, phase-C (phase-Z), and digital filter |

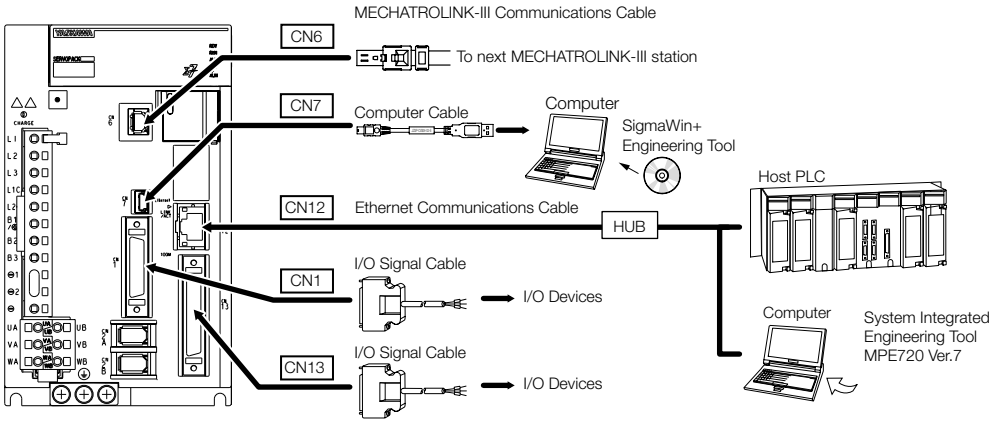
# System Register Specifications

This section shows the overall structure of the system registers. Refer to the following manuals for details.
Sigma-7-Series Sigma-7C SERVOPACK Product Manual (Manual No.: SIEP S800002 04)
Sigma-7-Series Sigma-7C SERVOPACK Troubleshooting Manual (Manual No.: SIEP S800002 07)

| Register Addresses | Contents |
|---|---|
| SW00000 to SW00029 | System Service Registers |
| SW00030 to SW00049 | System Status |
| SW00050 to SW00079 | System Error Status |
| SW00050 to SW00079 | User Operation Error Status |
| SW00090 to SW00103 | System Service Execution Status |
| SW00104 to SW00109 | Reserved |
| SW00110 to SW00189 | Detailed User Operation Error Status |
| SW00190 to SW00199 | Reserved |
| SW00200 to SW00503 | Security Status |
| SW00504 and SW00505 | Reserved |
| SW00506 and SW00507 | Security Status |
| SW00508 to SW00649 | Reserved |
| SW00650 to SW00667 | USB-Related System Status |
| SW00668 to SW00693 | Reserved |
| SW00694 to SW00697 | Message Relaying Status |
| SW00698 to SW00789 | Interrupt Status |
| SW00790 to SW00799 | Reserved |
| SW00800 to SW01095 | Module Information |
| SW01096 to SW02687 | Reserved |
| SW02688 to SW03199 | PROFINET Controller (266IF-01) IOPS Status |
| SW03200 to SW05119 | Motion Program Information |
| SW05120 to SW05247 | Used by the system (system memory read) |
| SW05248 to SW08191 | Reserved |
| SW08192 to SW09215 | Expansion Motion Program Information |
| SW09216 to SW09559 | Reserved |
| SW09560 to SW10627 | Expansion System I/O Error Status |
| SW10628 to SW13699 | Reserved |
| SW13700 to SW14259 | Expanded Unit and Module Information |
| SW14260 to SW15997 | Reserved |
| SW15998 to SW16011 | Expansion System Service Execution Status |
| SW16012 to SW16199 | Reserved |
| SW16200 to SW17999 | Alarm History Information |
| SW18000 to SW19999 | Reserved |
| SW20000 to SW22063 | Product Information |
| SW22064 to SW23999 | Reserved |
| SW24000 to SW24321 | Data Logging Execution Status |
| SW24322 to SW24999 | Reserved |
| SW24400 to SW24719 | FTP Client Status and Controls |
| SW25000 to SW25671 | Automatic Reception Status for Ethernet Communications |
| SW25672 to SW27599 | Reserved |
| SW27600 to SW29775 | Maintenance Monitor |
| SW29776 to SW65534 | Reserved |

# Selecting Cables SGD7C with built-in Controller

### System Configurations




## Selection Table

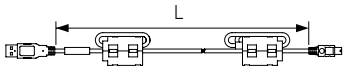
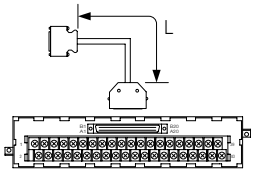
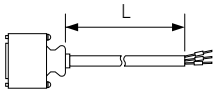
**Important**

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.

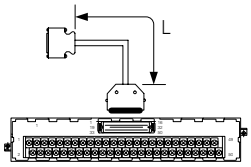
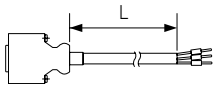
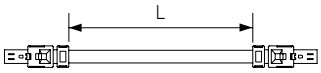
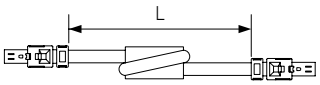
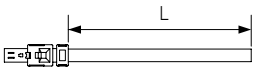
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |
| CN13 | I/O Signal Cables | Soldered Connector Kit | | DP9420007-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA36P-E |  |
| | | | 1 m | JUSP-TA36P-1-E | |
| | | | 2 m | JUSP-TA36P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI03-1-E |  |
| | | | 2 m | JZSP-CSI03-2-E | |
| | | | 3 m | JZSP-CSI03-3-E | |

Continued on next page.

Continued from previous page.

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-1-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA50PG-E |  |
| | | | 1 m | JUSP-TA50PG-1-E | |
| | | | 2 m | JUSP-TA50PG-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI01-1-E |  |
| | | | 2 m | JZSP-CSI01-2-E | |
| | | | 3 m | JZSP-CSI01-3-E | |
| CN6 | MECHATROLINK-III Communications Cables | Cables with Connectors on both Ends | 0.2 m | JEPMC-W6012-A2-E |  |
| | | | 0.5 m | JEPMC-W6012-A5-E | |
| | | | 1 m | JEPMC-W6012-01-E | |
| | | | 2 m | JEPMC-W6012-02-E | |
| | | | 3 m | JEPMC-W6012-03-E | |
| | | | 4 m | JEPMC-W6012-04-E | |
| | | | 5 m | JEPMC-W6012-05-E | |
| | | | 10 m | JEPMC-W6012-10-E | |
| | | | 20 m | JEPMC-W6012-20-E | |
| | | | 30 m | JEPMC-W6012-30-E | |
| | | | 50 m | JEPMC-W6012-50-E | |
| | | Cables with Connectors on both Ends (with core) | 10 m | JEPMC-W6013-10-E |  |
| | | | 20 m | JEPMC-W6013-20-E | |
| | | | 30 m | JEPMC-W6013-30-E | |
| | | | 50 m | JEPMC-W6013-50-E | |
| | | Cable with loose Wires at one End | 0.5 m | JEPMC-W6014-A5-E |  |
| | | | 1 m | JEPMC-W6014-01-E | |
| | | | 3 m | JEPMC-W6014-03-E | |
| | | | 5 m | JEPMC-W6014-05-E | |
| | | | 10 m | JEPMC-W6014-10-E | |
| | | | 30 m | JEPMC-W6014-30-E | |
| | | | 50 m | JEPMC-W6014-50-E | |
| CN12 | Ethernet communications cables | | | Use a commercially available cable that meets the following conditions:<br>Ethernet specification: 100Base-TX<br>Category 5 or higher<br>Twisted-pair cable with RJ-45 connectors | |

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

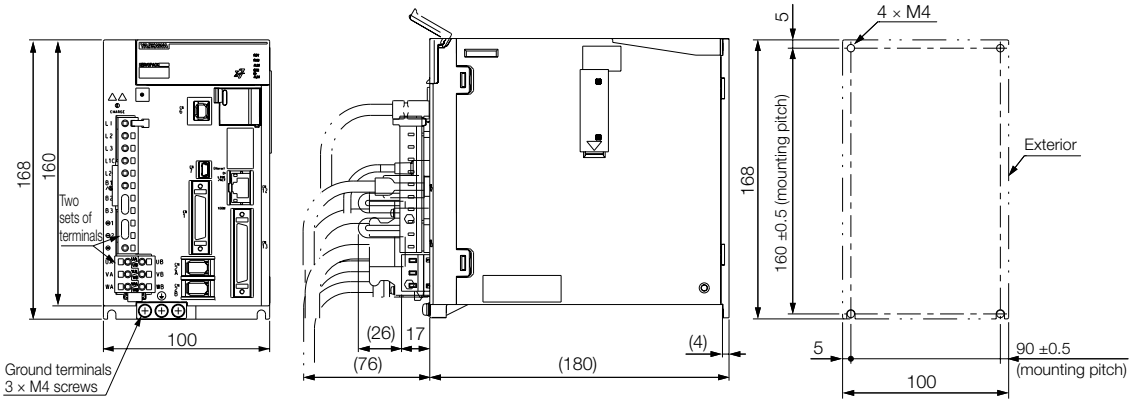
## Single-phase / Three-phase, 200-VAC Wires for Sigma-7C SERVOPACKs

| SGD7C- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| 1R6A*2 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm$^2$) | – | – |
| | Servomotor Main Circuit Cable*1 | UA, VA, WA, UB, VB, WB | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 2R8A*2 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm$^2$) | – | – |
| | Servomotor Main Circuit Cable*1 | UA, VA, WA, UB, VB, WB | AWG16 (1.25 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |
| 5R5A*2, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm$^2$) | – | – |
| | Servomotor Main Circuit Cable*1 | UA, VA, WA, UB, VB, WB | AWG16 (1.25 mm$^2$) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm$^2$) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm$^2$) min. | M4 | 1.2 to 1.4 |

*1 If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.
*2 You can use these models with either a single-phase or three-phase power supply input.

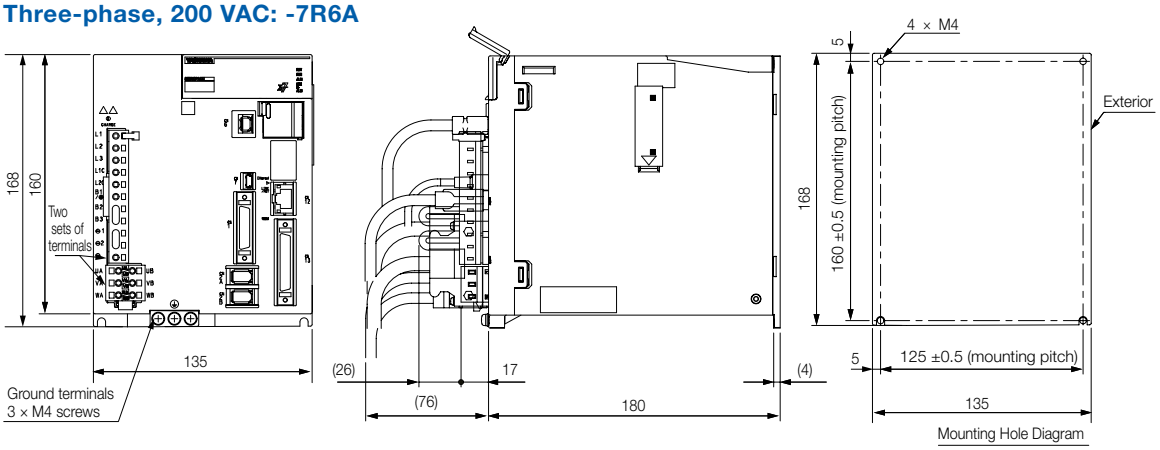
# Sigma-7C SERVOPACK External Dimensions

### Three-phase & Single-phase, 200 VAC: SGD7C-1R6A and -2R8A




Approx. mass: 2.0 kg
Unit: mm

### Three-phase & Single-phase, 200 VAC: SGD7C-5R5A
### Three-phase, 200 VAC: -7R6A

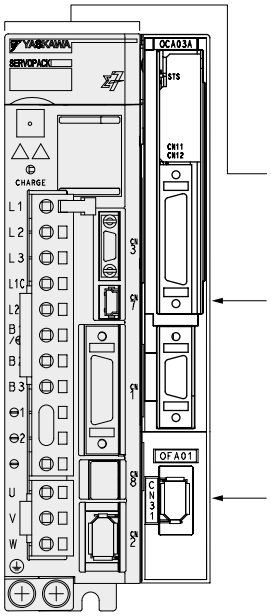



Approx. mass: 2.8 kg
Unit: mm

# Sigma-7S Command Option Attachable Type

## Configuration

A Sigma-7S Single-axis INDEXER Module-Mounted SERVOPACK is a Command Option Attachable-Type SERVOPACK with an INDEXER Module mounted on the side of the SERVOPACK. Positioning with single-axis control can be performed by using program table operation and other functions.




Command Option Attachable-Type SERVOPACKs
**SGD7S-□□□□E0A**

Option Module INDEXER
**SGDV-OCA03A**

Note: Firmware version 6 or later is required.

Fully-Closed Module*
**SGDV-OFA01A**

* Attach a Fully-Closed Module if fully-closed loop control is required.

## Model Designations

SGD7S - R70 A E0 A 001 000

| Sigma-7 Series Sigma-7S Models | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |
|---|---|---|---|---|---|---|---|

**1st ... 3rd digit - Maximum Applicable Motor Capacity**

| Code | Specification |
|---|---|
| Three-phase, 200 V | |
| R70*1 | 0.05 kW |
| R90*1 | 0.1 kW |
| 1R6*1 | 0.2 kW |
| 2R8*1 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5*1 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120*2 | 1.5 kW |
| 180 | 2.0 kW |
| 200*3 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specification |
|---|---|
| A | 200 VAC |

**5th + 6th digit - Interface*4**

| Code | Specification |
|---|---|
| E0 | Command Option Attachable Type*5 |

**7th digit - Design Revision Order**

| Code | Specification |
|---|---|
| A | Standard Model |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| None | Without Options | All models |
| 000 | Without Options only used in combination with FT/EX | All models |
| 001 | Rack-mounted | SGD7S-R70A to -330A |
| | Duct-ventilated | SGD7S-470A to -780A |
| 002 | Varnished | All models |
| 008 | Single-phase, 200 V power input | SGD7S-120A |
| 020*6 | No dynamic brake | SGD7S-R70A to -2R8A |
| | External dynamic brake resistor | SGD7S-3R8A to -780A |
| 00A | Varnished and single-phase power input | All models |

Note:
**Depending on configuration choices made, the model code might end after the 7th or 10th digit, or involve all 13 digits.**
Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

Note:
*1. You can use these models with either a single-phase or three-phase power supply input.
*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model. SGD7S-120A□0A008).
*3. The rated output is 2.4 kW if you combine the SGM7G-30A with the SGD7S-200A.
*4. The same SERVOPACKs are used for both Rotary Servomotors and Linear Servomotors.
*5. A command option module must be attached to the Command Option Attachable-type SERVOPACK for use.
*6. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Sigma-7S/Sigma-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual (Manual No.: SIEP S800001 73)
*7. Refer to the following manual for details.
Sigma-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for SGM7D Motor Product Manual (Manual No.: SIEP S800001 91)

# Sigma-7S Single-axis INDEXER Module

## Ratings

### Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 11.6 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 28 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 16 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4.0 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.1 | 12.1 | 23.7 | 39.2 | 71.8 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17.0 | 19.1 | 24.1 | 35.7 | 61.2 | 103.8 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

## Three-Phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3.0 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1.0 | 1.3 | 1.6 | 2.3 | 3.2 | 4.0 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.0 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17.0 | 19.0 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6.0 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]* 1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | External Regenerative Resistor Unit Power Loss [W] | | 180*2 | 180*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| External Regenerative Resistor Unit | External Regenerative Resistor Unit | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

Note: Readily available up to 1.5 kW. Others available on request.

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

### 270 VDC

| Model SGD7S- | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A |
|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1 | 1.5 |
| Continuous Output Current [A] | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 |
| Instantaneous Maximum Output Current [A] | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 |
| Main Circuit | Power Supply | 270 VDC to 324 VDC, -15% to +10% | | | | | | | |
| | Input Current [A]*1 | 0.5 | 1 | 1.5 | 3 | 3.8 | 4.9 | 6.9 | 11 |
| Control | Power Supply | 270 VDC to 324 VDC, -15% to +10% | | | | | | | |
| | Input Current [A]*1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2*2 |
| Power Supply Capacity [kVA]*1 | | 0.2 | 0.3 | 0.6 | 1 | 1.4 | 1.6 | 2.3 | 3.2 |
| Power Loss*1 | Main Circuit Power Loss [W] | 4.4 | 5.9 | 9.8 | 17.5 | 23.0 | 30.7 | 38.7 | 55.8 |
| | Control Circuit Power Loss [W] | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 |
| | Total Power Loss [W] | 16.4 | 17.9 | 21.8 | 29.5 | 37.0 | 44.7 | 52.7 | 70.8 |
| Overvoltage Category | | III | | | | | | | |

*1 This is the net value at the rated load.
*2 The value is 0.25 A for the SGD7S-120A00A008.

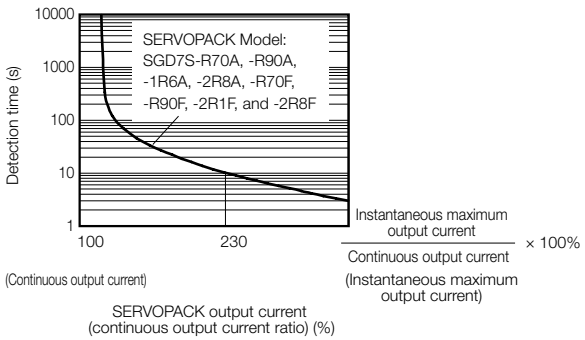
| Model SGD7S- | | 180A | 200A | 330A | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | 2.0 | 3.0 | 5.0 | 6.0 | 7.5 | 11.0 | 15.0 |
| Continuous Output Current [A] | | 18.5 | 19.6 | 32.9 | 46.9 | 54.7 | 58.6 | 78.0 |
| Instantaneous Maximum Output Current [A] | | 42.0 | 56.0 | 84.0 | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | 270 VDC to 324 VDC, -15% to + 10% | | | | | | |
| | Input Current [A]* | 14 | 20 | 34 | 36 | 48 | 68 | 92 |
| Control | Power Supply | 270 VDC to 324 VDC, -15% to + 10% | | | | | | |
| | Input Current [A]* | 0.25 | 0.25 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]* | | 4.0 | 5.9 | 7.5 | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss* | Main Circuit Power Loss [W] | 82.7 | 83.5 | 146.2 | 211.6 | 255.3 | 243.6 | 343.4 |
| | Control Circuit Power Loss [W] | 16 | 16 | 19 | 21 | 21 | 28 | 28 |
| | Total Power Loss [W] | 98.7 | 99.5 | 165.2 | 232.6 | 276.3 | 271.6 | 371.4 |
| Overvoltage Category | | III | | | | | | |

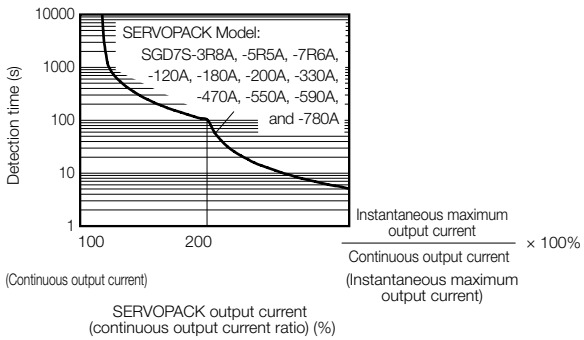
* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

## SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic (or force-motor speed characteristics) of the Servomotor.

## Specifications

The specification when the INDEXER Module is combined with a Command Option Attachable-Type SERVOPACK are given in the following table.

| Item | | Specification | |
|---|---|---|---|
| Control Method | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Surrounding Air Temperature | 0°C to 55°C | |
| | Storage Temperature | -20°C to 85°C | |
| | Surrounding Air Humidity | 90% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | 90% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | 4.9 $m/s^2$ | |
| | Shock Resistance | 19.6 $m/s^2$ | |
| | Degree of Protection | Class | SERVOPACK Model: SGD7S- |
| | | IP10 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A |
| | | IP20 | 120AE0A008, 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude | 1,000 m max. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | UL 61800-5-1 (E147823), CSA C22.2 No.274, EN ISO13849-1: 2015,<br>EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4,<br>EN 61800-3 (Category C2, Second environment), EN 50178, EN 61800-5-1,<br>IEC 60204-1, IEC 61508 series, IEC 62061, IEC 61800-5-2, and IEC 61326-3-1 | |
| Mounting | | Mounting | SERVOPACK Model: SGD7S- |
| | | Base-mounted | All Models |
| | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A |
| | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation*1 | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) | |
| | Torque Control Precision (Repeatability) | ±1% | |
| | Soft Start Time Setting | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |
| I/O Signals | Encoder Divided Pulse Putput | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed | |
| | Overheat Protection Input | Number of input points: 1<br>Input voltage range: 0 V to ±5 V | |

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| Item | | | | Specification | |
|---|---|---|---|---|---|
| I/O Signals | Sequence Input Signals | SERVOPACK | Fixed Input | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 6<br>Input method: Sink inputs or source inputs Input Signals:<br>• Alarm Reset (/ALM-RST)<br>• Forward Drive Prohibited (P-OT)<br>• Reverse Drive Prohibited (N-OT)<br>• Origin Return Deceleration Switch (/DEC)<br>• Registration (/RGRT)<br>• Servo ON (/S-ON)<br>A signal can be allocated and the positive and negative logic can be changed. | |
| | | INDEXER Module | Fixed Input | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 11<br>/MODE 0/1 (Mode Switch Input) signal | |
| | | | | Mode 0 | Mode 1 |
| | | | | • /START-STOP (Program Table Operation Start-Stop Input) signal<br>• /PGMRES (Program Table Operation Reset Input) signal<br>• /SEL0 (Program Step Selection Input 0) signal<br>• /SEL1 (Program Step Selection Input 1) signal<br>• /SEL2 (Program Step Selection Input 2) signal<br>• /SEL3 (Program Step Selection Input 3) signal<br>• /SEL4 (Program Step Selection Input 4) signal<br>• /SEL5 (Program Step Selection Input 5) signal<br>• /SEL6 (Program Step Selection Input 6) signal<br>• /SEL7 (Program Step Selection Input 7) signal | • /HOME (Origin Return Input) signal<br>• /JOGP (Forward Jog Input) signal<br>• /JOGN (Reverse Jog Input) signal<br>• /JOG0 (Jog Speed Table Selection Input 0) signal<br>• /JOG1 (Jog Speed Table Selection Input 1) signal<br>• /JOG2 (Jog Speed Table Selection Input 2) signal<br>• /JOG3 (Jog Speed Table Selection Input 3) signal |
| | Sequence Output Signals | SERVOPACK | Fixed Input | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: Servo Alarm (ALM) | |
| | | | Output Signals for Which Allocations Can Be Changed | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.)<br>Output Signals:<br>• Warning Output (/WARN)<br>• Brake Output (/BK)<br>• Servo Ready Output (/S-RDY)<br>• Alarm Code Output (/ALO1, /ALO2, and /ALO3)<br>A signal can be allocated and the positive and negative logic can be changed. | |
| | | INDEXER Module | Fixed Input | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 9<br>Output Signals:<br>• Positioning Completion Output (/INPOSITION)<br>• Programmable Output 0 (/POUT0)<br>• Programmable Output 1 (/POUT1)<br>• Programmable Output 2 (/POUT2)<br>• Programmable Output 3 (/POUT3)<br>• Programmable Output 4 (/POUT4)<br>• Programmable Output 5 (/POUT5)<br>• Programmable Output 6 (/POUT6)<br>• Programmable Output 7 (/POUT7) | |

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| Item | | | Specification |
|---|---|---|---|
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interfaces | Interface Personal computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB2.0 standard (12 Mbps). |
| Displays/ Indicators | SERVOPACK | | CHARGE and PWR indicators, and one-digit seven-segment display |
| | INDEXER Module | | Refer to the following manual for details.<br>Sigma-7-Series AC Servo Drive Sigma-7S SERVOPACK Command Option Attachable Type with INDEXER Module Product Manual (Manual No.: SIEP S800001 64) |
| Operating Methods | Program Table Method | | • Program table positioning in which steps are executed sequentially by commands given through contact input or serial communications<br>• Positioning in which station numbers are specified by commands given through contact input or serial communications |
| | | Max. Number of Steps | 256 |
| | | Max. Number of Tables | 256 |
| | | Max. Number of Stations | 256 |
| | Serial Communications Method | | Serial command by 1-channel ASCII code<br>Communications specifications: RS-422/485 (50 m max.)<br>Connection topology: Multi-drop connection (16 axes max.)<br>Baud rate: 9,600, 19,200, 38,400 bps |
| | Other Functions | | Registration (positioning by external signals), origin return |
| Analog Monitor (CN5) | | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to the following section for details or Built-In Regenerative Resistor. |
| Overtravel (OT) Prevention | | | Stopping with a dynamic brake (DB), coasting to a stop, performing a hard stop, or performing a smooth stop (decelerating to a stop) for a CCW-OT (CCW Drive Prohibit Input) signal or CW-OT (CW Drive Prohibit Input) signal. |
| Protective Functions | | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Input | | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*2 | | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | | Fully-Closed Module<br>You cannot use a Safety Module if you are using an INDEXER Module. |

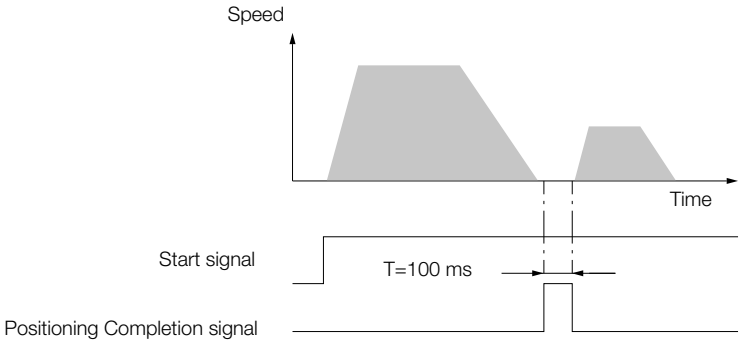
*1. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*2. Always perform risk assessment for the system and confirm that the safety requirements are met.

# Reference Methods

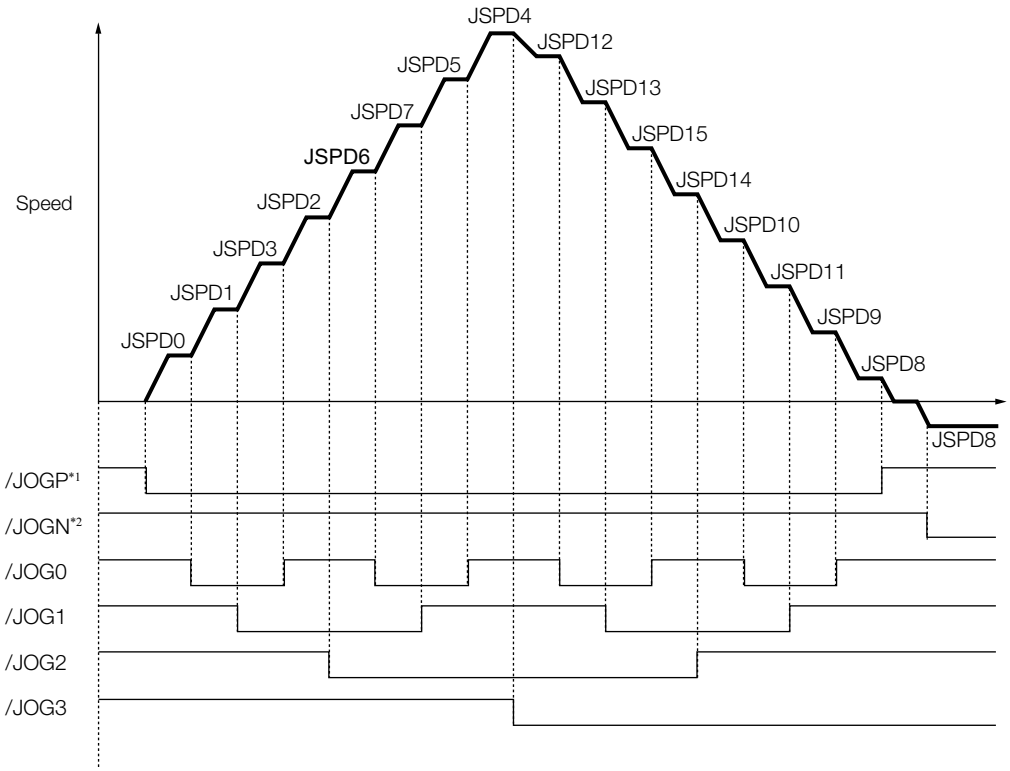
| | PGMSTEP | POS | SPD | RDST | RSPD | ACC* | DEC* | EVENT | LOOP | NEXT |
|---|---|---|---|---|---|---|---|---|---|---|
| 256 steps | 0 | I+400000 | 2000 | 500000 | 1000 | 200 | 100 | T5000 | 1 | 1 |
| | 1 | I+100000 | 1000 | 200000 | 2000 | 100 | 50 | ITO | 1 | END |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | n | I+400000 | 2000 | 500000 | 1000 | 100 | 50 | IT100 | 1 | n+1 |
| | n+1 | I+100000 | 1000 | 200000 | 2000 | ⋮ | ⋮ | NT0 | 1 | END |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | 254 | I+400000 | 2000 | 500000 | 1000 | 100 | 50 | SEL3T200 | 1 | 127 |
| | 255 | I+100000 | 1000 | 200000 | 2000 | 100 | 50 | DT0 | 1 | END |



## Jog Speed Table

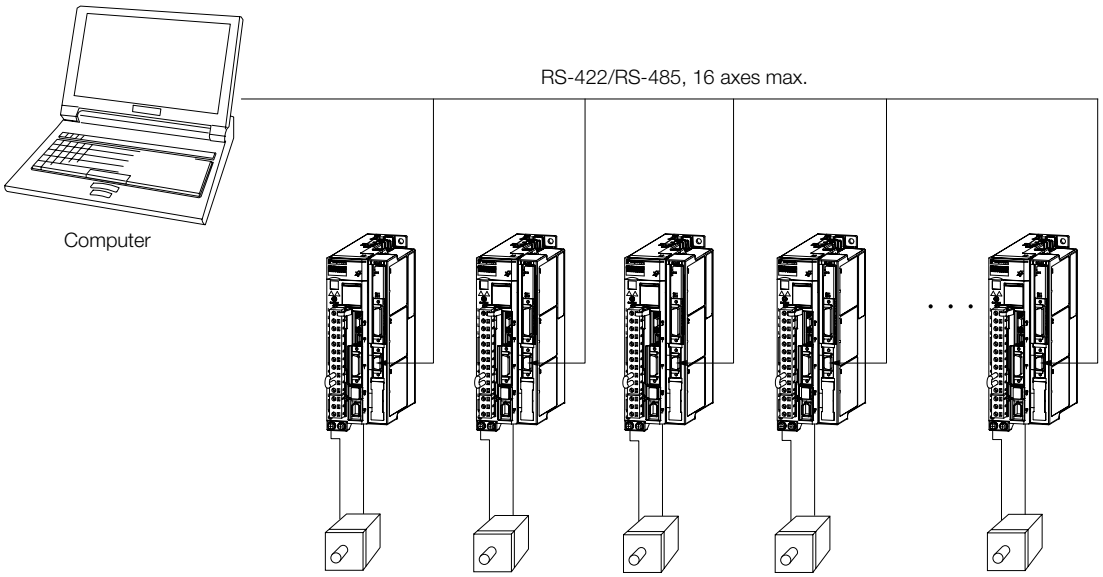
| | JSPD | JOG3 | JOG2 | JOG1 | JOG0 | Jog Speed |
|---|---|---|---|---|---|---|
| 16 combinations | 0 | 0 | 0 | 0 | 0 | 1000 |
| | 1 | 0 | 0 | 0 | 1 | 2000 |
| | 2 | 0 | 0 | 1 | 0 | 4000 |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | 15 | 1 | 1 | 1 | 1 | 5500 |

Note: 1: Signal is ON (active), 0: Signal is OFF (inactive).

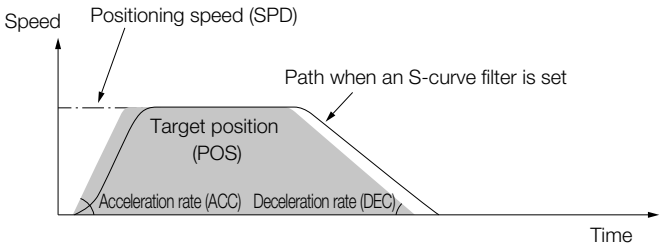



*1. Forward operation at the jog speed is performed while the /JOGP signal is ON.
*2. Reverse operation at the jog speed is performed while the /JOGN signal is ON.

With serial commands, ASCII command strings are sent to the INDEXER Module through RS-422 or RS-485 communications and these commands are interpreted and executed immediately. You can use general-purpose serial communications (RS422/RS485) to perform independent control of up to 16 axes from one host controller (e.g., PC or HMI).



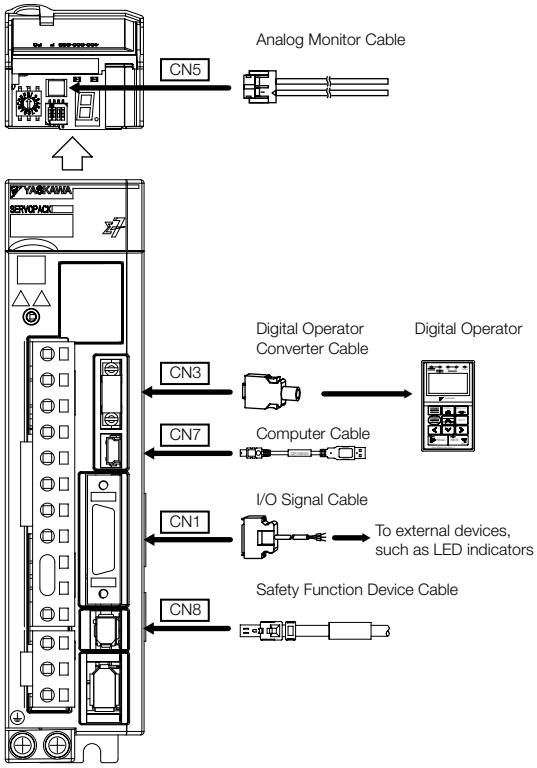

```
1SVON              # Servo turned ON.
1POSI=400000       # Set relative position to 400,000.
1SPD=2000          # Set speed to 2,000.
1ACC=200           # Set acceleration rate to 200.
1DEC=100           # Set deceleration rate to 100.
1ST                # Start operation.
 :
```



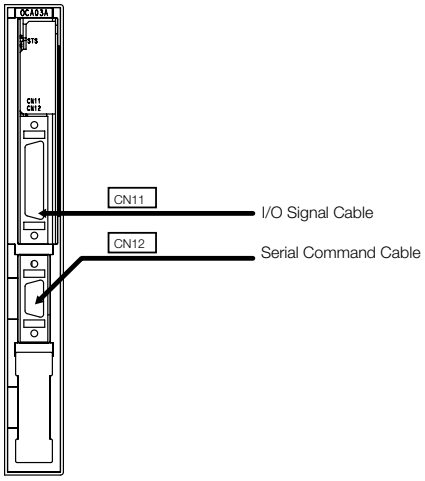
# Selecting Cables SGD7S Command Option Attachable Type with INDEXER Module

## System Configurations

SGD7S Single Axis Command Option Attachable Type SERVOPACK




INDEXER Module




## Selection Table

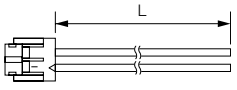
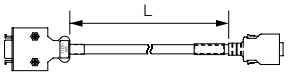
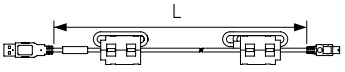
Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.

- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN3 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

Continued on next page.

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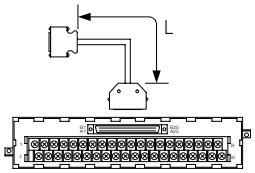
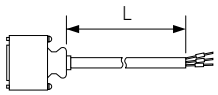
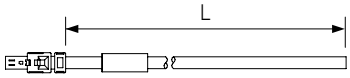
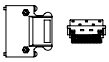
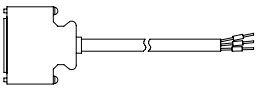
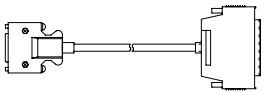
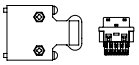
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-1-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |  |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |  |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*2 | 1 m | JZSP-CVH03-01-E |  |
| | | | 3 m | JZSP-CVH03-03-E | |
| | | Connector Kit*3 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |
| CN11 | I/O Signal Cables | Connector Kit | | DP9420007-E |  |
| | | Cables with Loose Wires at One End | 1 m | JZSP-CVI01-1-E |  |
| | | | 2 m | JZSP-CVI01-2-E | |
| | | | 3 m | JZSP-CVI01-3-E | |
| | | Cables with Terminal Block on One End | 0.5 m | JUSP-TA36V-E |  |
| | | | 1 m | JUSP-TA36V-1-E | |
| | | | 2 m | JUSP-TA36V-2-E | |
| CN12 | Serial Command Cable | Connector Kit*3 | | JZSP-CHI9-1 |  <br>Contact YASKAWA Controls Co., Ltd. for the cable. |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for Sigma-7-series SERVOPACKs.
*2. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*3. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | AWG16 (1.25 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm²) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

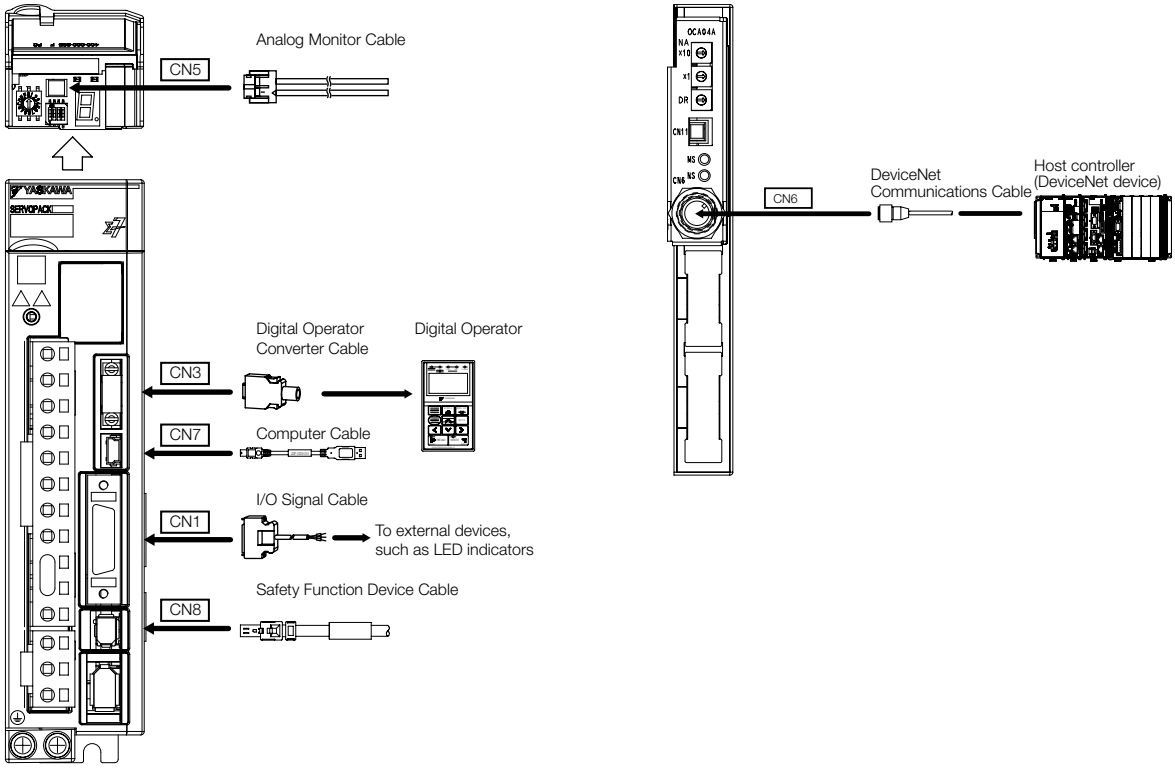
*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

# Selecting Cables SGD7S Command Option Attachable Type with DeviceNet Module

## System Configurations

SGD7S Single Axis Command Option Attachable Type SERVOPACK

DeviceNet Module



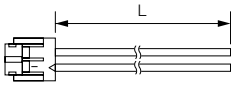
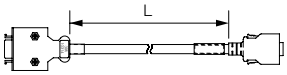
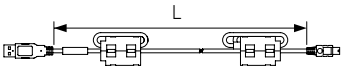
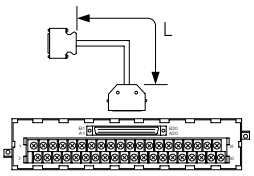
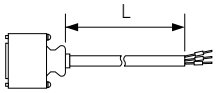
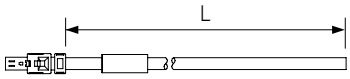
## Selection Table

Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.
- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN3 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |  |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |  |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*2 | 1 m | JZSP-CVH03-01-E |  |
| | | | 3 m | JZSP-CVH03-03-E | |
| | | Connector Kit*3 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |
| CN6 | DeviceNet Communications Cable | | | The communications cable must be an ODVA-Compliant DeviceNet communications cable. We recommend the following Cable.<br>OMRON DCA1-5CN02F1 Cable with Connectors or the equivalent. | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for Sigma-7-series SERVOPACKs.
*2. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*3. Use the Connector Kit when you make cables yourself.

# SERVOPACK Main Circuit Wires

Important

These specifications are based on IEC/EN 61800-5-1, UL 61800-5-1, and CSA C22.2 No.274.
1. To comply with UL standards, use UL-compliant wires.
2. Use copper wires with a rated temperature of 75° or higher.
3. Use copper wires with a rated withstand voltage of 300 V or higher.

Note:
To use 600-V heat-resistant polyvinyl chloride-insulated wire (HIV), use the following table as reference for the applicable wires.
- The specified wire sizes are for three bundled leads when the rated current is applied with a surrounding air temperature of 40°C.
- Select the wires according to the surrounding air temperature.

## Three-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 200A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG12 (3.5 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG10 (5.5 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | M5 | 2.2 to 2.4 |
| | Servomotor Main Circuit Cable* | U, V, W | AWG6 (14 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG8 (8.0 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG3 (30 mm²) | | |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

## Single-phase, 200-VAC Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG16 (1.25 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 5R5A | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | – | – |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 | Main Circuit Power Supply Cable | L1, L2, L3 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Servomotor Main Circuit Cable* | U, V, W | | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, B2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |

* If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

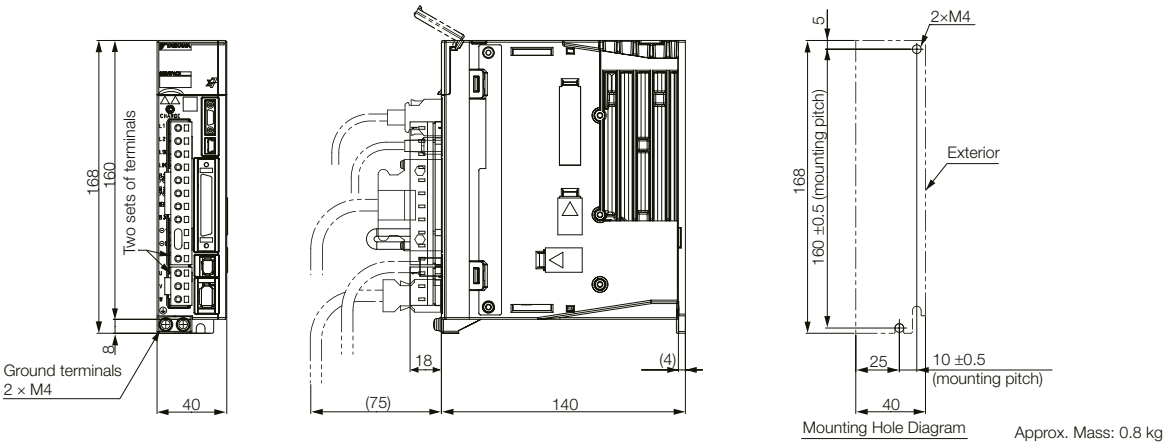
## DC Power Supply Wires for Sigma-7S SERVOPACKs

| SGD7S- | Terminals*1 | | Wire Size | Screw Size | Tightening Torque [Nm] |
|---|---|---|---|---|---|
| R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A | Servomotor Main Circuit Cable | U, V, W*2 | AWG16 (1.25 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A (three-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | – | – |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 120A□□□008 (single-phase, 200-VAC input) | Servomotor Main Circuit Cable | U, V, W*2 | AWG14 (2.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG14 (2.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 180A, 200A | Servomotor Main Circuit Cable | U, V, W*2 | AWG10 (5.5 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG10 (5.5 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 330A | Servomotor Main Circuit Cable | U, V, W*2 | AWG8 (8.0 mm²) | M4 | 1.0 to 1.2 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | M4 | 1.2 to 1.4 |
| 470A | Servomotor Main Circuit Cable | U, V, W*2 | AWG6 (14 mm²) | M5 | 2.2 to 2.4 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG8 (8.0 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 550A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG6 (14 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 590A | Servomotor Main Circuit Cable | U, V, W*2 | AWG4 (22 mm²) | M6 | 2.7 to 3.0 |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |
| 780A | Servomotor Main Circuit Cable | U, V, W*2 | AWG3 (30 mm²) | | |
| | Control Power Supply Cable | L1C, L2C | AWG16 (1.25 mm²) | | |
| | External Regenerative Resistor Cable | B1/⊕, ⊖2 | AWG3 (30 mm²) | | |
| | Ground cable | ⏚ | AWG14 (2.0 mm²) min. | | |

*1. Do not wire the following terminals: L1, L2, L3, B2, B3, ⊖1, ⊖ and terminals.
*2. If you do not use the recommended Servomotor Main Circuit Cable, use this table to select wires.

# SERVOPACK External Dimensions

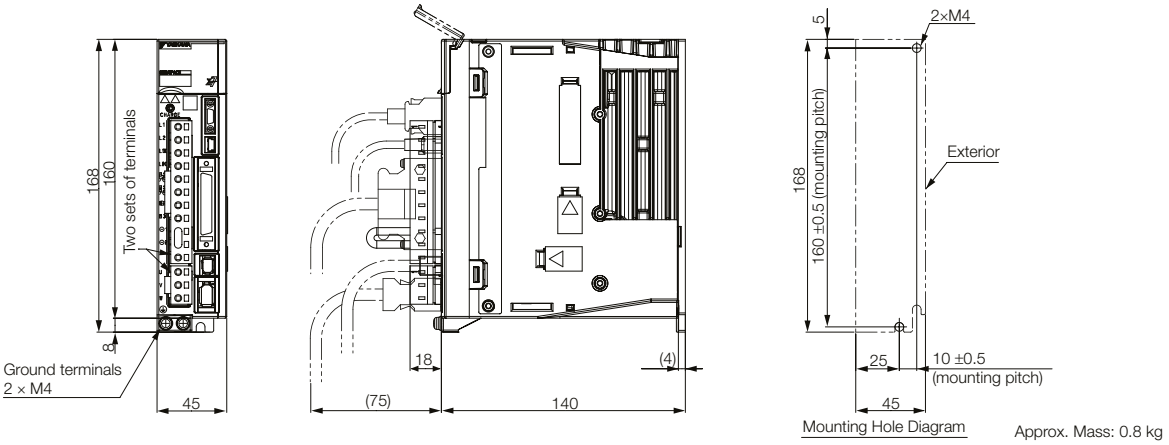
### Three-phase & Single-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A




Approx. Mass: 0.8 kg

Unit: mm

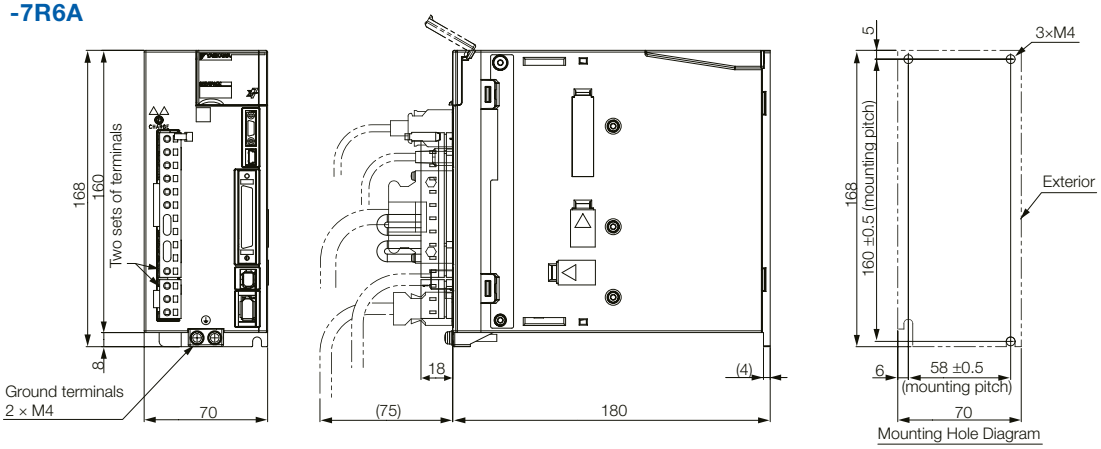
### Three-phase & Single-phase, 200 VAC: SGD7S-2R8A




Approx. Mass: 0.8 kg

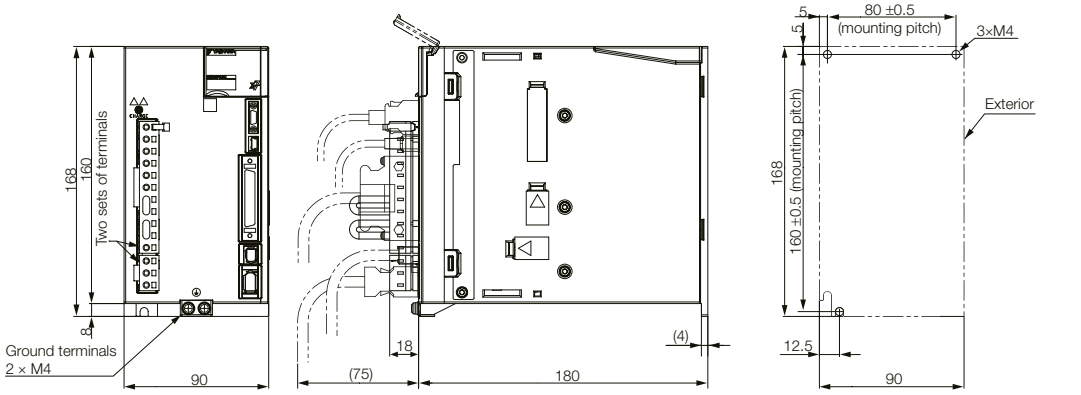
Unit: mm

## Three-phase & Single-phase, 200 VAC: SGD7S-3R8A, -5R5A -7R6A




Approx. Mass: 1.6 kg

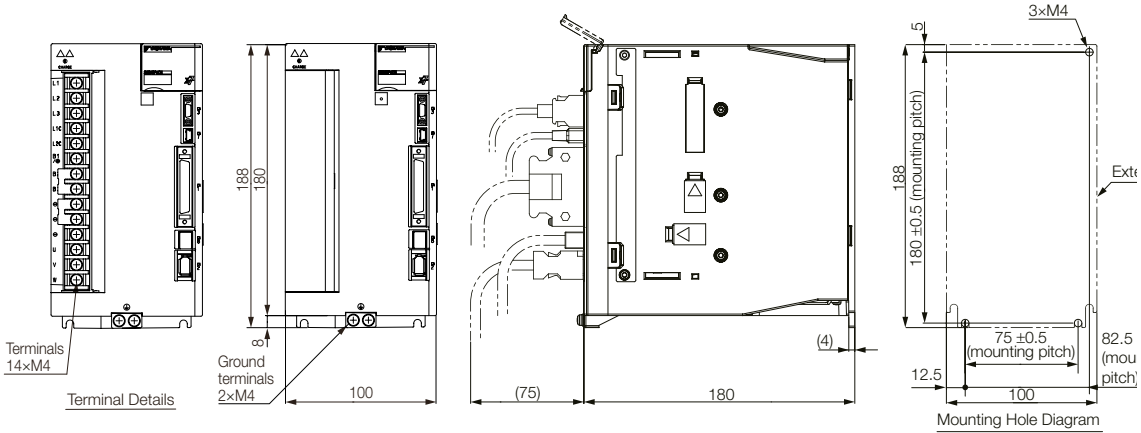
## Three-phase & Single-phase, 200 VAC: SGD7S-120A




Approx. Mass: 2.2 kg

Unit: mm

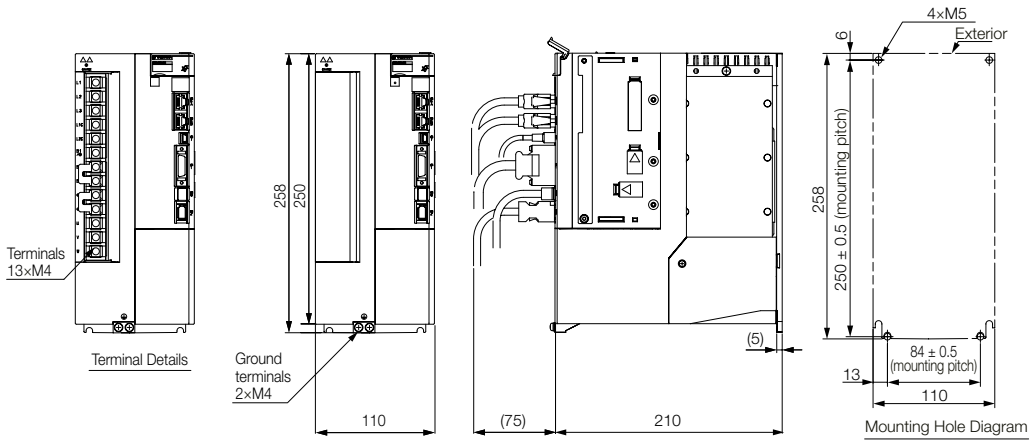
## Three-phase, 200 VAC: SGD7S-180A and -200A




Approx. Mass: 2.7

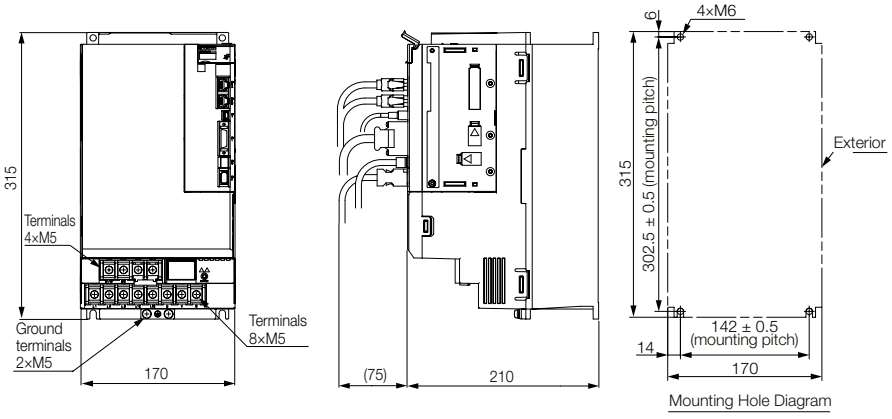
Unit: r

## Three-phase, 200 VAC: SGD7S-330A



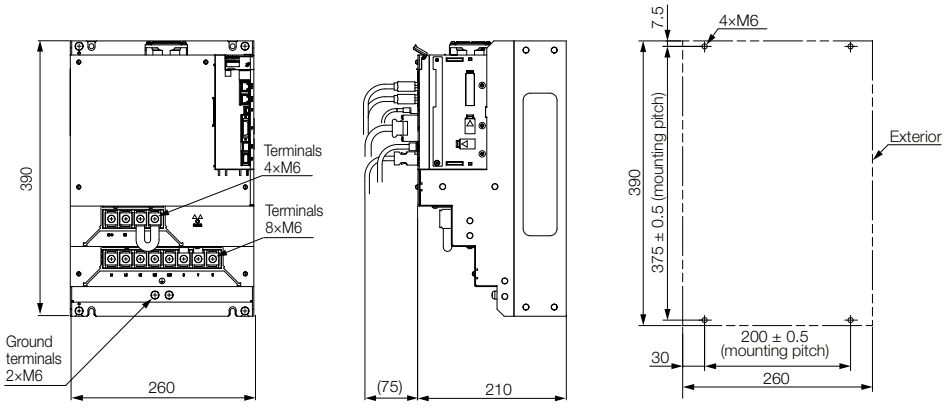

Approx. Mass: 4.4 kg

## Three-phase, 200 VAC: SGD7S-470A and -550A




Approx. Mass: 8.2 kg

## Three-phase, 200 VAC: SGD7S-590A and -780A




Approx. Mass: 15.5 kg
Unit: mm

# Sigma-7Siec with integrated iec-Controller

## Model Designations

| SGD7S | - | 2R8 | A | M0 | A | 000 | F50 | |
|---|---|---|---|---|---|---|---|---|
| Sigma-7 Series SERVOPACKs | | 1st ... 3rd | 4th | 5th + 6th | 7th | 8th ... 10th | 11th ... 13th | digit |

**1st ... 3rd digit - Maximum Applicable Motor Capacity per Axis**

| Code | Specifications |
|---|---|
| R70 | 0.05 kW |
| R90 | 0.1 kW |
| 1R6 | 0.2 kW |
| 2R8 | 0.4 kW |
| 3R8 | 0.5 kW |
| 5R5 | 0.75 kW |
| 7R6 | 1.0 kW |
| 120 | 1.5 kW |
| 180 | 2.0 kW |
| 200 | 3.0 kW |
| 330 | 5.0 kW |
| 470 | 6.0 kW |
| 550 | 7.5 kW |
| 590 | 11 kW |
| 780 | 15 kW |

**4th digit - Voltage**

| Code | Specifications |
|---|---|
| A | 200 VAC, Three-phase |

**5th + 6th digit - Interface**

| Code | Specifications |
|---|---|
| M0 | Sigma-7Siec (with integrated iec-Controller) |

**7th digit - Design Revision Order**

| Code | Specifications |
|---|---|
| A | |

**8th ... 10th digit - Hardware Options Specifications**

| Code | Specifications | Applicable Models |
|---|---|---|
| 000 | Without Options | All models |

**11th ... 13th digit - FT/EX Specifications**

| Code | Specifications |
|---|---|
| F50 | Application function for integrated MPiec |

Note: Readily available up to 1.5 kW. Others available on request.
Additional accessories and software for SERVOPACKs is described in the Periphery section.

# Ratings and Specifications

## Ratings

### Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 2 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 18.5 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 42 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 10 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4 |
| Power Loss* | Main Circuit Power Loss [W] | | 5 | 7.1 | 12.1 | 23.7 | 39.2 | 104.2 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17 | 19.1 | 24.1 | 35.7 | 61.2 | 136.2 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

## Three-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1 | 1.5 | 2 | 3 | 5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1 | 1.3 | 1.6 | 2.3 | 3.2 | 4 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5 | 7 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17 | 19 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

Note: Readily available up to 1.5 kW. Others available on request.

| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]*1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | Built-in Regenerative Resistor Power Loss [W] | | 180*2 | 350*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| Regenerative Resistor | External Regenerative Resistor | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

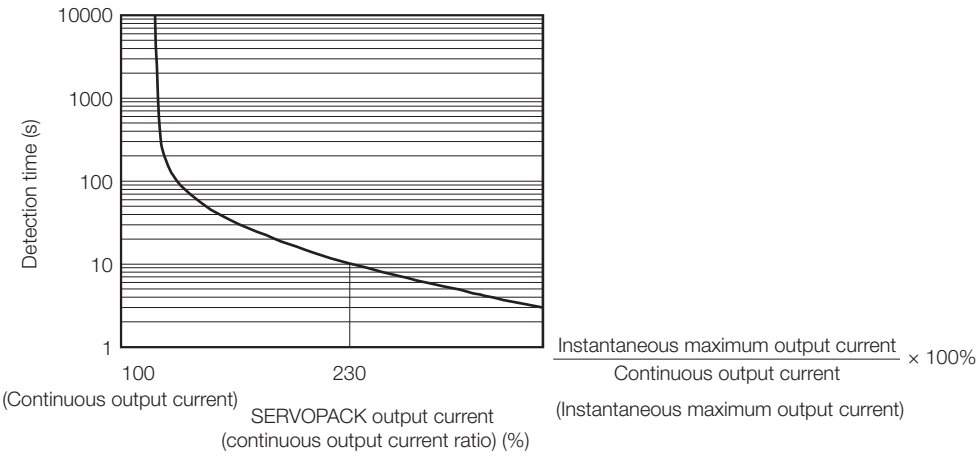
Note: Readily available up to 1.5 kW. Others available on request.

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

# SERVOPACK Overload Protection Characteristics

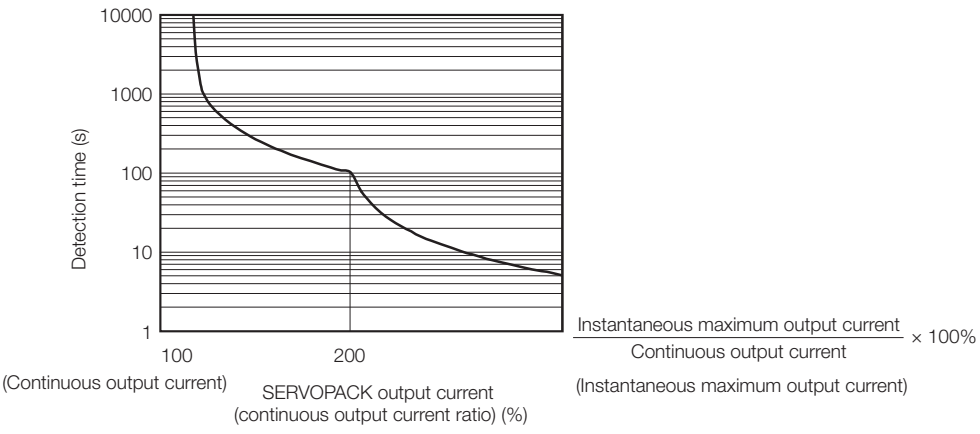
The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.
An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.

### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A and -780A




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

# Specifications

| Item | | | Specification | |
|---|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | | Serial encoder: 20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Ambient Air Temperature | | -5°C to 55°C With derating, usage is possible between 55°C and 60°C. | |
| | Storage Temperature | | -20°C to 85°C | |
| | Ambient Air Humidity | | 95% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | | 95% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | | 4.9 m/s$^2$ | |
| | Shock Resistance | | 19.6 m/s$^2$ | |
| | Degree of Protection | | Degree | SERVPOACK Model: SGD7S- |
| | | | IP 20 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, R70F, R90F, 2R1F, 2R8F |
| | | | IP 10 | 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | | • Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude | | 1,000 m or less<br>With derating, usage is possible between 1,000 m and 2,000 m. | |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | | Compliance with UL Standards, EU Directives and Other Safety Standards | |
| Mounting | | | Mounting | SERVOPACK Model: SGD7S |
| | | | Base-mounted | All Models |
| | | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, R70F, R90F, 2R1F, 2R8F |
| | | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | | 1:5000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation | | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ± 25°C) | |
| | Torque Control Precision (Repeatability) | | ±1% | |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. | |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to +5 V | |
| | Digital Input Signals | Input Signals that can be allocated | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 7<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals<br>• /EXT1 External latch signal input (General purpose input)<br>• /EXT2 External latch signal input (General purpose input)<br>• /EXT3 External latch signal input (General purpose input)<br>• /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals<br>• FSTP (Forced Stop Input) signal<br>A signal can be allocated and the positive and negative logic can be changed. | |

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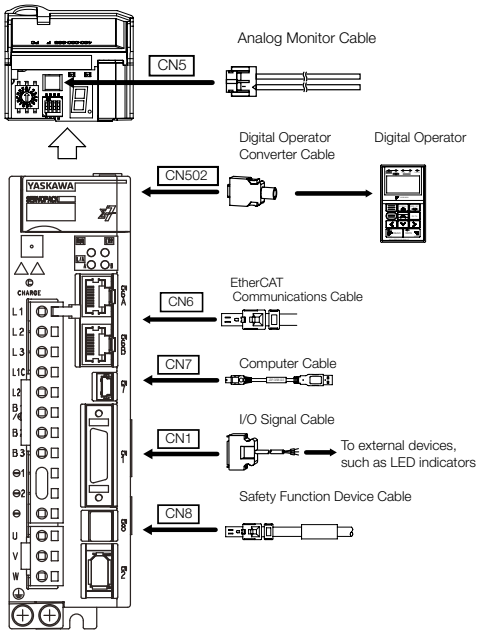
| Item | | | Specification |
|---|---|---|---|
| I/O Signals | Digital Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: ALM (Servo Alarm) signal |
| | | Output Signals that can be allocated | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.) |
| | | | Output Signals<br>• /COIN (Positioning Completion) signal<br>• /V-CMP (Speed Coincidence Detection) signal<br>• /TGON (Rotation Detection) signal<br>• /S-RDY (Servo Ready) signal<br>• /CLT (Torque Limit Detection) signal<br>• /VLT (Speed Limit Detection) signal<br>• /BK (Brake) signal<br>• /WARN (Warning) signal<br>• /NEAR (Near) signal<br>A signal can be allocated and the positive and negative logic can be changed. |
| Communications | RS-422A Communications (CN502) | Interfaces | A JUSP-JC001 Communications Unit is required to connect to a Digital Operator (JUSP-OP05A-1-E). |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Addres s Setting | Set with parameters. |
| | USB Communications (CN7) | Interface | Personal computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB2.0 standard (12 Mbps). |
| Displays/Indicators | | | CHARGE, PWR, CN, RUN, ERR, and L/A (A and B) indicators, and one-digit seven-segment display |
| Analog Monitor (CN5) | | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to the following manual for details.<br>S-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32) |
| Overtravel (OT) Prevention | | | Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal |
| Protective Functions | | | Overcurrent, overvoltage, low voltage, overload, regeneration error , etc. |
| Utility Functions | | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Inputs | | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards | | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | | Fully-closed Modules and Safety Modules<br>Note: You cannot use a Fully-closed Module and a Safety Module together. |

# Selecting Cables SGD7Siec with integrated iec-Controller

## System Configurations




## Selection Table

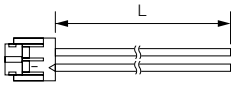
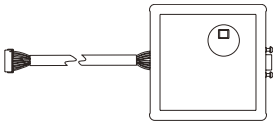
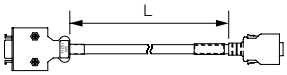
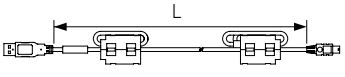
Important

1. Use the cable specified by YASKAWA for the Computer Cable. Operation may not be dependable with any other cable.
2. Use the cable specified by YASKAWA for the MECHATROLINK Communications Cables. Operation may not be dependable due to low noise resistance with any other cable.

Refer to the following manual for the following information.

- Cable dimensional drawings and cable connection specifications
- Order numbers and specifications of individual connectors for cables

Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN5 | Analog Monitor Cable | | 1 m | JZSP-CA01-E |  |
| CN502 | Digital Operator | | | JUSP-0P05A-1-E | |
| | | Serial Communications Connector | 0.3 m | JUSP-JC001-1 |  |
| | | Digital Operator Converter Cable | 0.3 m | JZSP-CVS05-A3-E*1 |  |
| | | | | JZSP-CVS07-A3-E*2 | |
| CN7 | Computer Cable | | 2.5 m | JZSP-CVS06-02-E |  |

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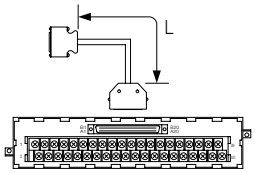
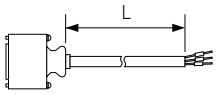
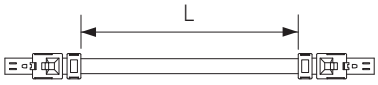
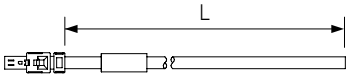
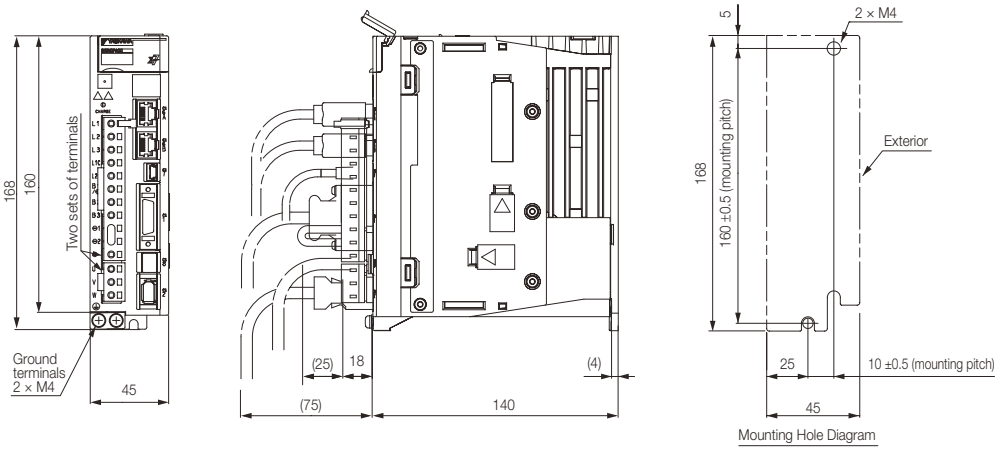
| Code | Description | | Length | Order Number | Appearance |
|---|---|---|---|---|---|
| CN1 | I/O Signal Cables | Soldered Connector Kit | | JZSP-CSI9-2-E | |
| | | Connector-Terminal Block Converter Unit (with cable) | 0.5 m | JUSP-TA26P-E |  |
| | | | 1 m | JUSP-TA26P-1-E | |
| | | | 2 m | JUSP-TA26P-2-E | |
| | | Cable with Loose Wires at One End (loose wires on peripheral device end) | 1 m | JZSP-CSI02-1-E |  |
| | | | 2 m | JZSP-CSI02-2-E | |
| | | | 3 m | JZSP-CSI02-3-E | |
| CN6 | MECHATROLINK-III / EtherCAT / PROFINET Communications Cables (RJ45)*3 | | 0.2 m | CM3R□M0-00P2-E |  |
| | | | 0.5 m | CM3R□M0-00P5-E | |
| | | | 1 m | JZSP-CM3R□M0-01-E | |
| | | | 3 m | JZSP-CM3R□M0-03-E | |
| | | | 5 m | JZSP-CM3R□M0-05-E | |
| | | | 10 m | JZSP-CM3R□M0-10-E | |
| | | | 20 m | JZSP-CM3R□M0-20-E | |
| | | | 30 m | JZSP-CM3R□M0-30-E | |
| | | | 40 m | JZSP-CM3R□M0-40-E | |
| | | | 50 m | JZSP-CM3R□M0-50-E | |
| CN8 | Safety Function Device Cables | Cables with Connectors*4 | 1 m | JZSP-CVH03-01-E-Gx |  |
| | | | 3 m | JZSP-CVH03-03-E-Gx | |
| | | Connector Kit*5 | | Contact Tyco Electronics Japan G.K.<br>Product name: Industrial Mini I/O D-shape Type 1 Plug Connector Kit<br>Model number: 2013595-1 | |

*1. This Converter Cable is required to use the Sigma-III-series Digital Operator (JUSP-OP05A) for S-7-series SERVOPACKs.
*2. If you use a MECHATROLINK-III Communications Reference SERVOPACK, this Converter Cable is required to prevent the cable from disconnecting from the Digital Operator.
*3. This cable is available in two variants. The order number for these cables differs at the marked □, an „R“ at this place is used for Cables with RJ45 Connectors on both ends, while an „M“ is used for Cables with RJ45 Connector on One End and IMI Connector on the other End.
*4. When using safety functions, connect this Cable to the safety function devices.
When not using safety functions, connect the enclosed Safety Jumper Connector (JZSP-CVH05-E) to the SERVOPACK.
*5. Use the Connector Kit when you make cables yourself.

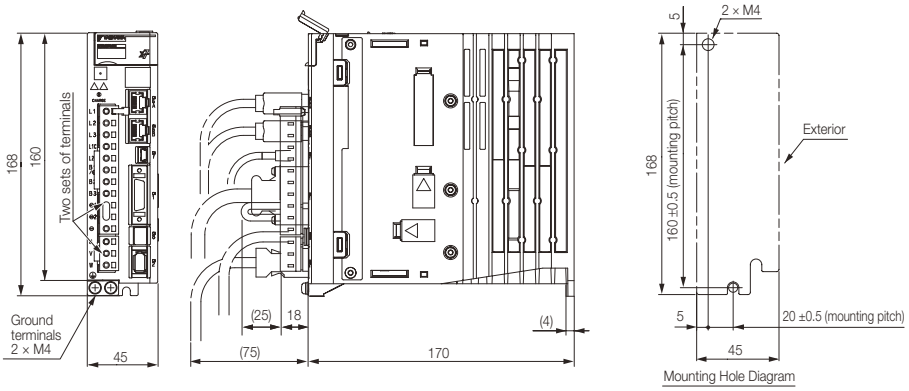
# SERVOPACK External Dimensions

### Three-phase, 200 VAC: SGD7S-R70A, -R90A, and -1R6A



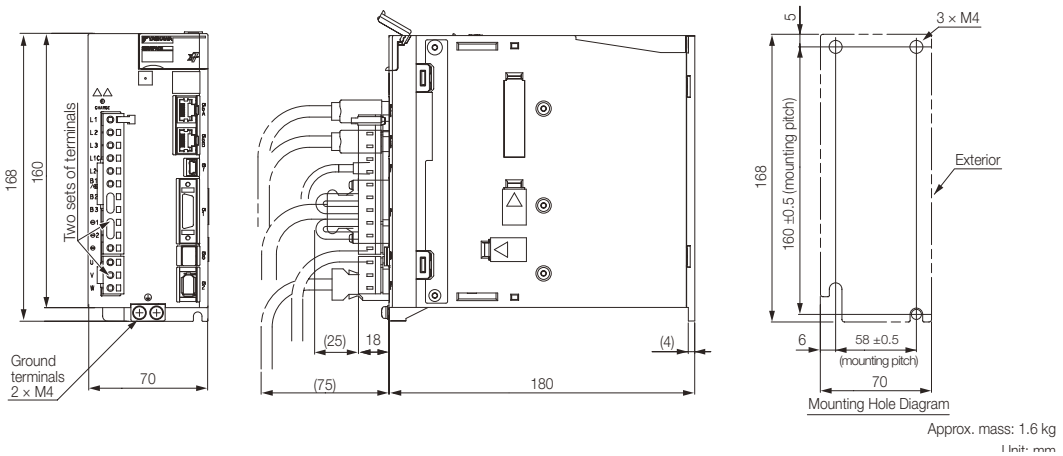

Approx. mass: 0.8 kg
Unit: mm

### Three-phase, 200 VAC: SGD7S-2R8A



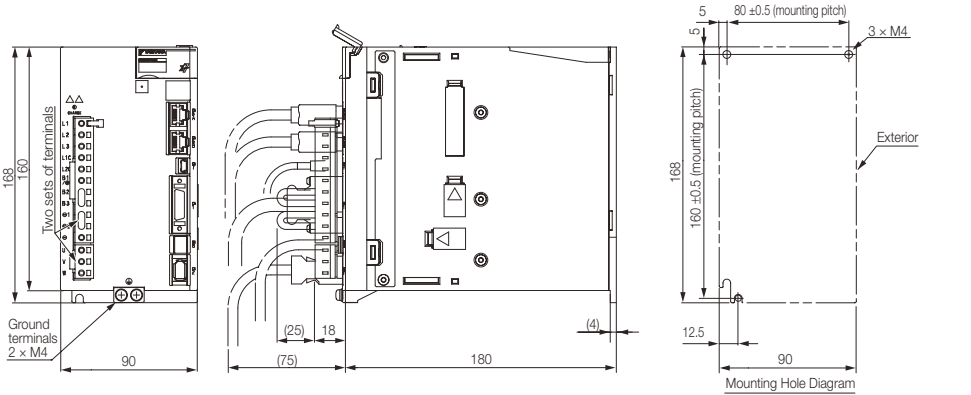

Approx. mass: 1.0 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-3R8A, -5R5A, and -7R6A



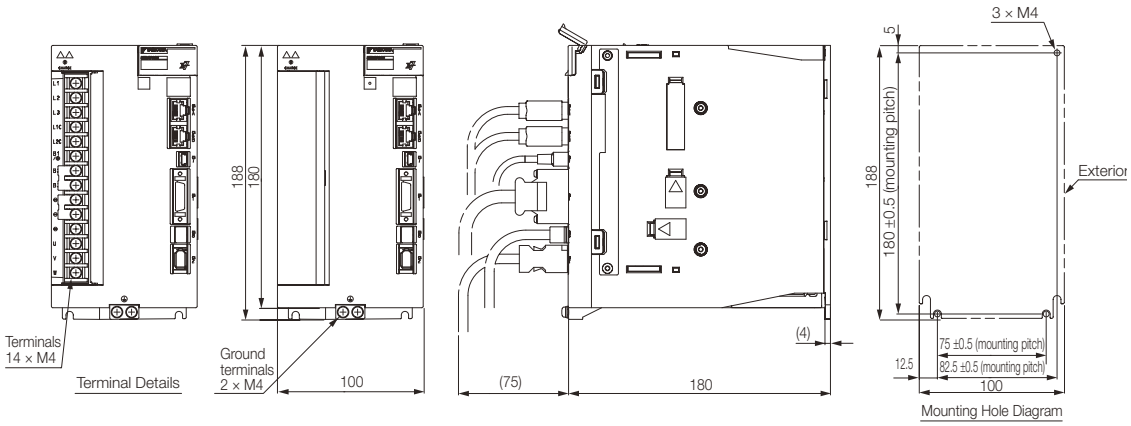

Approx. mass: 1.6 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-120A



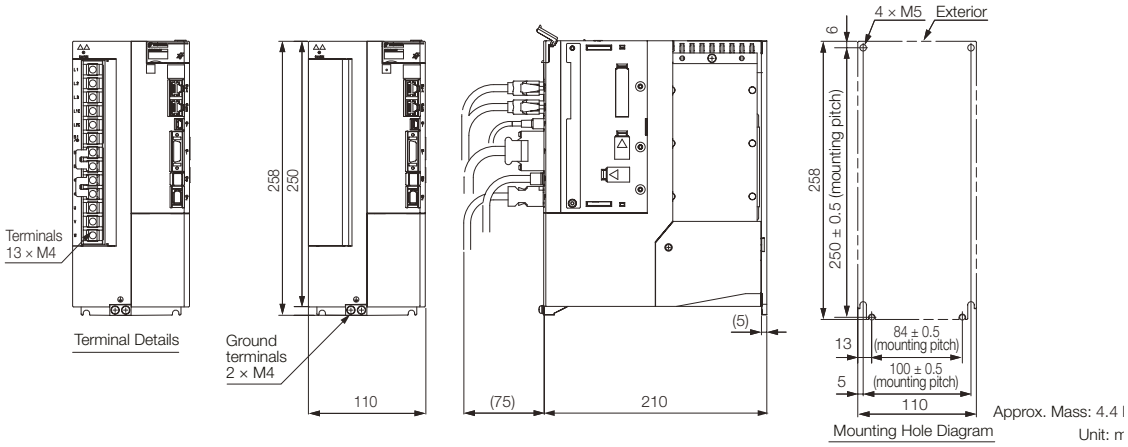

Approx. mass: 2.2 kg
Unit: mm

## Three-phase, 200 VAC: SGD7S-180A and -200A

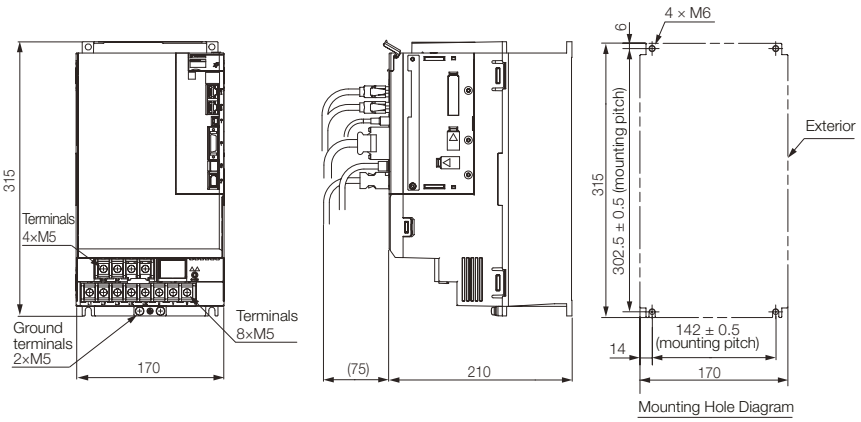



Approx. mass: 2.7 kg
Unit: mm

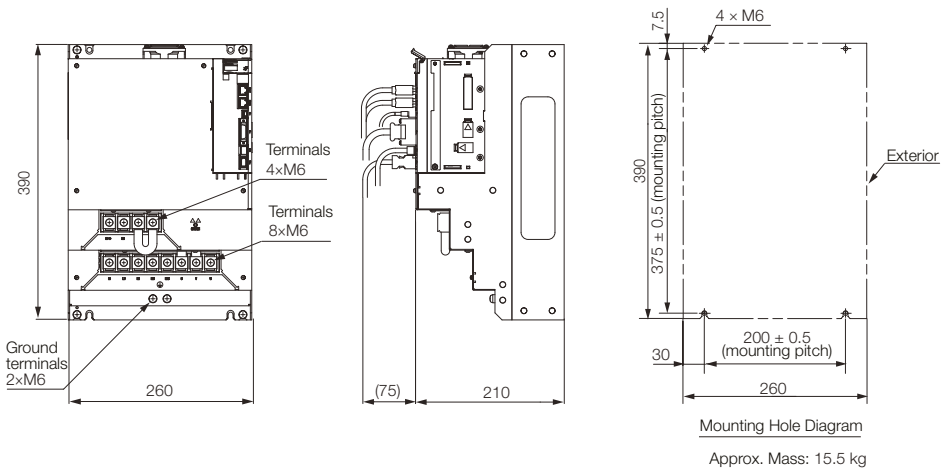
## Three-phase, 200 VAC: SGD7S-330A




## Three-phase, 200 VAC: SGD7S-470A and -550A




## Three-phase, 200 VAC: SGD7S-590A and -780A



# Connector Specifications and Front Cover Dimensions

## Connector Specifications

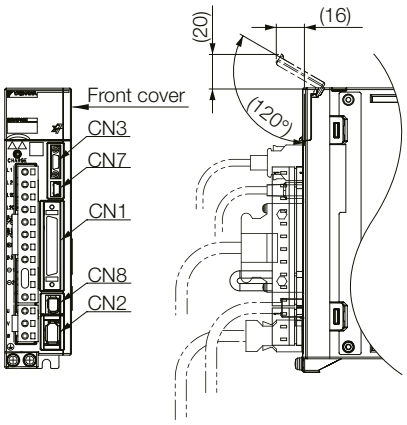
| SERVOPACK | Connector No. | Model | Number of Pins | Manufacturer |
|---|---|---|---|---|
| Sigma-7S Analog Voltage/Pulse Train Reference SERVOPACK | CN1 | 10150-3000PE | 50 | Sumitomo 3M Ltd. |
| | CN2 | 3E106-0220KV | 6 | Sumitomo 3M Ltd. |
| | CN3 | HDR-EC14LFDTN- SLD-PLUS | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| Sigma-7S MECHATROLINK-II Communications Reference SERVOPACK | CN1 | 10226-59A3MB | 26 | Sumitomo 3M Ltd. |
| | CN2 | 3E106-0220KV | 6 | Sumitomo 3M Ltd. |
| | CN3 | HDR-EC14LFDTN- SLD-PLUS | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | CN6A, CN6B | 1903815-1 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| Sigma-7S MECHATROLINK-III Communications Reference SERVOPACK | CN1 | 10226-59A3MB | 26 | Sumitomo 3M Ltd. |
| | CN2 | 3E106-0220KV | 6 | Sumitomo 3M Ltd. |
| | CN3 | HDR-EC14LFDTN- SLD-PLUS | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | CN502 | S8B-ZR-SM4A-TF (LF)(SN) | 8 | J.S.T. Mfg. Co., Ltd. |
| | CN6A, CN6B | 1-1734579-4 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| Sigma-7S MECHATROLINK-III with RJ45 Communications Reference SERVOPACK | CN1 | 10236-59A3MB | 36 | 3M Japan Ltd. |
| | CN3 | HDR-EC14LFDTN- SLD-PLUS | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | CN6A, CN6B | 1-1734579-4 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| Sigma-7W MECHATROLINK-III Communications Reference SERVOPACK | CN1 | 10236-59A3MB | 36 | Sumitomo 3M Ltd. |
| | CN2A, CN2B | 3E106-2230KV | 6 | Sumitomo 3M Ltd. |
| | CN3 | HDR-EC14LFDTN- SLD-PLUS | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | CN6A, CN6B | 1-1734579-4 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| Sigma-7S EtherCAT Communications Reference SERVOPACK | CN1 | 10226-59A3MB | 29 | Sumitomo 3M Ltd. |
| | CN2 | 3E106-0220KV | 6 | Sumitomo 3M Ltd. |
| | CN502 | S8B-ZR-SM4A-TF (LF)(SN) | 8 | J.S.T. Mfg. Co., Ltd. |
| | CN6A, CN6B | 1-1734579-4 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| Sigma-7S PROFINET Communications Reference SERVOPACK | CN1 | 10226-59A3MB | 29 | Sumitomo 3M Ltd. |
| | CN2 | 3E106-0220KV | 6 | Sumitomo 3M Ltd. |
| | CN502 | S8B-ZR-SM4A-TF (LF)(SN) | 8 | J.S.T. Mfg. Co., Ltd. |
| | CN6A, CN6B | 1-1734579-4 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| Sigma-7C Bus Connection Reference SERVOPACK | CN1 | 10236-59A3MB | 36 | 3M Japan Ltd. |
| | CN2A, CN2B | 3E106-2230KV | 6 | 3M Japan Ltd. |
| | CN6 | 1981386-1 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN12 | 26-51024KB13-1 | 8 | UDE Corp. |
| | CN13 | 10250-52A3PL | 50 | 3M Japan Ltd. |
| Sigma-7Siec SERVOPACK | CN1 | 10236-59A3MB | 36 | 3M Japan Ltd. |
| | CN3 | HDR-EC14LFDTN- SLD-PLUS | 14 | Honda Tsushin Kogyo Co., Ltd. |
| | CN6A, CN6B | 1-1734579-4 | 8 | Tyco Electronics Japan G.K. |
| | CN7 | 2172034-1 | 5 | Tyco Electronics Japan G.K. |
| | CN8 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |

Note: The above connectors or their equivalents are used for the SERVOPACKs.

# Front Cover Dimensions

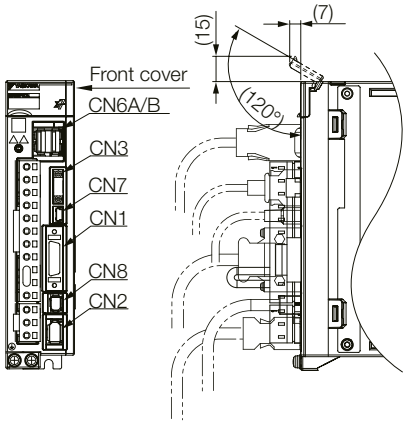
### Sigma-7S

Analog Voltage/Pulse Train Reference SERVOPACKs



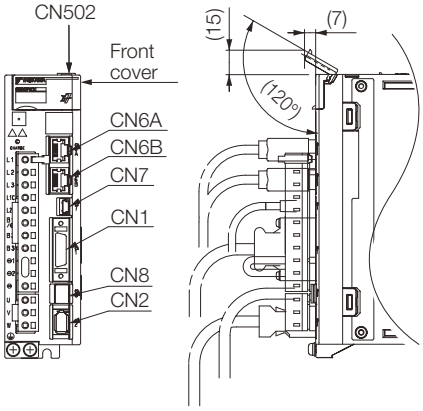

### Sigma-7S

MECHATROLINK-II Communications Reference SERVOPACKs



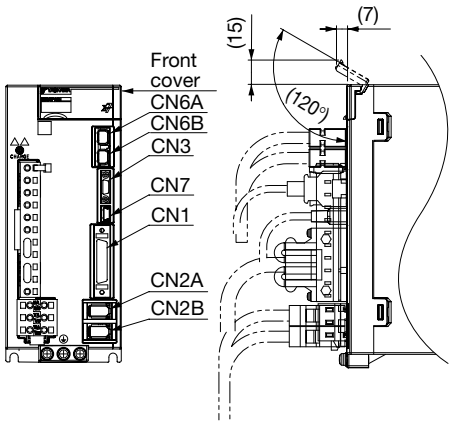

### Sigma-7S

MECHATROLINK-III Communications Reference SERVOPACKs



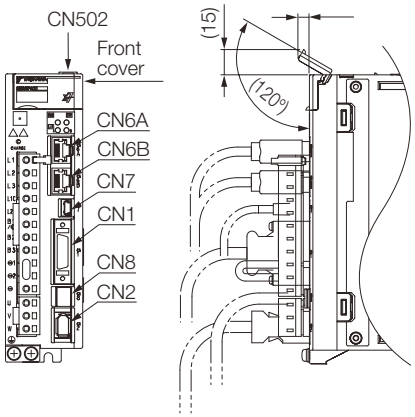

### Sigma-7W

MECHATROLINK-III Communications Reference SERVOPACKs



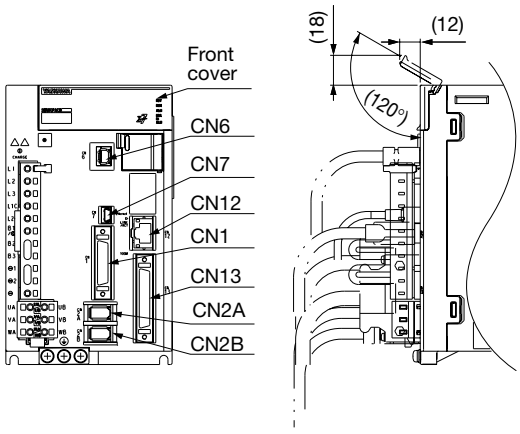

### Sigma-7S

EtherCAT Communication Reference SERVOPACKs




### Sigma-7C

Bus Connection Reference SERVOPACKs



# Option Modules


| | |
|---|---|
| Feedback Option Modules | 477 |
| Safety Option Module | 484 |
| INDEXER Module | 488 |
| DeviceNet Modules | 498 |
| MP2600iec Single Axis Machine Controller Option Module | 504 |
| Dimensions | 508 |

# Feedback Option Modules

## Fully-Closed Module

With fully-closed control, an externally installed encoder is used to detect the position of the controlled machine and the machine's position information is fed back to the SERVOPACK. High-precision positioning is possible because the actual machine position is fed back directly. To perform fully-closed loop control, a Fully-Closed Module and SERVOPACK are required.

## Model Designations

When ordering a SERVOPACK and a Safety Module separately, use the following Safety Module model number.

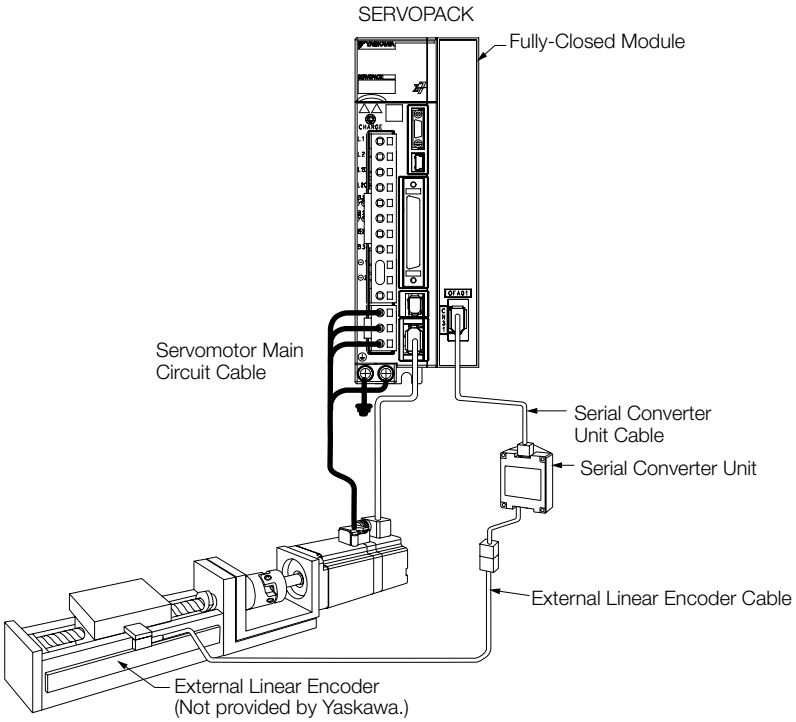
| SGDV | - | OF | A01 | A |
|---|---|---|---|---|
| Option Module Safety | | 1st & 2nd | 3rd ... 5th | 6th digit |

| 1st & 2nd digit - Module Type | |
|---|---|
| Code | Module |
| OF | Option Module Feedback |

| 3rd ... 5th digit - Interface Specifications | |
|---|---|
| Code | Interface |
| A01 | for YASKAWA Serial Protocol |
| B01 | Serial and Sin/Cos Encoders |
| B03 | Pulse A quad B Encoders |
| B04 | Resolver |

| 6th digit - Design Revision Order | |
|---|---|
| Code | Specification |
| A | Initial Design |

## System Configuration Example



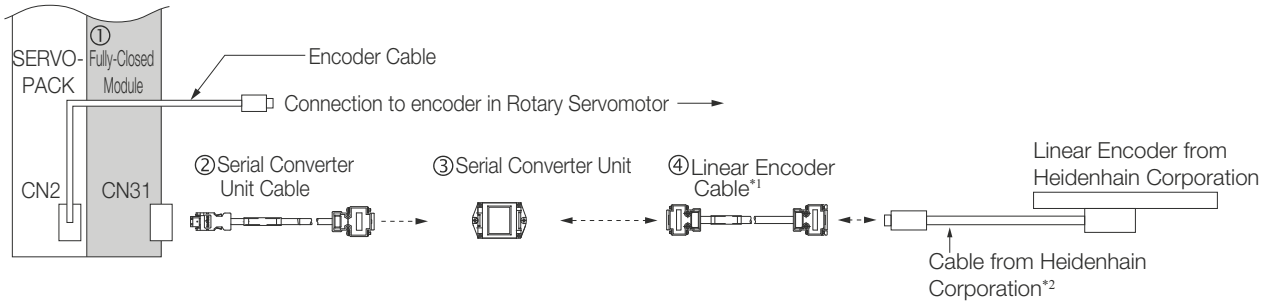

* The connected devices and cables depend on the type of external Linear Encoder that is used.

Note:
Refer to the following section for the information on peripheral devices or chapter Peripheral Devices.

## Connections to Linear Encoder from Heidenhain Corporation

### Connections for a 1 Vp-p Analog Voltage Output Signal

You must make the connections through a YASKAWA Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) in the Serial Converter Unit.



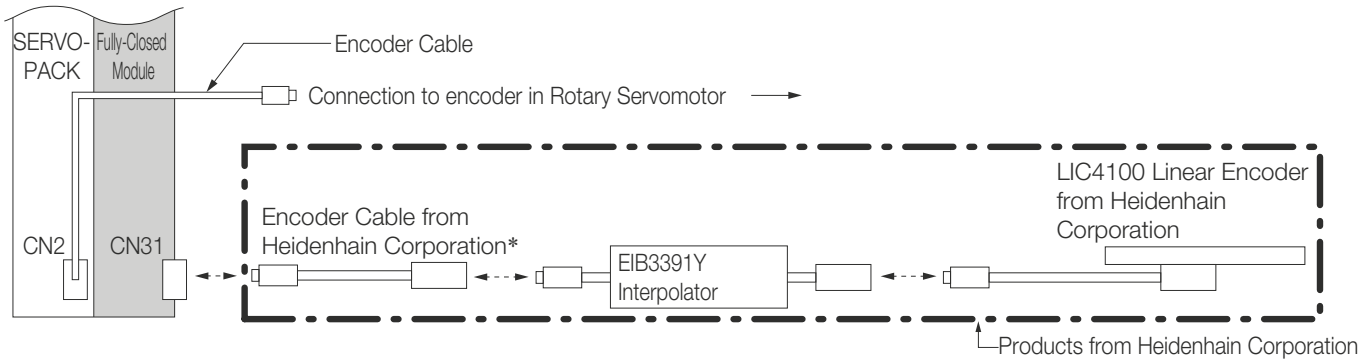

*1. When using a JZDP-J00□-□□□Serial Converter Unit, do not use a YASKAWA Linear Encoder Cable that is longer than 3 m.
*2. Contact Heidenhain Corporation for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Heidenhain Corporation.

| No. | Item | Model |
|---|---|---|
| ① | Fully-Closed Module (Purchased alone) | Fully-Closed Module*1 SGDV-OFA01A |
| ② | Serial Converter Unit Cable | JZSP-CLP70-□□*3-E |
| ③ | Serial Converter Unit*2 | JZDP-H003-000 |
| ④ | Linear Encoder Cable | JZSP-CLL30-□□*3-E |

*1 When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number. Please use the YASKAWA mounting rail JZSP-P7R2-8-E in combination with a Fully-Closed Module.
*2 Contact your YASKAWA representative for specific information.
*3 The boxes (□□) in the model number are reolaced with cable length when ordering. (1m = 01, 3m = 03, 5m = 05, 10m = 10, 15m = 15)

## Connections when using a YASKAWA Serial Interface for the Output Signals

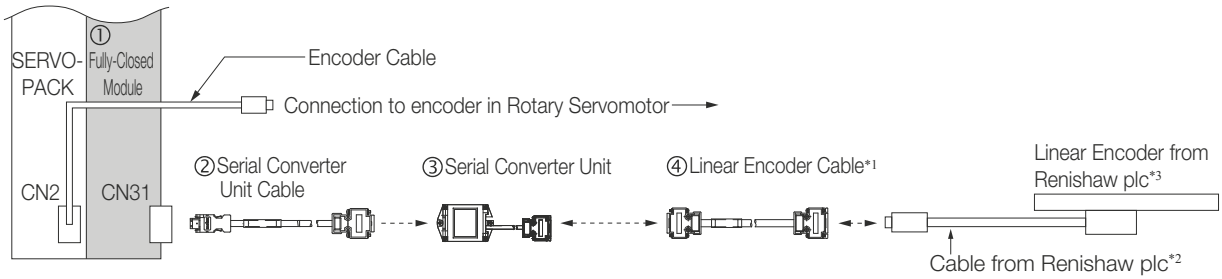
### LIC4100 Linear Encoder with EIB3391Y Interpolator




* Use an Encoder Cable from Heidenhain Corporation. Contact Heidenhain Corporation for detailed Encoder Cable specifications.

# Connections to Linear Encoder from Renishaw Plc

## Connections for a 1 Vp-p Analog Voltage Output Signal



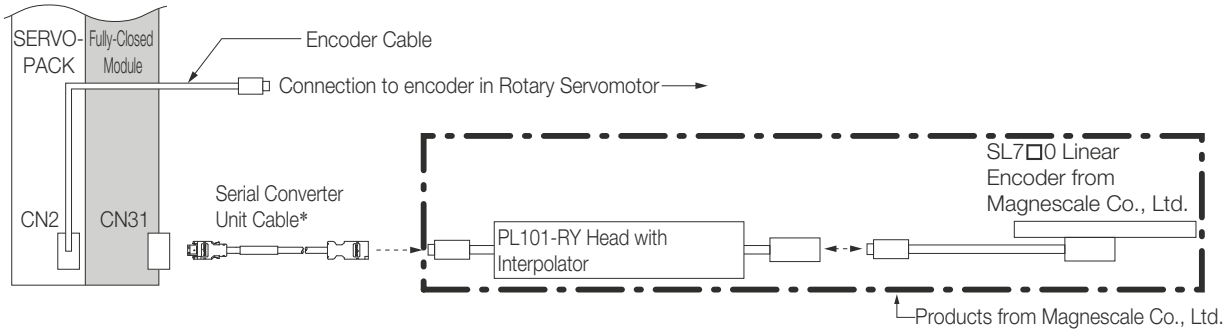

*1 When using a JZDP-J00□-□□□Serial Converter Unit, do not use a YASKAWA Linear Encoder Cable that is longer than 3 m.
*2 Contact Renishaw plc for details on cables (analog 1 Vp-p output, D-sub 15-pin, male) from Renishaw plc.
*3 If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected. If that occurs, use the BID/DIR signal to output the origin signal only in one direction.

| No. | Item | Model |
|---|---|---|
| ① | Fully-Closed Module (Purchased alone) | Fully-Closed Module*1 SGDV-OFA01A |
| ② | Serial Converter Unit Cable | JZSP-CLP70-□□*3-E |
| ③ | Serial Converter Unit*2 | JZDP-H005-000 |
| ④ | Linear Encoder Cable | JZSP-CLL00-□□*3-E |

*1 When ordering a SERVOPACK and a Fully-Closed Module separately, use this Fully-Closed Module model number. Please use the YASKAWA mounting rail JZSP-P7R2-8-E in combination with a Fully-Closed Module.
*2 Contact your YASKAWA representative for specific information.
*3 The boxes (□□) in the model number are reolaced with cable length when ordering. (1m = 01, 3m = 03, 5m = 05, 10m = 10, 15m = 15)

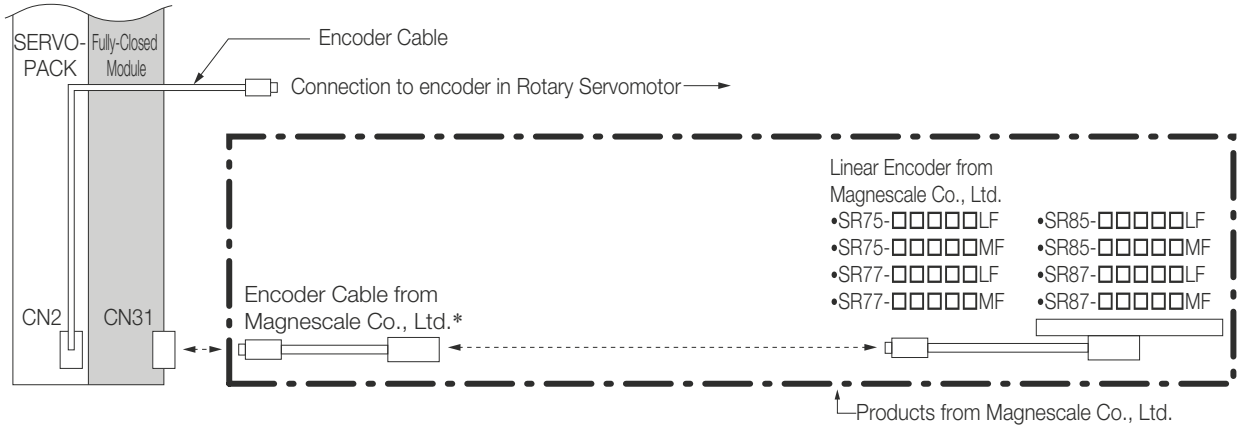
# Connections to Linear Encoder from Magnescale Co., Ltd.

## SL7□0 Linear Encoder and PL101-RY Sensor Head with Interpolator



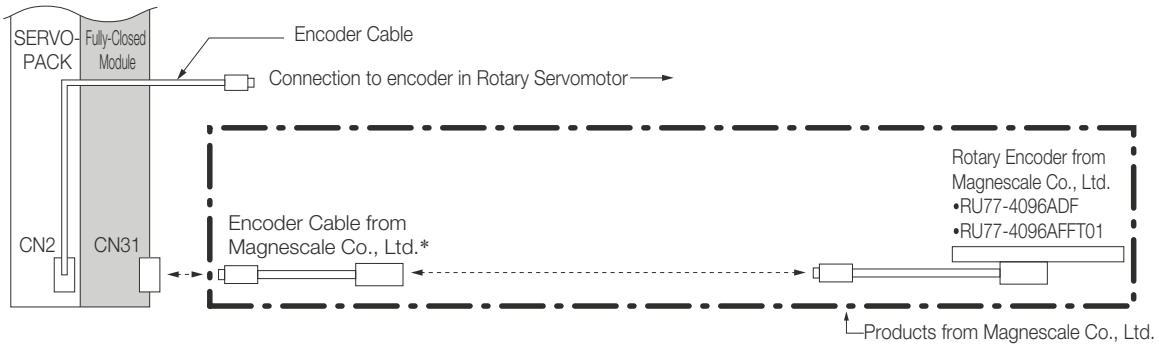

* Refer to the following section for information on cables to connect Fully-Closed Modules and Linear Encoders or chapter Serial Converter Unit Cables.

### SR-75, SR-77, SR-85, and SR-87 Linear Encoders




* To connect the SERVOPACK and Linear Encoder, use a CH33-xx□□G Cable from Magnescale Co., Ltd. (This Cable has connectors designed for use with YASKAWA products).

### RU77-4096ADF/RU77-4096AFFT01 Absolute Rotary Encoders

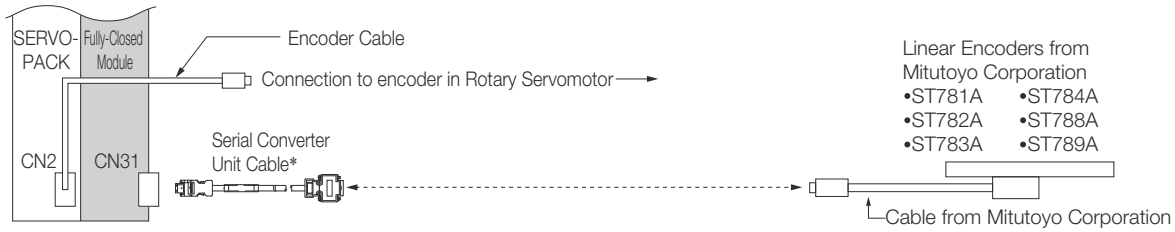



*To connect the SERVOPACK and Rotary Encoder, use a CE28-Series Extension Cable for RU77 from Magnescale Co., Ltd.

Note: The RU77 is a single-turn absolute rotary encoder.

## Connections to Linear Encoders from Mitutoyo Corporation

### ST78□A Linear Encoders




* Refer to the following section for information on cables to connect Fully-Closed Modules and Linear Encoders or chapter Serial Converter Unit Cables.

## Connectors

| Device Label | Model | YASKAWA Order No. | Number of Pins | Manufacturer |
|---|---|---|---|---|
| CN31 | 3E106-0220KV | JZSP-CMP9-1-E-G# | 6 | 3M Japan Ltd. |

Note: The above connecor or their equivalent are used for the Fully-Closed Module.

## Standard Specifications

| Encoder Type | | Specifications | |
|---|---|---|---|
| EnDat 2.2 | Encoder Supply | Output voltage | Typ. 5 V |
| | Serial Interface (Synchronous) | Signal transfer | RS485 |
| | | Max. Baud rate | 16 MHz |
| EnDat 2.1 | Encoder Supply | Output voltage | Typ. 5 V |
| | Serial Interface (Synchronous) | Signal transfer | RS485 |
| | | Max. Baud rate | 2 MHz |
| | Sine-Cosine input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.5 to 1.25 Vss |
| | | Terminating resistor | 124 Ohm |
| | | Signal frequency | 250 kHz |
| | | Resolution | 13-bits (8192) |
| Hiperface | Encoder Supply | Output voltage | 7 to 12 V |
| | Serial Interface (Asynchronous) | Signal transfer | RS485 |
| | | Max. Baud rate | 38.4 MHz |
| | Sine-Cosine input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.5 to 1.25 Vss |
| | | Terminating resistor | 124 Ohm |
| | | Signal frequency | 250 kHz |
| | | Resolution | 13-bits (8192) |
| Sine-Cosine Encoder | Encoder Supply | Output voltage | Typ. 5 V |
| | Sine-Cosine input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.5 to 1.25 Vss |
| | | Terminating resistor | 124 Ohm |
| | | Signal frequency | 250 kHz |
| | | Resolution | 13-bits (8192) |
| | Reference input | Signal transfer | Differential signals, symmetric |
| | | Differential voltage | 0.2 V or more |
| | | Terminating resistor | 124 Ohm |

## Option Module Feedback Set-up for Fully-closepd Loop Control

The encoder parameters must be written into the module via the SERVOPACK using the SigmaWin+ engineering tool. Ask YASKAWA for preparation encoder parameter file for fully-closed loop.

## Procedure to download the encoder parameter via SigmaWin+ Version 7.2x via Sigma-7 200 V to Option Module Feedback.

1. Install a motor, encoder and SERVOPACK.
2. In SigmaWin+ select “Parameters > Parameter edit”. Set parameter Pn002.3 = 1 or 3.
3. Start “Setup > Motor parameter scale write” in SigmaWin+.
4. Write configuration file to option module feedback.

Note: Refer to SigmaWin+ Operation manual for information on how to write parameters using SigmaWin+.

## General Specification SGDV-OFB01A

| Item | | Specification |
|---|---|---|
| Applicable SERVOPACK | | All Sigma-7 Series SERVOPACKs |
| Applicable SERVOPACK Firmware Version | | Version 0023 or later |
| Placement | | Attached to the SERVOPACK |
| Power Specification | Power Supply Method | Supplied from the control power supply of the SERVOPACK. |
| Operating Conditions | Surrounding Air / Storage Temperature | 0°C to +55 °C / -20 °C to +85 °C |
| | Ambient / Storage Humidity | 90% RH or less (with no condensation) |
| | Vibration / Shock Resistance | 4.9 m/s$^2$ / 19.8 m/s$^2$ |
| | Protection Class / Pollution Degree | Protection class: IP10, Pollution degree: 2<br>An environment that satisfies the following conditions.<br>• Free of corrosive or explosive gases<br>• Free of exposure to water, oil or chemicals<br>• Free of dust, salts or iron dust |
| | Altitude | 1,000 m or less |
| | Others | Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity |
| Supported motors | | Permanent magnet, Synchronous AC rotary or linear motor |
| Max. output frequency range | | Must be lower than 500 [rev/sec].<br>Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V).<br>If UL is needed, the combination should be applied to UL on customer side. |
| Supported scales for motor driving usage | | EnDat2.1, EnDat2.2, HIPERFACE, Sin/Cos |
| Supported scales for fully-closed usage | | EnDat2.1, EnDat2.2, HIPERFACE, Sin/Cos |
| Motor pole information for motor driving | Without hall sensor signals | Sigma-5 detecting function is available.<br>In case of EnDat2.1, EnDat2.2 and HIPERFACE, the function should be carried out once (after that, recognized data will be used).<br>In other cases, the function should be carried out each boot-up. |
| | With hall sensor signals | The data is used (any functions needed for the information). |
| Unsupported devices | | Advanced option module safety: SGDV-OSA01A<br>Fully-closed option module: SGDV-OFA01A |

## General Specification SGDV-OFB03A

| Item | | Specification |
|---|---|---|
| Applicable SERVOPACK | | All Sigma-7 Series SERVOPACKs |
| Applicable SERVOPACK Firmware Version | | Version 0023 or later |
| Placement | | Attached to the SERVOPACK |
| Power Specification | Power Supply Method | Supplied from the control power supply of the SERVOPACK. |
| Operating Conditions | Surrounding Air / Storage Temperature | 0°C to +55 °C / -20 °C to +85 °C |
| | Ambient / Storage Humidity | 90% RH or less (with no condensation) |
| | Vibration / Shock Resistance | 4.9 m/s$^2$ / 19.8 m/s$^2$ |
| | Protection Class / Pollution Degree | Protection class: IP10, Pollution degree: 2<br>An environment that satisfies the following conditions.<br>• Free of corrosive or explosive gases<br>• Free of exposure to water, oil or chemicals<br>• Free of dust, salts or iron dust |
| | Altitude | 1,000 m or less |
| | Others | Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity |
| Supported motors | | Permanent magnet, Synchronous AC rotary or linear motor |
| Max. output frequency range | | Must be lower than 500 [rev/sec].<br>Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V).<br>If UL is needed, the combination should be applied to UL on customer side. |
| Supported scales for motor driving usage | | A quad B |
| Supported scales for fully-closed usage | | A quad B |
| Motor pole information for motor driving | Without hall sensor signals | Sigma-5 detecting function is available.<br>In other cases, the function should be carried out each boot-up. |
| | With hall sensor signals | The data is used (any functions needed for the information). |
| Unsupported devices | | Advanced option module safety: SGDV-OSA01A<br>Fully-closed option module: SGDV-OFA01A |

## General Specification SGDV-OFB04A

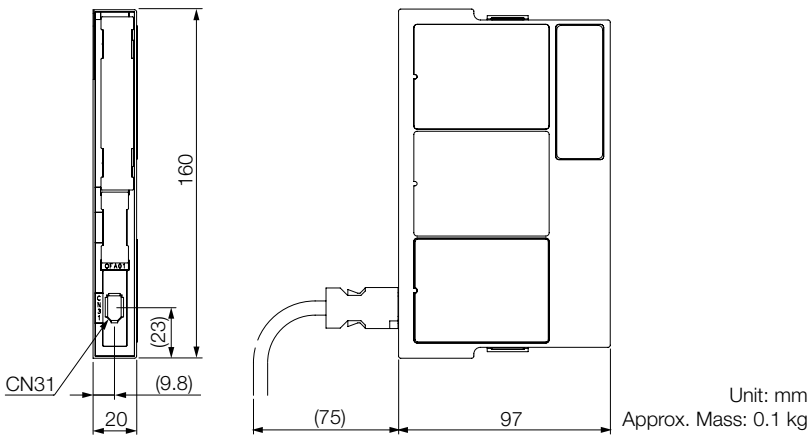
| Item | | Specification |
|---|---|---|
| Applicable SERVOPACK | | All Sigma-7 Series SERVOPACKS |
| Applicable SERVOPACK Firmware Version | | Version 0023 or later |
| Placement | | Attached to the SERVOPACK |
| Power Specification | Power Supply Method | Supplied from the control power supply of the SERVOPACK. |
| Operating Conditions | Surrounding Air / Storage Temperature | 0°C to +55 °C / -20 °C to +85 °C |
| | Ambient / Storage Humidity | 90% RH or less (with no condensation) |
| | Vibration / Shock Resistance | 4.9 $m/s^2$ / 19.8 $m/s^2$ |
| | Protection Class / Pollution Degree | Protection class: IP10, Pollution degree: 2<br>An environment that satisfies the following conditions.<br>• Free of corrosive or explosive gases<br>• Free of exposure to water, oil or chemicals<br>• Free of dust, salts or iron dust |
| | Altitude | 1,000 m or less |
| | Others | Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity |
| Supported motors | | Permanent magnet, Synchronous AC rotary or linear motor |
| Max. output frequency range | | Must be lower than 240 [rev/sec].<br>Note: UL application: 400 [rev/sec] (200 V), 300 [rev/sec] (400 V).<br>If UL is needed, the combination should be applied to UL on customer side. |
| Motor pole information for motor driving | Incremental usage | Sigma-5 detecting function is available.<br>The function should be carried out at each boot-up. |
| | Absolute usage | The data is used (any functions needed for the information). The pole detection function should be carried out only once after the card or the motor has been replaced. |
| Unsupported devices | | Advanced option module safety: SGDV-OSA01A<br>Fully-closed option module: SGDV-OFA01A |

## Connectors

| Device Label | Function | Model | YASKAWA Order Code | Number of Pins | Manufacturer |
|---|---|---|---|---|---|
| CN31 | Connector Kit for CN1 | Case: 10326-52A0-008<br>Connector: 10126-3000PE | JZSP-CSI9-2-E | 26 | 3M Japan Ltd. |

Note: The above connecor or their equivalent are used for the Fully-Closed Module SGDV-0FB0□A.

# External Dimensions




Unit: mm
Approx. Mass: 0.1 kg

### Connectors

| Device Label | Model | Number of Pins | Manufacturer |
|---|---|---|---|
| CN31 | 3E106-0220KV | 6 | 3M Japan Ltd. |

### Encoder Signal Functions (CN31)

| Pin | Signal | Function |
|---|---|---|
| 1 | PG5 V | Encoder power supply +5 V |
| 2 | PG0 V | Encoder power supply 0 V |
| 3 | – | – |
| 4 | – | – |
| 5 | PS | Serial data (+) |
| 6 | /PS | Serial data (-) |
| Shell | Shield | – |

# Safety Option Module

## Safety Module

This Safety Module implements safety functions that conform to EN ISO 13849-1 (the harmonized EU Machinery Directive) and are specified in the individual IEC 61800-5-2 standard. You can combine it with an SGD7S SERVOPACK to design optimum safety in a machine system according to industry needs.

## Model Designations

When ordering a SERVOPACK and a Safety Module separately, use the following Safety Module model number.

| SGDV | - | OS | A01 | A | |
|---|---|---|---|---|---|
| Option Module Safety | | 1st & 2nd | 3rd ... 5th | 6th | digit |

| 1st & 2nd digit - Module Type | |
|---|---|
| Code | Module |
| OS | Option Module Safety |

| 3rd ... 5th digit - Interface Specifications | |
|---|---|
| Code | Interface |
| A01 | Safety Module |

| 6th digit - Design Revision Order | |
|---|---|
| Code | Specification |
| A | Initial Design |

# Applicable Standards and Functions

### Compliance with Safety Standards

| Safety Standards | Applicable Standards | Products | |
|---|---|---|---|
| | | SERVOPACK | SERVOPACK + Safety Module |
| Safety of Machinery | EN ISO13849-1: 2015<br>IEC 60204-1 | √ | √ |
| Functional Safety | IEC 61508 Series<br>IEC 62061<br>IEC 61800-5-2 | √ | √ |
| EMC | IEC 61326-3-1 | √ | √ |

# Support for Functions defined in IEC61800-5-2

Safety functions are implemented by using the hard wire base block (HWBB) in the SERVOPACK.

| Safety Function | Description | Applicable Products | |
|---|---|---|---|
| | | SERVOPACK | SERVOPACK + Safety Module |
| Safe BaseBlock Function<br>(SBB function) | This safety function is equivalent to an STO function. (It shuts OFF the power supply from the SERVOPACK to the motor.) | √ | √ |
| Safe BaseBlock with Delay Function<br>(SBB-D function) | This safety function is equivalent to an SS1 function. (It monitors the deceleration operation of the motor for the specified time and then shuts OFF the power supply from the SERVOPACK to the motor.) | — | √ |
| Safe Position Monitor with Delay Function<br>(SPM-D function) | This safety function is equivalent to an SS2 function. (It monitors the deceleration operation of the motor for the specified time and then monitors the position after the motor stops.) | — | √ |
| Safely Limit Speed with Delay Function<br>(SLS-D function) | This safety function is equivalent to an SLS function. (It monitors the deceleration operation of the motor for the specified time and then monitors the speed of the motor to confirm that it remains in the allowable range.) | — | √ |

# Specifications and Ratings

## Basic Specifications

| Item | | Specification | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
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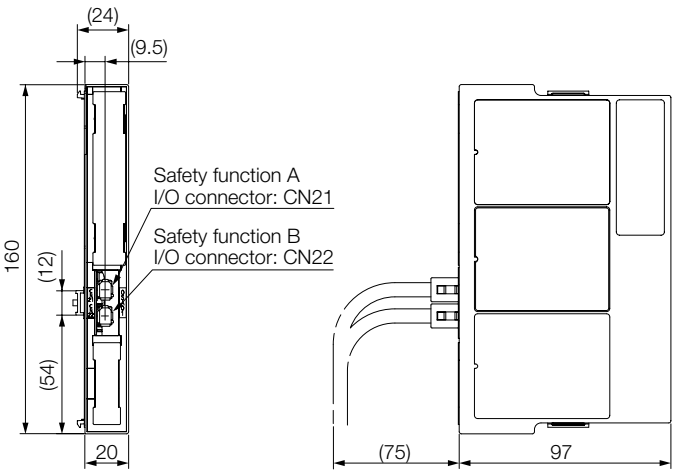
| | | | |
| | | | |

## Compliance with UL Standards, EU Directives, and other Safety Standards (in Combination with SERVOPACK)

| Item | | Specification | |
|---|---|---|---|
| North American Safety Standards | | UL61800-5-1<br>CSA C22.2 No.274 | |
| European Directives | Machinery Directive (2006/42/EC) | EN ISO 13849-1: 2015 | |
| | EMC Directive (2004/108/EC) | EN 55011/A2 group 1, class A<br>EN 61000-6-2<br>EN 61000-6-4<br>EN 61800-3 (Category C2, Second Environment) | |
| | Low Voltage Directive (2006/95/EC) | EN 50178<br>EN 61800-5-1 | |
| | RoHS Directive (2011/65/EU) | EN 50581 | |
| Safety Standards | Safety of Machinery | EN ISO 13849-1<br>IEC 60204-1 | |
| | Functional Safety | IEC 61508 Series<br>IEC 62061<br>IEC 61800-5-2 | |
| | EMC Directive | IEC 61326-3-1 | |
| Safety Function | | IEC 61800-5-2 | IEC 60204-1 |
| | | Safe Torque Off (STO) | Stop Category 0 |
| | | Safe Stop 1 (SS1) | Stop Category 1 |
| | | Safe Stop 2 (SS2) | Stop Category 2 |
| | | Safely Limited Speed (SLS) | |
| | Number of Blocks | 2 | |
| | Safety Function A | Input signals: 2 channels (redundant signals),<br>output signals: 1 channel | |
| | Safety Function B | Input signals: 2 channels (redundant signals),<br>output signals: 1 channel | |
| Safe Performance | | | |
| | Safety Integrity Level | SIL2, SILCL2 | |
| | Probability of Dangerous Failure per Hour | PFH = 8.0 × $10^{-8}$ [1/h] (SBB)<br>PFH = 3.4 × $10^{-8}$ [1/h] (SBB-D, SPM-D, SLS-D) | |
| | Category | Cat2 | |
| | Performance Level | PLd (Category 2) | |
| | Mean Time to Dangerous Failure of Each Channel | MTTFd: High | |
| | Average Diagnostic Coverage | DCave: Medium | |
| | Proof Test Interval | 10 years | |

# External Dimensions




Unit: mm
Approx. Mass: 0.1 kg

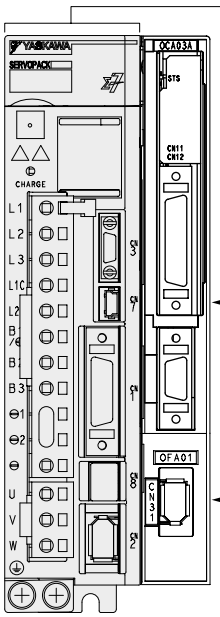
| Device Label | Model | Number of Pins | Manufacturer |
|---|---|---|---|
| CN21 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |
| CN22 | 1981080-1 | 8 | Tyco Electronics Japan G.K. |

Note:
1. The above connectors or their equivalents are used for SERVOPACKs.
2. Refer to the user's manual of the Safety Module for installation standards.

# INDEXER Module

## Configuration

A Sigma-7S Single-axis INDEXER Module-Mounted SERVOPACK is a Command Option Attachable-Type SERVOPACK with an INDEXER Module mounted on the side of the SERVOPACK. Positioning with single-axis control can be performed by using program table operation and other functions.




Command Option Attachable-Type SERVOPACKs
**SGD7S-□□□□E0A**

Option Module INDEXER
**SGDV-OCA03A**

Note: Firmware version 6 or later is required.

Fully-Closed Module*
**SGDV-OFA01A**

* Attach a Fully-Closed Module if fully-closed loop control is required.

## Model Designation

One Option Case Kit is required for each SERVOPACK.

Option Case Kit model
SGDV-OZA01A

INDEXER Module
SGDV-OCA03A

Fully-Closed Module
SGDV-OFA01A

# Sigma-7S Single-Axis INDEXER Module

## Ratings

### Three-Phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1.0 | 1.5 | 2.0 | 3.0 | 5.0 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3.0 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1.0 | 1.3 | 1.6 | 2.3 | 3.2 | 4.0 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.0 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17.0 | 19.0 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6.0 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]* 1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | External Regenerative Resistor Unit Power Loss [W] | | 180*2 | 180*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| External Regenerative Resistor Unit | External Regenerative Resistor Unit | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

## Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 11.6 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 28 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 16 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4.0 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.1 | 12.1 | 23.7 | 39.2 | 71.8 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17.0 | 19.1 | 24.1 | 35.7 | 61.2 | 103.8 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

## 270 VDC

| Model SGD7S- | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A |
|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1 | 1.5 |
| Continuous Output Current [A] | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 |
| Instantaneous Maximum Output Current [A] | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 |
| Main Circuit | Power Supply | 270 VDC to 324 VDC, -15% to +10% | | | | | | | |
| | Input Current [A]*1 | 0.5 | 1 | 1.5 | 3 | 3.8 | 4.9 | 6.9 | 11 |
| Control | Power Supply | 270 VDC to 324 VDC, -15% to +10% | | | | | | | |
| | Input Current [A]*1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2*2 |
| Power Supply Capacity [kVA]*1 | | 0.2 | 0.3 | 0.6 | 1 | 1.4 | 1.6 | 2.3 | 3.2 |
| Power Loss*1 | Main Circuit Power Loss [W] | 4.4 | 5.9 | 9.8 | 17.5 | 23.0 | 30.7 | 38.7 | 55.8 |
| | Control Circuit Power Loss [W] | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 |
| | Total Power Loss [W] | 16.4 | 17.9 | 21.8 | 29.5 | 37.0 | 44.7 | 52.7 | 70.8 |
| Overvoltage Category | | III | | | | | | | |

*1 This is the net value at the rated load.
*2 The value is0.25 A for the SGD7S-120A00A008.

| Model SGD7S- | | 180A | 200A | 330A | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | 2.0 | 3.0 | 5.0 | 6.0 | 7.5 | 11.0 | 15.0 |
| Continuous Output Current [A] | | 18.5 | 19.6 | 32.9 | 46.9 | 54.7 | 58.6 | 78.0 |
| Instantaneous Maximum Output Current [A] | | 42.0 | 56.0 | 84.0 | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | 270 VDC to 324 VDC, -15% to + 10% | | | | | | |
| | Input Current [A]* | 14 | 20 | 34 | 36 | 48 | 68 | 92 |
| Control | Power Supply | 270 VDC to 324 VDC, -15% to + 10% | | | | | | |
| | Input Current [A]* | 0.25 | 0.25 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]* | | 4.0 | 5.9 | 7.5 | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss* | Main Circuit Power Loss [W] | 82.7 | 83.5 | 146.2 | 211.6 | 255.3 | 243.6 | 343.4 |
| | Control Circuit Power Loss [W] | 16 | 16 | 19 | 21 | 21 | 28 | 28 |
| | Total Power Loss [W] | 98.7 | 99.5 | 165.2 | 232.6 | 276.3 | 271.6 | 371.4 |
| Overvoltage Category | | III | | | | | | |

* This is the net value at the rated load.

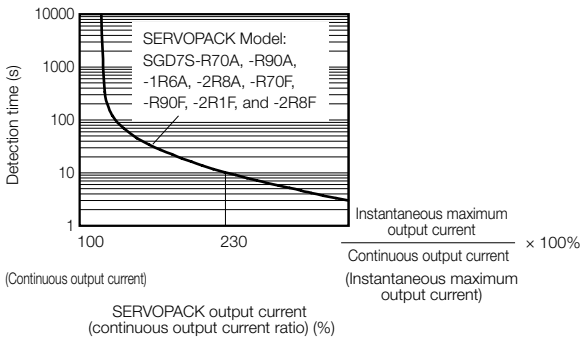
## INDEXER Module Power Loss

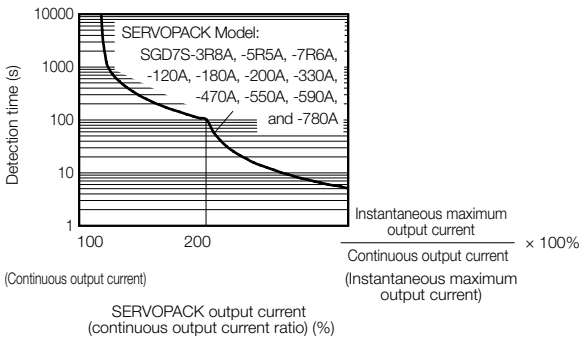
The power supply for an INDEXER Module is supplied from the control power supply of the SERVOPACK. The power loss is given in the following table.

| Item | Specification |
|---|---|
| Power Supply Method | 5.05 VDC |
| Maximum Operating Voltage | 5.25 VDC |
| Maximum Operating Current | 500 mA |
| Maximum Power Loss | 2.6 W |

## SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C. An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.
The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic (or force-motor speed characteristics) of the Servomotor.

## Specifications

The specification when the INDEXER Module is combined with a Command Option Attachable-Type SERVOPACK are given in the following table.

| Item | | Specification | |
|---|---|---|---|
| Control Method | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Surrounding Air Temperature | 0°C to 55°C | |
| | Storage Temperature | -20°C to 85°C | |
| | Surrounding Air Humidity | 90% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | 90% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | 4.9 $m/s^2$ | |
| | Shock Resistance | 19.6 $m/s^2$ | |
| | Degree of Protection | Class | SERVOPACK Model: SGD7S- |
| | | IP10 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A |
| | | IP20 | 120AE0A008, 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude | 1,000 m max. | |
| | Others | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | UL 61800-5-1 (E147823), CSA C22.2 No.274, EN ISO13849-1: 2015,<br>EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4,<br>EN 61800-3 (Category C2, Second environment), EN 50178, EN 61800-5-1,<br>IEC 60204-1, IEC 61508 series, IEC 62061, IEC 61800-5-2, and IEC 61326-3-1 | |
| Mounting | | Mounting | SERVOPACK Model: SGD7S- |
| | | Base-mounted | All Models |
| | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A |
| | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation*1 | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) | |
| | Torque Control Precision (Repeatability) | ±1% | |
| | Soft Start Time Setting | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |
| I/O Signals | Encoder Divided Pulse Putput | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed | |
| | Overheat Protection Input | Number of input points: 1<br>Input voltage range: 0 V to ±5 V | |

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<table>
<tr><th colspan="4">Item</th><th colspan="2">Specification</th></tr>
<tr><td rowspan="11">I/O Signals</td><td rowspan="9">Sequence Input Signals</td><td>SERVOPACK</td><td>Fixed Input</td><td colspan="2">Allowable voltage range: 24 VDC ±20%<br>Number of input points: 6<br>Input method: Sink inputs or source inputs Input Signals:<br>• Alarm Reset (/ALM-RST)<br>• Forward Drive Prohibited (P-OT)<br>• Reverse Drive Prohibited (N-OT)<br>• Origin Return Deceleration Switch (/DEC)<br>• Registration (/RGRT)<br>• Servo ON (/S-ON)<br>A signal can be allocated and the positive and negative logic can be changed.</td></tr>
<tr><td rowspan="8">INDEXER Module</td><td rowspan="8">Fixed Input</td><td colspan="2">Allowable voltage range: 24 VDC ±20%<br>Number of input points: 11<br>/MODE 0/1 (Mode Switch Input) signal</td></tr>
<tr><td>Mode 0</td><td>Mode 1</td></tr>
<tr><td>• /START-STOP (Program Table Operation Start-Stop Input) signal<br>• /PGMRES (Program Table Operation Reset Input) signal<br>• /SEL0 (Program Step Selection Input 0) signal<br>• /SEL1 (Program Step Selection Input 1) signal<br>• /SEL2 (Program Step Selection Input 2) signal<br>• /SEL3 (Program Step Selection Input 3) signal<br>• /SEL4 (Program Step Selection Input 4) signal<br>• /SEL5 (Program Step Selection Input 5) signal<br>• /SEL6 (Program Step Selection Input 6) signal<br>• /SEL7 (Program Step Selection Input 7) signal</td><td>• /HOME (Origin Return Input) signal<br>• /JOGP (Forward Jog Input) signal<br>• /JOGN (Reverse Jog Input) signal<br>• /JOG0 (Jog Speed Table Selection Input 0) signal<br>• /JOG1 (Jog Speed Table Selection Input 1) signal<br>• /JOG2 (Jog Speed Table Selection Input 2) signal<br>• /JOG3 (Jog Speed Table Selection Input 3) signal</td></tr>
<tr><td rowspan="2">Sequence Output Signals</td><td rowspan="2">SERVOPACK</td><td>Fixed Input</td><td colspan="2">Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 1<br>Output signal: Servo Alarm (ALM)</td></tr>
<tr><td>Output Signals for Which Allocations Can Be Changed</td><td colspan="2">Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 3<br>(A photocoupler output (isolated) is used.)<br>Output Signals:<br>• Warning Output (/WARN)<br>• Brake Output (/BK)<br>• Servo Ready Output (/S-RDY)<br>• Alarm Code Output (/ALO1, /ALO2, and /ALO3)<br>A signal can be allocated and the positive and negative logic can be changed.</td></tr>
<tr><td>INDEXER Module</td><td>Fixed Input</td><td colspan="2">Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 9<br>Output Signals:<br>• Positioning Completion Output (/INPOSITION)<br>• Programmable Output 0 (/POUT0)<br>• Programmable Output 1 (/POUT1)<br>• Programmable Output 2 (/POUT2)<br>• Programmable Output 3 (/POUT3)<br>• Programmable Output 4 (/POUT4)<br>• Programmable Output 5 (/POUT5)<br>• Programmable Output 6 (/POUT6)<br>• Programmable Output 7 (/POUT7)</td></tr>
</table>

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| Item | | | Specification |
|---|---|---|---|
| Communications | RS-422A Communications (CN3) | Interfaces | Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+) |
| | | 1:N Communications | Up to N = 15 stations possible for RS-422A port |
| | | Axis Address Setting | Set with parameters. |
| | USB Communications (CN7) | Interfaces | Interface Personal computer (with SigmaWin+) |
| | | Communications Standard | Conforms to USB2.0 standard (12 Mbps). |
| Displays/ Indicators | SERVOPACK | | CHARGE and PWR indicators, and one-digit seven-segment display |
| | INDEXER Module | | Refer to the following manual for details.<br>Sigma-7-Series AC Servo Drive Sigma-7S SERVOPACK Command Option Attachable Type with INDEXER Module Product Manual (Manual No.: SIEP S800001 64) |
| Operating Methods | Program Table Method | | • Program table positioning in which steps are executed sequentially by commands given through contact input or serial communications<br>• Positioning in which station numbers are specified by commands given through contact input or serial communications |
| | | Max. Number of Steps | 256 |
| | | Max. Number of Tables | 256 |
| | | Max. Number of Stations | 256 |
| | Serial Communications Method | | Serial command by 1-channel ASCII code<br>Communications specifications: RS-422/485 (50 m max.)<br>Connection topology: Multi-drop connection (16 axes max.)<br>Baud rate: 9,600, 19,200, 38,400 bps |
| | Other Functions | | Registration (positioning by external signals), origin return |
| Analog Monitor (CN5) | | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to the following section for details or Built-In Regenerative Resistor. |
| Overtravel (OT) Prevention | | | Stopping with a dynamic brake (DB), coasting to a stop, performing a hard stop, or performing a smooth stop (decelerating to a stop) for a CCW-OT (CCW Drive Prohibit Input) signal or CW-OT (CW Drive Prohibit Input) signal. |
| Protective Functions | | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Input | | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | | EDM1: Monitors the status of built-in safety circuit (fixed output). |
| | Applicable Standards*2 | | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | | Fully-Closed Module<br>You cannot use a Safety Module if you are using an INDEXER Module. |

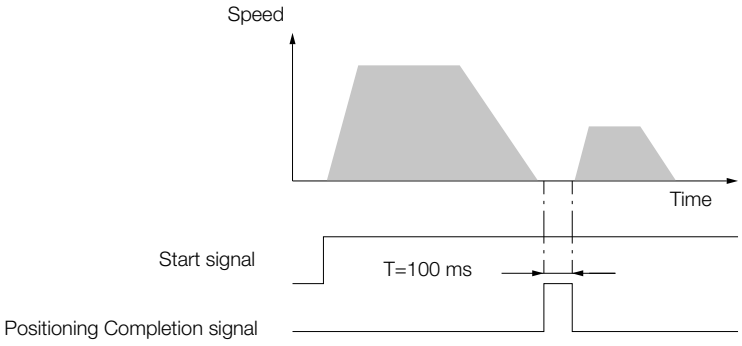
*1. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*2. Always perform risk assessment for the system and confirm that the safety requirements are met.

# Reference Methods

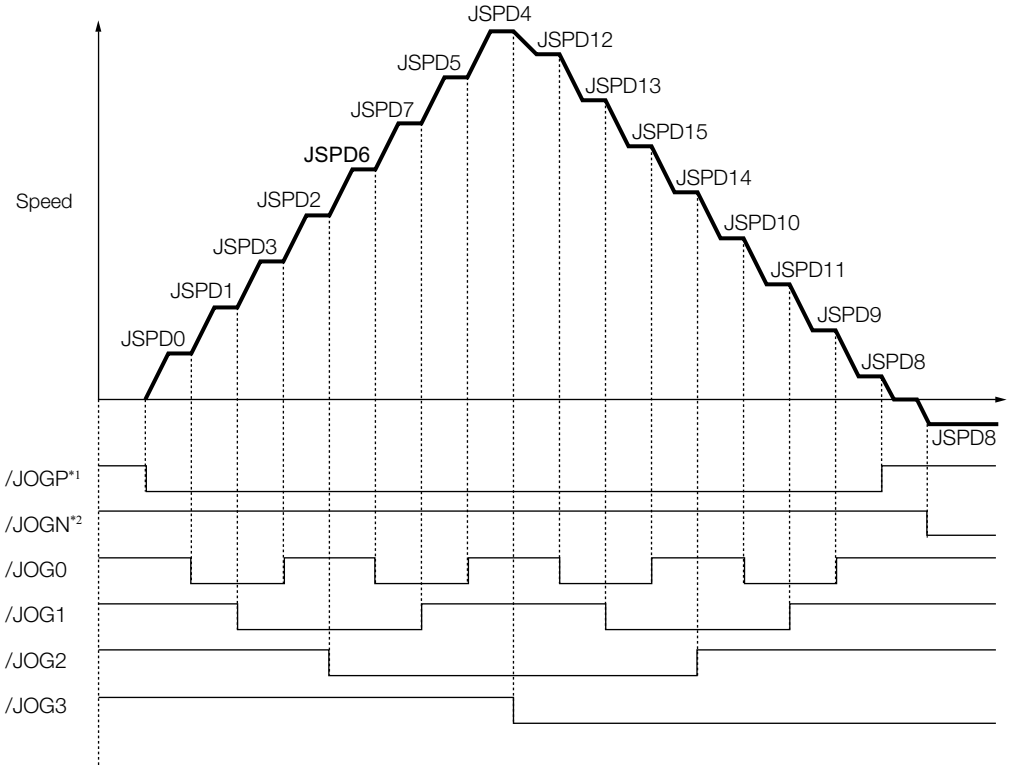
| | PGMSTEP | POS | SPD | RDST | RSPD | ACC* | DEC* | EVENT | LOOP | NEXT |
|---|---|---|---|---|---|---|---|---|---|---|
| 256 steps | 0 | I+400000 | 2000 | 500000 | 1000 | 200 | 100 | T5000 | 1 | 1 |
| | 1 | I+100000 | 1000 | 200000 | 2000 | 100 | 50 | ITO | 1 | END |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | n | I+400000 | 2000 | 500000 | 1000 | 100 | 50 | IT100 | 1 | n+1 |
| | n+1 | I+100000 | 1000 | 200000 | 2000 | ⋮ | ⋮ | NT0 | 1 | END |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | 254 | I+400000 | 2000 | 500000 | 1000 | 100 | 50 | SEL3T200 | 1 | 127 |
| | 255 | I+100000 | 1000 | 200000 | 2000 | 100 | 50 | DT0 | 1 | END |



## Jog Speed Table

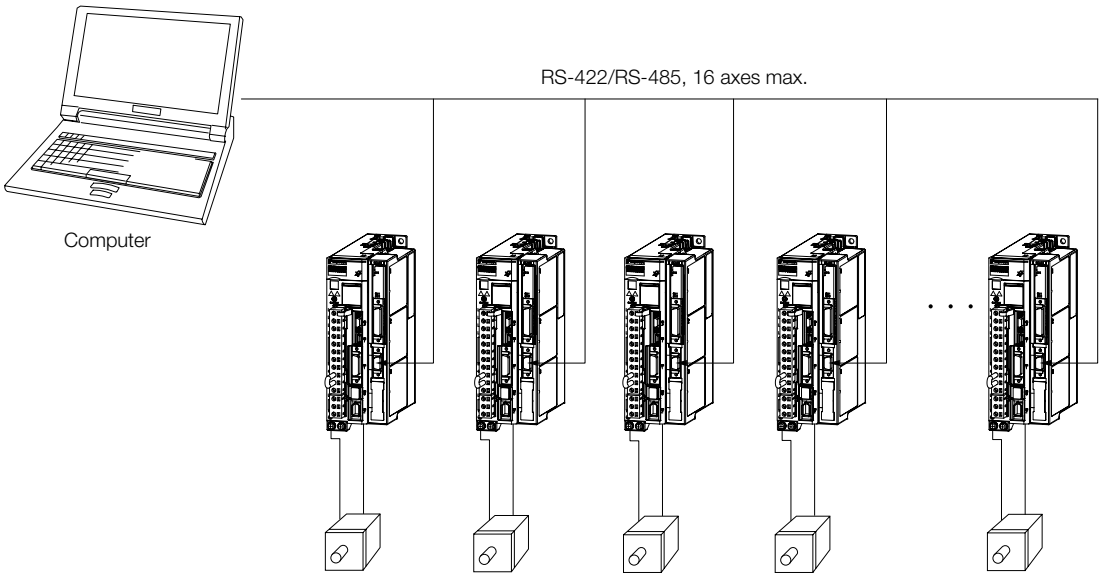
| | JSPD | JOG3 | JOG2 | JOG1 | JOG0 | Jog Speed |
|---|---|---|---|---|---|---|
| 16 combinations | 0 | 0 | 0 | 0 | 0 | 1000 |
| | 1 | 0 | 0 | 0 | 1 | 2000 |
| | 2 | 0 | 0 | 1 | 0 | 4000 |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| | 15 | 1 | 1 | 1 | 1 | 5500 |

Note: 1: Signal is ON (active), 0: Signal is OFF (inactive).

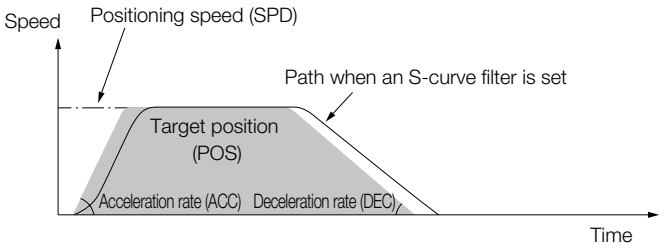



*1. Forward operation at the jog speed is performed while the /JOGP signal is ON.
*2. Reverse operation at the jog speed is performed while the /JOGN signal is ON.

With serial commands, ASCII command strings are sent to the INDEXER Module through RS-422 or RS-485 communications and these commands are interpreted and executed immediately. You can use general-purpose serial communications (RS422/RS485) to perform independent control of up to 16 axes from one host controller (e.g., PC or HMI).



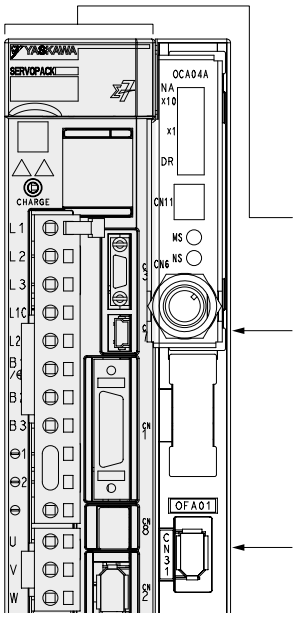

```
1SVON              # Servo turned ON.
1POSI=400000       # Set relative position to 400,000.
1SPD=2000          # Set speed to 2,000.
1ACC=200           # Set acceleration rate to 200.
1DEC=100           # Set deceleration rate to 100.
1ST                # Start operation.
 :
```



# DeviceNet Modules

## Configuration

A Sigma-7S Single-axis DeviceNet Module-Mounted SERVOPACK is a Command Option Attachable-Type SERVOPACK with a DeviceNet Module mounted on the side of the SERVOPACK. Positioning and origin returns can be performed by sending commands from the host controller (DeviceNet master).




Command Option Attachable-Type SERVOPACKs
**SGD7S-□□□□E0A□□□**

Option Module DeviceNet
**SGDV-OCA04A (driven by control power supply)**
**SGDV-OCA05A (driven by external power supply)**

Fully-Closed Module*
**SGDV-OFA01A**

## Purchasing a Module separately

One Option Case Kit is required for each SERVOPACK.

Option Case Kit model
SGDV-OZA01A

DeviceNet Modules
SGDV-OCA04A (driven by control power supply)
SGDV-OCA05A (driven by external power supply)

Fully-Closed Module
SGDV-OFA01A

# Sigma-7S Single-Axis DeviceNet Module

## Ratings

### Three-Phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A | 180A | 200A | 330A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1 | 1.5 | 2 | 3 | 5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 | 18.5 | 19.6 | 32.9 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 | 42 | 56 | 84 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.4 | 0.8 | 1.3 | 2.5 | 3.0 | 4.1 | 5.7 | 7.3 | 10 | 15 | 25 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 | 0.25 | 0.3 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.5 | 1 | 1.3 | 1.6 | 2.3 | 3.2 | 4 | 5.9 | 7.5 |
| Power Loss* | Main Circuit Power Loss [W] | | 5 | 7 | 11.9 | 22.5 | 28.5 | 38.9 | 49.2 | 72.6 | 104.2 | 114.2 | 226.6 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 | 16 | 16 | 19 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 8 | 8 | 10 | 16 | 16 | 36 |
| | Total Power Loss [W] | | 17 | 19 | 23.9 | 34.5 | 50.5 | 60.9 | 71.2 | 97.6 | 136.2 | 146.2 | 281.6 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| | | Capacity [W] | – | – | – | – | 40 | 40 | 40 | 60 | 60 | 60 | 180 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 20 | 12 | 12 | 8 |
| Overvoltage Category | | | III | | | | | | | | | | |

* This is the net value at the rated load.

| Model SGD7S- | | | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 6 | 7.5 | 11 | 15 |
| Continuous Output Current [A] | | | 46.9 | 54.7 | 58.6 | 78 |
| Instantaneous Maximum Output Current [A] | | | 110 | 130 | 140 | 170 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 29 | 37 | 54 | 73 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | |
| | Input Current [A]*1 | | 0.3 | 0.3 | 0.4 | 0.4 |
| Power Supply Capacity [kVA]* 1 | | | 10.7 | 14.6 | 21.7 | 29.6 |
| Power Loss*1 | Main Circuit Power Loss [W] | | 271.7 | 326.9 | 365.3 | 501.4 |
| | Control Circuit Power Loss [W] | | 21 | 21 | 28 | 28 |
| | External Regenerative Resistor Unit Power Loss [W] | | 180*2 | 350*3 | 350*3 | 350*3 |
| | Total Power Loss [W] | | 292.7 | 347.9 | 393.3 | 529.4 |
| External Regenerative Resistor Unit | External Regenerative Resistor Unit | Resistance [Ω] | 6.25*2 | 3.13*3 | 3.13*3 | 3.13*3 |
| | | Capacity [W] | 880*2 | 1,760*3 | 1,760*3 | 1,760*3 |
| | Minimum Allowable External Resistance [Ω] | | 5.8 | 2.9 | 2.9 | 2.9 |
| Overvoltage Category | | | III | | | |

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

## Single-phase, 200 VAC

| Model SGD7S- | | | R70A | R90A | 1R6A | 2R8A | 5R5A | 120A |
|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | | 0.05 | 0.1 | 0.2 | 0.4 | 0.75 | 1.5 |
| Continuous Output Current [A] | | | 0.66 | 0.91 | 1.6 | 2.8 | 5.5 | 11.6 |
| Instantaneous Maximum Output Current [A] | | | 2.1 | 3.2 | 5.9 | 9.3 | 16.9 | 28 |
| Main Circuit | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.8 | 1.6 | 2.4 | 5.0 | 8.7 | 16 |
| Control | Power Supply | | 200 VAC to 240 VAC, -15% to +10%, 50 Hz/60 Hz | | | | | |
| | Input Current [A]* | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.25 |
| Power Supply Capacity [kVA]* | | | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 4 |
| Power Loss* | Main Circuit Power Loss [W] | | 5.0 | 7.1 | 12.1 | 23.7 | 39.2 | 71.8 |
| | Control Circuit Power Loss [W] | | 12 | 12 | 12 | 12 | 14 | 16 |
| | Built-in Regenerative Resistor Power Loss [W] | | – | – | – | – | 8 | 16 |
| | Total Power Loss [W] | | 17.0 | 19.1 | 24.1 | 35.7 | 61.2 | 103.8 |
| Regenerative Resistor | Built-In Regenerative Resistor | Resistance [Ω] | – | – | – | – | 40 | 12 |
| | | Capacity [W] | – | – | – | – | 40 | 60 |
| | Minimum Allowable External Resistance [Ω] | | 40 | 40 | 40 | 40 | 40 | 12 |
| Overvoltage Category | | | III | | | | | |

* This is the net value at the rated load.

## 270 VDC

| Model SGD7S- | | R70A | R90A | 1R6A | 2R8A | 3R8A | 5R5A | 7R6A | 120A |
|---|---|---|---|---|---|---|---|---|---|
| Maximum Applicable Motor Capacity [kW] | | 0.05 | 0.1 | 0.2 | 0.4 | 0.5 | 0.75 | 1 | 1.5 |
| Continuous Output Current [A] | | 0.66 | 0.91 | 1.6 | 2.8 | 3.8 | 5.5 | 7.6 | 11.6 |
| Instantaneous Maximum Output Current [A] | | 2.1 | 3.2 | 5.9 | 9.3 | 11 | 16.9 | 17 | 28 |
| Main Circuit | Power Supply | 270 VDC to 324 VDC, -15% to +10% | | | | | | | |
| | Input Current [A]*1 | 0.5 | 1 | 1.5 | 3 | 3.8 | 4.9 | 6.9 | 11 |
| Control Power Supply | Power Supply | 270 VDC to 324 VDC, -15% to +10% | | | | | | | |
| | Input Current [A]*1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2*2 |
| Power Supply Capacity [kVA]*1 | | 0.2 | 0.3 | 0.6 | 1 | 1.4 | 1.6 | 2.3 | 3.2 |
| Power Loss*1 | Main Circuit Power Loss [W] | 4.4 | 5.9 | 9.8 | 17.5 | 23 | 30.7 | 38.7 | 55.8 |
| | Control Circuit Power Loss [W] | 12 | 12 | 12 | 12 | 14 | 14 | 14 | 15 |
| | Total Power Loss [W] | 16.4 | 17.9 | 21.8 | 29.5 | 37.0 | 44.7 | 52.7 | 70.8 |
| Overvoltage Category | | III | | | | | | | |

*1. This is the net value at the rated load.
*2. The value is 0.25 A for the SGD7S-120A00A008.

| Model SGD7S- | | | 180A | 200A | 330A | 470A | 550A | 590A | 780A |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
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| | | | | | | | | | |

* This is the net value at the rated load.

# DeviceNet Module Ratings

The power supply method and power loss of a DeviceNet Module depend on the model of the DeviceNet Module.

## SGDV-OCA04A (Interface: Driven by Control Power Supply)

The specifications of the SGDV-OCA04A DeviceNet Module are given in the following table.

| Item | Specification | |
|---|---|---|
| | DeviceNet Communications Section | Control Section |
| Power Supply Method | Supplied from the DeviceNet communications cable. | Supplied from the control power supply of a Command Option Attachable-Type SERVOPACK. |
| Minimum Operating Voltage | 11 VDC | Included in the current consumption of the Command Option Attachable-Type SERVOPACK. |
| Maximum Operating Voltage | 25 VDC | |
| Maximum Operating Current | 25 mA | |
| Maximum Power Loss | 625 mW | |

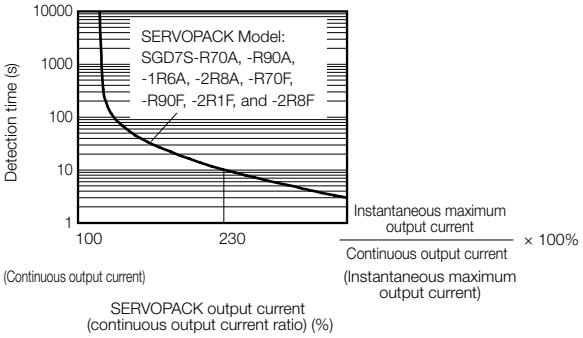
## SGDV-OCA05A (Interface: Driven by External Power Supply)

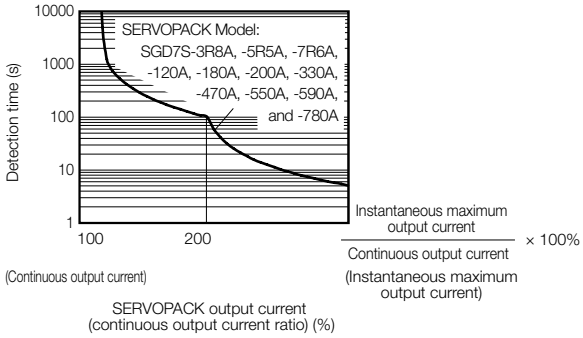
The specifications of the SGDV-OCA05A DeviceNet Module are given in the following table.

| Item | Specification | |
|---|---|---|
| | DeviceNet Communications Section | Control Section |
| Power Supply Method | Supplied from the DeviceNet communications cable. | |
| Minimum Operating Voltage | 11 VDC | |
| Maximum Operating Voltage | 25 VDC | |
| Maximum Operating Current | 100 mA for 24-VDC power supply<br>200 mA for 11-VDC power supply | |
| Maximum Power Loss | 2.4 W | |

## SERVOPACK Overload Protection Characteristics

The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C. An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the appli- cable line) is performed. The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.
In most cases, that will be the overload protection characteristics of the Servomotor.




Note:
The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a YASKAWA-specified combination of SERVOPACK and Servomotor, maintain the effective torque (or effective force) within the continuous duty zone of the torque-motor speed characteristic (or force-motor speed characteristics) of the Servomotor.

## Specifications

The specification when the INDEXER Module is combined with a Command Option Attachable-Type SERVOPACK are given in the following table.

| Item | | | Specification | |
|---|---|---|---|---|
| Control Method | | | IGBT-based PWM control, sine wave current drive | |
| Feedback | With Rotary Servomotor | | Serial encoder: 17 bits (absolute encoder)<br>20 bits or 24 bits (incremental encoder/absolute encoder)<br>22 bits (absolute encoder) | |
| | With Linear Servomotor | | • Absolute linear encoder (The signal resolution depends on the absolute linear encoder.)<br>• Incremental linear encoder (The signal resolution depends on the incremental linear encoder or Serial Converter Unit.) | |
| Environmental Conditions | Surrounding Air Temperature | | 0°C to 55°C | |
| | Storage Temperature | | -20°C to 85°C | |
| | Surrounding Air Humidity | | 90% relative humidity max. (with no freezing or condensation) | |
| | Storage Humidity | | 90% relative humidity max. (with no freezing or condensation) | |
| | Vibration Resistance | | 4.9 $m/s^2$ | |
| | Shock Resistance | | 19.6 $m/s^2$ | |
| | Degree of Protection | | Class | SERVOPACK Model: SGD7S- |
| | | | IP20 | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A |
| | | | IP10 | 120AE0A008, 180A, 200A, 330A, 470A, 550A, 590A, 780A |
| | Pollution Degree | | 2<br>• Must be no corrosive or flammable gases.<br>• Must be no exposure to water, oil, or chemicals.<br>• Must be no dust, salts, or iron dust. | |
| | Altitude | | 1,000 m max. | |
| | Others | | Do not use the SERVOPACK in the following locations: Locations subject to static electricity noise, strong electromagnetic/magnetic fields, or radioactivity | |
| Applicable Standards | | | UL 61800-5-1 (E147823), CSA C22.2 No.274, EN ISO13849-1: 2015,<br>EN 55011 group 1 class A, EN 61000-6-2, EN 61000-6-4,<br>EN 61800-3 (Category C2, Second environment), EN 50178, EN 61800-5-1,<br>IEC 60204-1, IEC 61508 series, IEC 62061, IEC 61800-5-2, and IEC 61326-3-1 | |
| Mounting | | | Mounting | SERVOPACK Model: SGD7S- |
| | | | Base-mounted | All Models |
| | | | Rack-mounted | R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A |
| | | | Duct-ventilated | 470A, 550A, 590A, 780A |
| Performance | Speed Control Range | | 1:5,000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.) | |
| | Coefficient of Speed Fluctuation*1 | | ±0.01% of rated speed max. (for a load fluctuation of 0% to 100%) | |
| | | | 0% of rated speed max. (for a voltage fluctuation of ±10%) | |
| | | | ±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C) | |
| | Torque Control Precision (Repeatability) | | ±1% | |
| | Soft Start Time Setting | | 0 s to 10 s (Can be set separately for acceleration and deceleration.) | |
| I/O Signals | Encoder Divided Pulse Output | | Phase A, phase B, phase C: Line-driver output<br>Number of divided output pulses: Any setting is allowed. | |
| | Linear Servomotor Overheat Protection Signal Input | | Number of input points: 1<br>Input voltage range: 0 V to ±5 V | |
| | Sequence Input Signals | Fixed Input | Allowable voltage range: 24 VDC ±20%<br>Number of input points: 4<br>Input method: Sink inputs or source inputs<br>Input Signals<br>• CCW-OT (CCW Drive Prohibit Input) signal<br>• CW-OT (CW Drive Prohibit Input) signal<br>• /HOME (Origin Signal Input) signal<br>• EXSTOP (External Stop Input) Signal<br>Positive or negative logic can be changed in the parameters. | |
| | Sequence Output Signals | Fixed Output | Allowable voltage range: 5 VDC to 30 VDC<br>Number of output points: 4<br>Output Signals<br>• ALM (Servo Alarm Output) signal<br>• /WARN (Warning Signal Output) signal<br>• /BK (Brake) signal<br>• /S-RDY (Servo Ready Output) signal | |
| Communications | RS-422A Communications (CN3) | Interface | Digital Operator (JUSP-OP05A-1-E) | |
| | USB Communications (CN7) | Interface | Conforms to USB2.0 standard (12 Mbps) | |
| | | Communications Standard | | |
| Displays / Indicators | SERVOPACK | | CHARGE and PWR indicators, and one-digit seven-segment display | |
| | DeviceNet Module | | Refer to the following manual for details.<br>Sigma-7-Series AC Servo Drive Sigma-7S SERVOPACK Command Option Attachable Type with DeviceNet Module Product Manual (Manual No.: SIEP S800001 70) | |

Continued on next page.

| Item | | | Specification |
|---|---|---|---|
| Operating Methods | Reference Method | Operation Specifications | Positioning via DeviceNet communications |
| | | Reference Inputs | DeviceNet communications<br>Commands: Movement references (positioning or speed) and origin returns |
| | Position Control Functions | Acceleration/ Deceleration Methods | Linear, asymmetrical, exponential, and S-curve acceleration/deceleration |
| | | Operating Methods | Simple positioning, origin returns, continuous operation, and switching to positioning |
| | | Fully-Closed Loop Control | Supported. |
| | Built-in Functions | Position Data Latching | Position data can be latched on phase C, the origin signal, of an external signal. |
| | DeviceNet Communications | Communications Methods | DeviceNet I/O communications and explicit messages |
| | | Topology | Multidrop or T-branching*2 |
| | | Baud Rate | 125 kbps, 250 kbps, or 500 kbps (Set on rotary switch (DR).) |
| | | Cables | Special cables<br>(OMRON DCA1-5CN02F1 Cable with Connectors or the equivalent.) |
| | | Maximum Number of Nodes | 64 nodes (including the master, Maximum number of slaves: 63) |
| | | Node Address Setting | 0 to 63 (Set on NA ×10 and ×1 rotary switches.) |
| Analog Monitor (CN5) | | | Number of points: 2<br>Output voltage range: ±10 VDC (effective linearity range: ±8 V)<br>Resolution: 16 bits<br>Accuracy: ±20 mV (Typ)<br>Maximum output current: ±10 mA<br>Settling time (±1%): 1.2 ms (Typ) |
| Dynamic Brake (DB) | | | Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF. |
| Regenerative Processing | | | Built-in (An external resistor must be connected to the SGD7S-470A to -780A.)<br>Refer to the following section for details or Built-In Regenerative Resistor. |
| Overtravel (OT) Prevention | | | Stopping with a dynamic brake (DB), coasting to a stop, performing a hard stop, or performing a smooth stop (decelerating to a stop) for a CCW-OT (CCW Drive Prohibit Input) signal or CW-OT (CW Drive Prohibit Input) signal. |
| Protective Functions | | | Overcurrent, overvoltage, low voltage, overload, regeneration error, etc. |
| Utility Functions | | | Gain adjustment, alarm history, jogging, origin search, etc. |
| Safety Functions | Input | | /HWBB1 and /HWBB2: Base block signals for Power Modules |
| | Output | | EDM1: Monitors the status of built-in safety circuit (fixed output) |
| | Applicable Standrads *3 | | ISO13849-1 PLe (Category 3), IEC61508 SIL3 |
| Applicable Option Modules | | | Fully-Closed Module<br>Note: You cannot use a Safety Module if you are using a DeviceNet Module. |

*1. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*2. Externally connected terminating resistance is required.
*3. Always perform risk assessment for the system and confirm that the safety requirements are met.

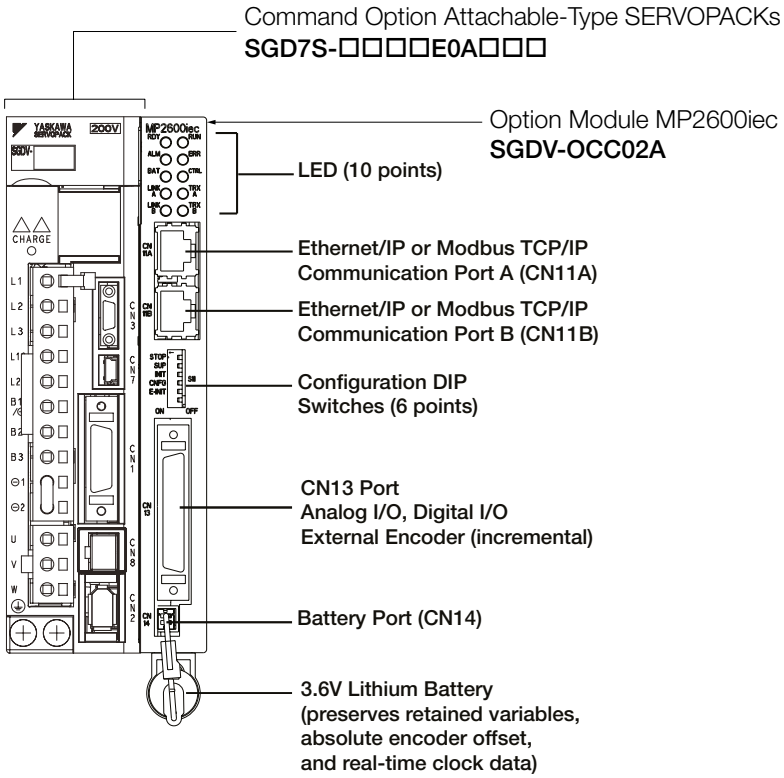
The following table gives the specifications of the DeviceNet Module.

| Item | | Specification | |
|---|---|---|---|
| | | SGDV-OCA04A | SGDV-OCA05A |
| Mounting Location | | Mounted to the side of a Command Option Attachable-Type SERVOPACK. | |
| Power Supply Method | Control Section | Supplied from the control power supply of a Command Option Attachable-Type SERVOPACK. | Supplied from the DeviceNet communications cable. |
| | DeviceNet Communications Section | Supplied from the DeviceNet communications cable. | |
| Current Consumption | Control Section | Included in the current consumption of the Command Option Attachable-Type SERVOPACK. | For 24-VDC power supply: 100 mA max.,<br>For 11-VDC power supply: 200 mA max. |
| | DeviceNet Communications Section | 25 mA max. | |

# MP2600iec Single Axis Machine Controller Option

## Configuration

The MP2600iec 1.5 Axis Motion Controller Option for the Sigma-5 amplifier provides a compact, all-in-one, servo/controller package with the following features:




## Purchasing a Module separately

Ordering a SERVOPACK and a MP2600iec Single Axis Machine Controller Option Module separately.
Please use the following model number.

### VMK-U-MP26A01R001

This kit includes the option module (SGDV-OCC02A), mounting kit (SGDV-OZC01A), battery holder and battery.

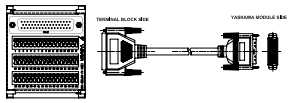
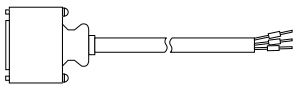
# Specifications

| Items | | | | Specifications |
|---|---|---|---|---|
| Environmental Conditions | | Ambient Operating Temperature | | 0 to 55°C |
| | | Ambient Storage Temperature | | -20°C to +85°C |
| | | Ambient Operating Humidity | | 90% RH or less (with no condensation) |
| | | Ambient Storage Humidity | | 90% RH or less (with no condensation) |
| | | Protection Class / Pollution Degree | | Protection class: IP10, Pollution degree: 2<br>An environment that satisfies the following conditions:<br>• Free of corrosive or explosive gases<br>• Free of exposure to water, oil or chemicals<br>• Free of dust, salts or iron dust |
| | | Operating Altitude | | 1,000 m above sea level or lower |
| Mechanical Operating Conditions | | Vibration Resistance | | 4.9 m/s$^2$ |
| | | Shock Resistance | | 19.6 m/s$^2$ |
| | | Others | | Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity |
| CPU | | | | 200 MHz, 32 bit, ARM 9 |
| Memory | | SDRAM | | 32 MB |
| | | SRAM | | 512 kB with battery backup |
| | | Flash | | 4 MB flash. Code and parameter storage |
| Operator interface | | LED | | 10 LEDs (red and green - operating mode, communication and error status |
| | | User Configuration | | 6x DIP switch (operating mode and communication configuration |
| User I/O | Controller Side (CN13) | Network | | 2x 100baseTX Ethernet |
| | | Digital input | | 8 programmable inputs |
| | | Digital output | | 8 programmable outputs |
| | | Analog input | | 1 ch., +/- 10V, 16 bit |
| | | Analog output | | 1 ch., +/- 10V, 16 bit |
| | | Pulse Counter | | RS-422-compatible pulse counter input (quadrature, pulse and direction, and up/down counter modes) with 5, 12, and 24 V position latch inputs |
| | Servo Side (CN1) | Sequence Input | Allocated | Number of Inputs: 7<br>(1 registration input latches external encoder in 5 µs) |
| | | | | Functions: The signal allocation and positive/negative logic can be modified. Forward run prohibited (P-OT), reverse run prohibited (N-OT), forward torque limit (/P-CL), reverse torque limit (/N-CL), general-purpose input signal (/SI0 to /SI6) |
| | | Sequence Input | Fixed | Servo Alarm (ALM) |
| | | | Allocated | Number of Outputs: 3 |
| | | | | Functions: The signal allocation and positive/negative logic can be modified. Positioning completion (/COIN), speed coincidence detection(/V-CMP), servomotor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), speed limit detection (VLT), brake (/BK), warning (/WARN), near (/NEAR) |
| Network capability | | | | OPC (Client and Server required) |
| | | | | Ethernet/IP |
| | | | | Modbus/TCP |
| Programming standards | | | | IEC61131/PLCopen |
| Diagnostic and configuration interface | | | | Web interface |
| Motion control performance | | | | 1 controlled axis and one external encoder input plus virtual axis |
| Servo-Side Safety Functions | | Input | | /HWBB1, /HWBB2: Baseblock signal for power module |
| | | Output | | EDM1: Status monitor (fixed output) of built-in safety circuit |

* Allocated I/O can also be used as programmable I/O.

# Selecting Cables

## Cable Selection

| Description | | Length | Order No. | Appearance | Details |
|---|---|---|---|---|---|
| CN13<br>Cables for I/O Signals | Connector Kit | | JZSP-CSI9-1-E | Soldered | (1) |
| | Connector Terminal Converter Unit | 0.5 m | CBK-U-MP2B-A5 | Terminal Block and 0.5 m Connection Cable  | (2) |
| | | 1 m | CBK-U-MP2B-01 | | |
| | | 3 m | CBK-U-MP2B-03 | | |
| | Flying Lead Cable | 0.5 m | CFC-U-MP2B-A5 |  | (3) |
| | | 1 m | CFC-U-MP2B-01 | | |
| | | 3 m | CFC-U-MP2B-03 | | |
| CN11A CN11B<br>Ethernet/EtherCAT/PROFINET Cables for Industrial Use | | | Category: CAT5e<br>Shield specifications: S/UTP or S/STP<br>Cable length: 50 m maximum | | |

## (1) Connector Kit for CN13

Use the following connector and cable to assemble the cable. The CN13 connector kit includes one case and one connector.

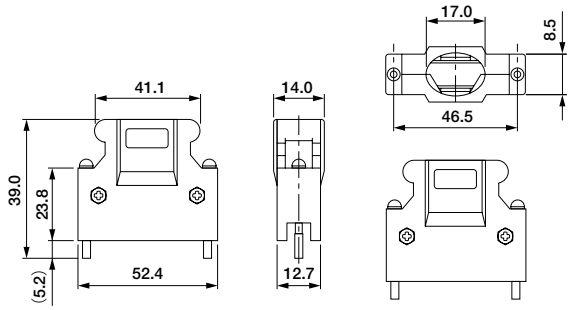
| Connector Kit Model | Case | | Connector | |
|---|---|---|---|---|
| | Model | Qty | Model | Qty |
| JZSP-CSI9-1-E | 10350-52Z0-008* | 1 set | 10150-3000PE* (Soldered) | 1 |

* : Manufactured by Sumitomo 3M Ltd.

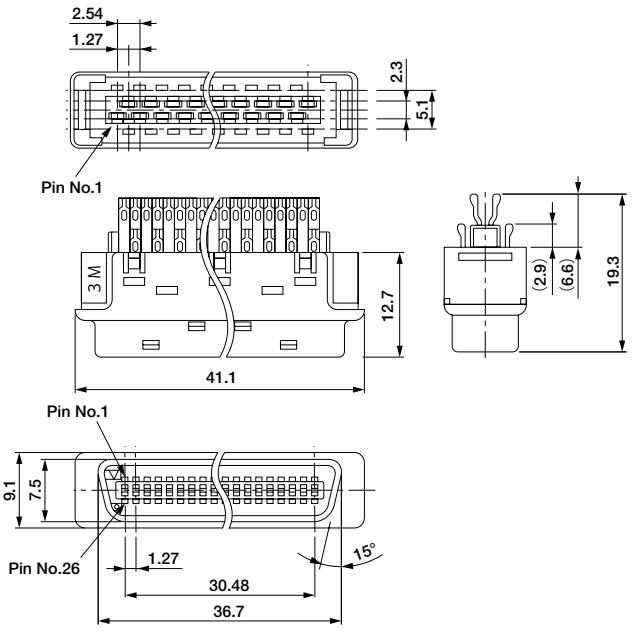
### Cable Size

| Item | Specifications |
|---|---|
| Cable | Use twisted-pair or twisted-pair shielded wire. |
| Applicable Wires | AWG 24, 26, 28, 30 |
| Cable Finished Diameter | 16 dia. max. |

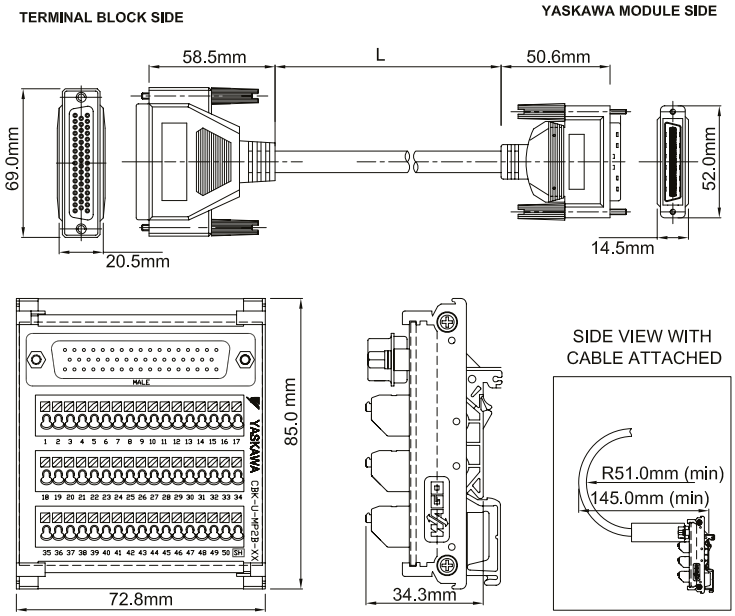
### Dimensional Drawings of Case




### Dimensional Drawings of Connector



## (2) Connector Terminal Converter Unit for CN13




| ITEM# | L = LENGTH (mm) |
|---|---|
| CBK-U-MP2B-A5 | 500 +/- 38.1 |
| CBK-U-MP2B-01 | 1000 +/- 38.1 |
| CBK-U-MP2B-03 | 3000 +/- 38.1 |

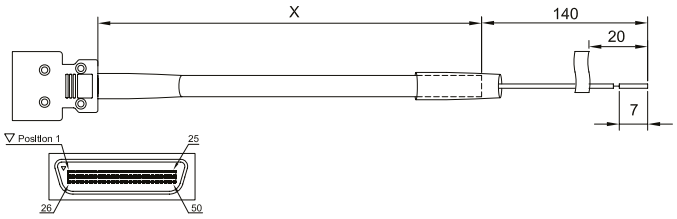
| CABLE SPECIFICATION (mm) | |
|---|---|
| OUTER DIAMETER | 8.5 +/- 0.1mm |
| BENDING RADIUS | 6 x O.D. MINIMUM<br>15 x O.D. FOR LONG<br>TERM RELIABILITY |

**CBK-U-MP2B-XX Function Chart for MP2600iec**

| Pin No. | Signal Name | I/O | Function |
|---|---|---|---|
| 1 | AO | O | Analog output |
| 2 | AI | I | Analog input |
| 3 | - | - | - |
| 4 | PA+ | I | Phase A pulse (+) |
| 5 | PA- | I | Phase A pulse (-) |
| 6 | GND | P | Encoder input ground |
| 7 | BAT+ | P | Controller SRAM Battery (+) |
| 8 | - | - | - |
| 9 | PILC5V | I | Phase-C latch pulse (-) for 5VDC input |
| 10 | PILC24V | I | Phase-C latch pulse (-) for 24VDC input |
| 11 | DO_00- | O | Digital output 0 (-) |
| 12 | DO_02- | O | Digital output 2 (-) |
| 13 | DICOM | I | Digital input common |
| 14 | DI_00 | I | Digital input 0 |
| 15 | DI_02 | I | Digital input 2 |
| 16 | DI_04 | I | Digital input 4 |
| 17 | DI_06 | I | Digital input 6 |
| 18 | DO_04- | O | Digital output 4 (-) |
| 19 | DO_06- | O | Digital output 6 (-) |
| 20 | - | - | - |
| 21 | DO_00+ | O | Digital output 0 (+) |
| 22 | DO_02+ | O | Digital output 2 (+) |
| 23 | DO_04+ | O | Digital output 4 (+) |
| 24 | DO_06+ | O | Digital output 6 (+) |
| 25 | - | - | - |
| 26 | AO_GND | O | Analog output ground |
| 27 | AI_GND | I | Analog input ground |
| 28 | - | - | - |
| 29 | PB+ | I | Phase B pulse (+) |
| 30 | PB- | I | Phase B pulse (-) |
| 31 | GND | P | Encoder input ground |
| 32 | BAT- | P | Controller SRAM Battery (-) |
| 33 | - | - | - |
| 34 | PILC12V | I | Phase-C latch pulse (-) for 12VDC input |
| 35 | PIL | I | Phase-C latch pulse (+) |
| 36 | DO_01- | O | Digital output 1 (-) |
| 37 | DO_03- | O | Digital output 3 (-) |
| 38 | DICOM | I | Digital input common |
| 39 | DI_01 | I | Digital input 1 - shared with pulse latch input |
| 40 | DI_03 | I | Digital input 3 |
| 41 | DI_05 | I | Digital input 5 |
| 42 | DI_07 | I | Digital input 7 |
| 43 | DO_05- | O | Digital output 5 (-) |
| 44 | DO_07- | O | Digital output 7 (-) |
| 45 | - | - | - |
| 46 | DO_01+ | O | Digital output 1 (+) |
| 47 | DO_03+ | O | Digital output 3 (+) |
| 48 | DO_05+ | O | Digital output 5 (+) |
| 49 | DO_07+ | O | Digital output 7 (+) - shared w/ position agreement COIN signal |
| 50 | - | - | - |

I = Input, O = Output, P = Power

## (3) Flying Lead Cable for CN13




| ITEM NUMBER | X = LENGTH (mm) |
|---|---|
| CFC-U-MP2B-A5 | 500 |
| CFC-U-MP2B-01 | 1000 |
| CFC-U-MP2B-03 | 3000 |

| CABLE SPECIFICATION (mm) | |
|---|---|
| OUTER DIAMETER | 8.1 |
| BENDING RADIUS | 12 O.D. |

**CFC-U-MP2B-XX Function Chart for MP2600iec**

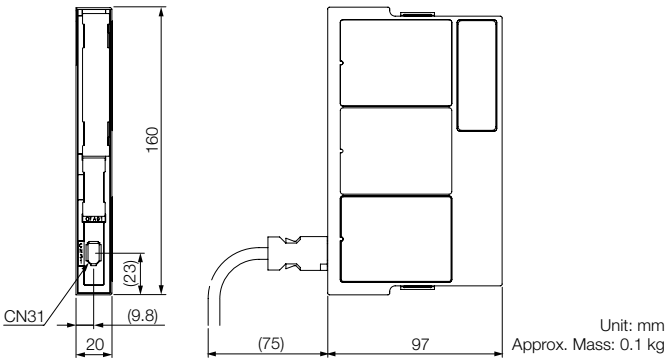
| Pin No. | Color (Solid/Band) | Signal Name | | Function |
|---|---|---|---|---|
| 1 | BLK/RED | AO | O | Analog output |
| 2 | BLK/WHT | AI | I | Analog input |
| 3 | RED/GRN | - | - | - |
| 4 | BLK/BLU | PA+ | I | Phase A pulse (+) |
| 5 | BLU/BLK | PA- | I | Phase A pulse (-) |
| 6 | RED/BLU | GND | P | Encoder input ground |
| 7 | RED/WHT | BAT+ | P | Controller SRAM Battery (+) |
| 8 | BLK/GRN | - | - | - |
| 9 | BLK/YEL | PILC5V | I | Phase-C latch pulse (-) for 5VDC input |
| 10 | BLK/ORG | PILC24V | I | Phase-C latch pulse (-) for 24VDC input |
| 11 | RED/YEL | DO_00- | O | Digital output 0 (-) |
| 12 | RED/BRN | DO_02- | O | Digital output 2 (-) |
| 13 | RED/ORG | DICOM | I | Digital input common |
| 14 | GRN/WHT | DI_00 | I | Digital input 0 |
| 15 | GRN/BLU | DI_02 | I | Digital input 2 |
| 16 | GRN/YEL | DI_04 | I | Digital input 4 |
| 17 | GRN/BRN | DI_06 | I | Digital input 6 |
| 18 | GRN/ORG | DO_04- | O | Digital output 4 (-) |
| 19 | WHT/BLU | DO_06- | O | Digital output 6 (-) |
| 20 | WHT/YEL | - | - | - |
| 21 | YEL/RED | DO_00+ | O | Digital output 0 (+) |
| 22 | BRN/RED | DO_02+ | O | Digital output 2 (+) |
| 23 | ORG/GRN | DO_04+ | O | Digital output 4 (+) |
| 24 | BLU/WHT | DO_06+ | O | Digital output 6 (+) |
| 25 | WHT/BRN | - | - | - |
| 26 | RED/BLK | AO_GND | O | Analog output ground |
| 27 | WHT/BLK | AI_GND | I | Analog input ground |
| 28 | GRN/RED | - | - | - |
| 29 | BLK/BRN | PB+ | I | Phase B pulse (+) |
| 30 | BRN/BLK | PB- | I | Phase B pulse (-) |
| 31 | BLU/RED | GND | P | Encoder input ground |
| 32 | WHT/RED | BAT- | P | Controller SRAM Battery (-) |
| 33 | GRN/BLK | - | - | - |
| 34 | ORG/BLK | PILC12V | I | Phase-C latch pulse (-) for 12VDC input |
| 35 | YEL/BLK | PIL | I | Phase-C latch pulse (+) |
| 36 | WHT/ORG | DO_01- | O | Digital output 1 (-) |
| 37 | BLU/YEL | DO_03- | O | Digital output 3 (-) |
| 38 | ORG/RED | DICOM | I | Digital input common |
| 39 | WHT/GRN | DI_01 | I | Digital input 1 - shared with pulse latch input |
| 40 | BLU/GRN | DI_03 | I | Digital input 3 |
| 41 | YEL/GRN | DI_05 | I | Digital input 5 |
| 42 | BRN/GRN | DI_07 | I | Digital input 7 |
| 43 | BLU/BRN | DO_05- | O | Digital output 5 (-) |
| 44 | BLU/ORG | DO_07- | O | Digital output 7 (-) |
| 45 | YEL/WHT | - | - | - |
| 46 | ORG/WHT | DO_01+ | O | Digital output 1 (+) |
| 47 | YEL/BLU | DO_03+ | O | Digital output 3 (+) |
| 48 | BRN/BLU | DO_05+ | O | Digital output 5 (+) |
| 49 | ORG/BLU | DO_07+ | O | Digital output 7 (+) - shared w/ position agreement COIN signal |
| 50 | BRN/WHT | - | - | - |

I = Input, O = Output, P = Power

# Dimensions

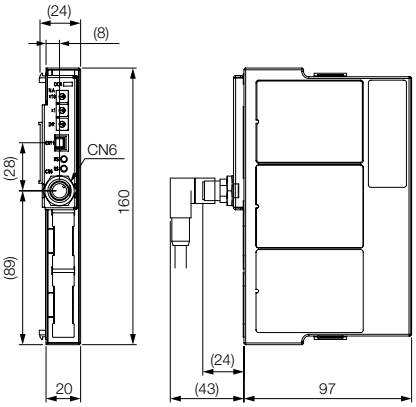
## Option Modules External Dimensions

### Feedback Option Module



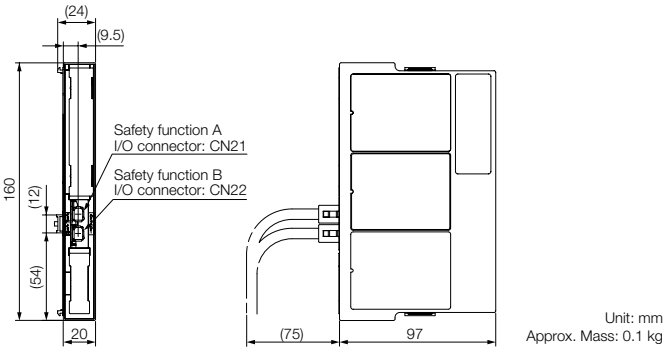

Unit: mm
Approx. Mass: 0.1 kg

### DeviceNet Module



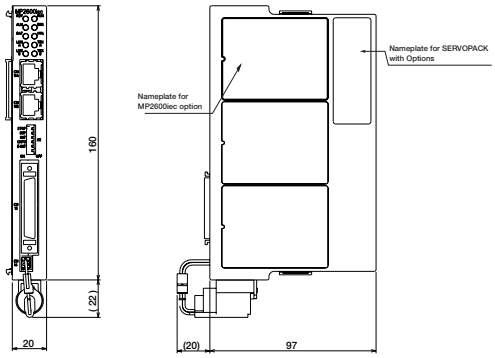

Approx. Mass: 0.3 kg
Unit: mm

### Safety Module



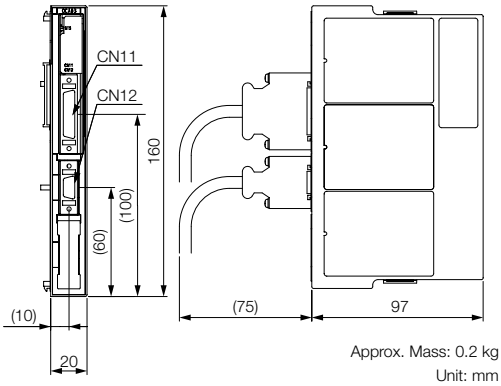

Unit: mm
Approx. Mass: 0.1 kg

### MP2600iec Single Axis Machine Controller Option




Dimensions in mm.

### INDEXER Module

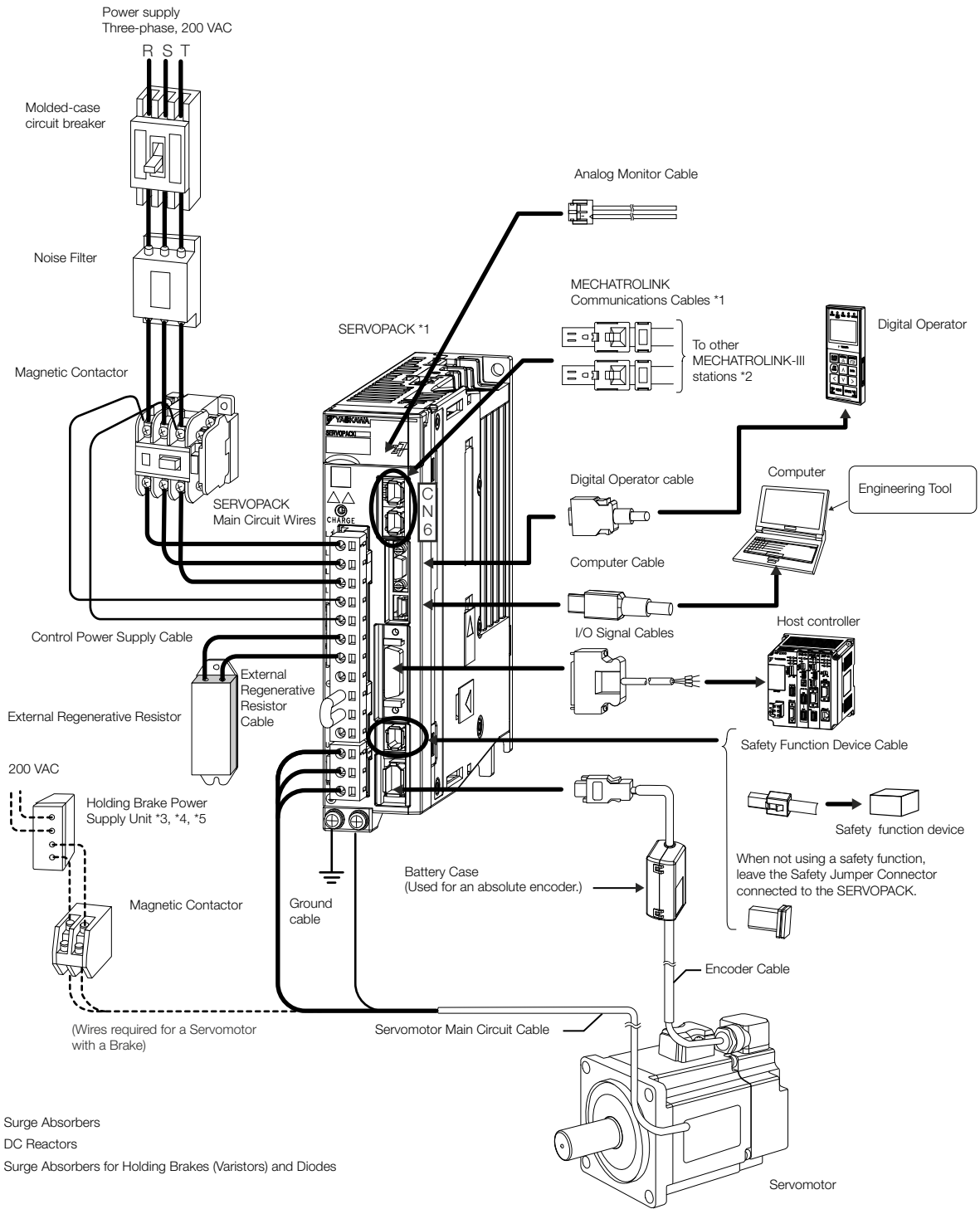



Approx. Mass: 0.2 kg
Unit: mm

# Periphery

Periphery 510
Software 522

# Periphery




*1. The peripheral devices are described using a MECHATROLINK-III Communications Reference SERVOPACK as an example. The shapes of the connectors may be different for other interfaces.

*2. The connected devices depend on the interface.
For MECHATROLINK-II communications references: Other MECHATROLINK-II stations
For analog voltage/pulse train references: There is no CN6 connector.

*3. A Holding Brake Power Supply Unit is required to use a Servomotor with a Holding Brake. Holding Brake Power Supply Units for 24 VDC are not provided by YASKAWA. Obtain these from other manufacturers.
Never connect Holding Brake Power Supply Units with different output voltages to a SERVOPACK. Overcurrent may result in burning in the brake.

*4. If you use a Servomotor with a Holding Brake, select a brake relay according to the power supply voltage and current of the brake. YASKAWA does not recommend any particular brake relays. Select an appropriate brake relay using the selection method of the brake relay manufacturer.

*5. The power supply for the holding brake is not provided by YASKAWA. Select a power supply based on the holding brake specifications. If you use a 24-V brake, install a separate power supply for the 24-VDC power supply from other power supplies, such as the one for the I/O signals of the CN1 connector. If the power supply is shared, the I/O signals may malfunction.

# Peripheral Device Selection Table

## Peripheral Device Selection Table - SGD7S

| Main Circuit Power Supply | Max. Appl. Motor Capacity [kW] | SGD7S- | Noise Filter*1 | DC Reactor*2 | Magnetic Contactor | Surge Absorber | Digital Operator |
|---|---|---|---|---|---|---|---|
| Three-phase, 200 VAC | 0.05 | R70A | HF3010C-SZC | X5061 | SC-03 | LTC32G801WS | JUSP-OP05A-1-E |
| | 0.1 | R90A | | | | | |
| | 0.2 | 1R6A | | | | | |
| | 0.4 | 2R8A | | | | | |
| | 0.5 | 3R8A | | | | | |
| | 0.75 | 5R5A | HF3020C-SZC | | SC-4-1 | | |
| | 1.0 | 7R6A | | | | | |
| | 1.5 | 120A | | X5060 | | | |
| | 2.0 | 180A | | | SC-5-1 | | |
| | 3.0 | 200A | HF3030C-SZC | X5059 | | | |
| | 5.0 | 330A | HF3050C-SZC -47EDD | X5068 | SC-N1 | | |
| | 6.0 | 470A | | X008025 | | | |
| | 7.5 | 550A | HF3060C-SZC | X008026 | SC-N2 | | |
| | 11 | 590A | HF3100C-SZC | X008027 | SC-N2S | | |
| | 15 | 780A | | X008028 | SC-N3 | | |
| Single-phase, 200 VAC | 0.05 | R70A | FESS-B005A | X5071 | SC-03 | LTC12G801WS | |
| | 0.1 | R90A | | | | | |
| | 0.2 | 1R6A | | X5070 | | | |
| | 0.4 | 2R8A | | X5069 | | | |
| | 0.75 | 5R5A | FESS-B009A | X5079 | SC-4-1 | | |
| | 1.5 | 120A□ □□008 | FESS-B016A | X5078 | SC-5-1 | | |

| Device | Enquires |
|---|---|
| FESS Noise Filters | EPA GmbH |
| Noise Filters | YASKAWA Controls Co., Ltd. |
| Surge Absorbers | |
| DC Reactors | |
| Magnetic Contactors | Fuji Electric FA Components & Systems Co., Ltd. |

*1. Some Noise Filters have large leakage currents. The grounding conditions also affect the size of the leakage current. If necessary, select an appropriate leakage detector or leakage breaker taking into account the grounding conditions and the leakage current from the Noise Filter.
*2. The last digit of an RoHS-compliant serial number is R. Consult with YASKAWA Controls Co., Ltd. for RoHS-compliant reactors.
Note:
1. Consult the manufacturer for details on peripheral devices.
2. For Digital Operator Converter cables, refer to the selection table for each type of SERVOPACK.
3. Refer to the following manual for the following information.
   • Dimensional drawings, ratings, and specifications of peripheral devices
   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

## Peripheral Device Selection Table - SGD7W

| Main Circuit Power Supply | Max. Appl. Motor Capacity [kW] | SGD7W- | Noise Filter*1 | DC Reactor*2 | Magnetic Contactor | Surge Absorber | Digital Operator |
|---|---|---|---|---|---|---|---|
| Three-phase, 200 VAC | 0.2 | 1R6A | HF3010C-SZC | X5061 | SC-03 | LTC32G801WS | JUSP-OP05A-1-E |
| | 0.4 | 2R8A | HF3020C-SZC | | SC-4-1 | | |
| | 0.75 | 5R5A | | X5060 | | | |
| | 1.0 | 7R6A | | | SC-5-1 | | |
| Single-phase, 200 VAC | 0.2 | 1R6A | FESW-B005A | X5069 | SC-03 | LTC12G801WS | |
| | 0.4 | 2R8A | FESW-B011A | X5079 | SC-4-1 | | |
| | 0.75 | 5R5A | FESW-B012A | X5078 | SC-5-1 | | |

| Device | Enquires |
|---|---|
| FESW Noise Filters | EPA GmbH |
| Noise Filters | YASKAWA Controls Co., Ltd. |
| Surge Absorbers | |
| DC Reactors | |
| Magnetic Contactors | Fuji Electric FA Components & Systems Co., Ltd. |

*1. Some Noise Filters have large leakage currents. The grounding conditions also affect the size of the leakage current. If necessary, select an appropriate leakage detector or leakage breaker taking into account the grounding conditions and the leakage current from the Noise Filter.
*2. The last digit of an RoHS-compliant serial number is R. Consult with YASKAWA Controls Co., Ltd. for RoHS-compliant reactors.
Note:
1. Consult the manufacturer for details on peripheral devices.
2. For Digital Operator Converter cables, refer to the selection table for each type of SERVOPACK.
3. Refer to the following manual for the following information.
   • Dimensional drawings, ratings, and specifications of peripheral devices
   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

## Peripheral Device Selection Table - SGD7C

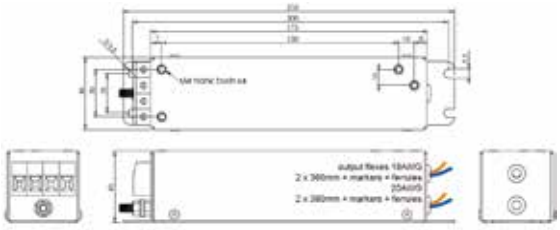
| Main Circuit Power Supply | Max. Appl. Motor Capacity [kW] | SGD7C- | Noise Filter*1 | DC Reactor*2 | Magnetic Contactor | Surge Absorber |
|---|---|---|---|---|---|---|
| Three-phase, 200 VAC | 0.2 | 1R6A | HF3010C-SZC | X5061 | SC-03 | LTC32G801WS |
| | 0.4 | 2R8A | HF3020C-SZC | | SC-4-1 | |
| | 0.75 | 5R5A | | X5060 | | |
| | 1.0 | 7R6A | | | SC-5-1 | |
| Single-phase, 200 VAC | 0.2 | 1R6A | FESW-B012A | X5069 | SC-03 | LTC12G801WS |
| | 0.4 | 2R8A | | X5079 | SC-4-1 | |
| | 0.75 | 5R5A | HF2020A-UPF-2BB | X5078 | SC-5-1 | |

| Device | Enquires |
|---|---|
| FESW Noise Filters | EPA GmbH |
| Noise Filters | YASKAWA Controls Co., Ltd. |
| Surge Absorbers | |
| DC Reactors | |
| Magnetic Contactors | Fuji Electric FA Components & Systems Co., Ltd. |

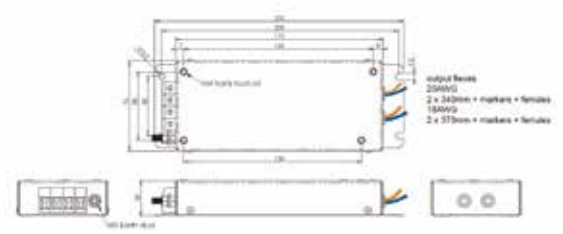
*1. Some Noise Filters have large leakage currents. The grounding conditions also affect the size of the leakage current. If necessary, select an appropriate leakage detector or leakage breaker taking into account the grounding conditions and the leakage current from the Noise Filter.
*2. The last digit of an RoHS-compliant serial number is R. Consult with YASKAWA Controls Co., Ltd. for RoHS-compliant reactors.
Note:
1. Consult the manufacturer for details on peripheral devices.
2. For Digital Operator Converter cables, refer to the selection table for each type of SERVOPACK.
3. Refer to the following manual for the following information.
   • Dimensional drawings, ratings, and specifications of peripheral devices
   Sigma-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

# Dimensions of Noise Filters

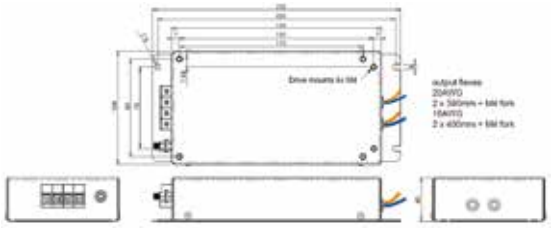
### FESS-B005A



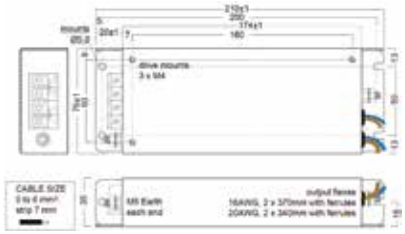
### FESS-B009A



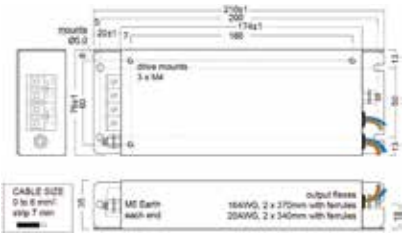
### FESS-B016A



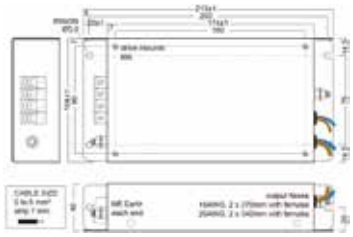
### FESW-B005A



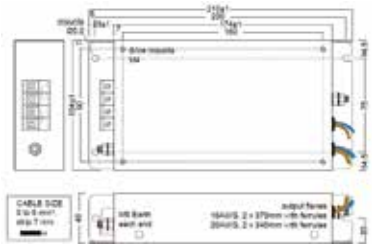
### FESW-B011A



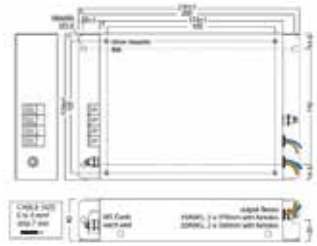
### FESW-B012A



### FESC-B011A



### FESC-B012A



| Noise Filter | Leakage Current | Ambient Temperature | Measurements (L x W x H) | Weight |
|---|---|---|---|---|
| FESS-B005A | 2.9 mA (0.37mA control) | 55 °C | 210 x 46 x 45 mm | 0.4 kg |
| FESS-B009A | 2.9 mA (0.37mA control) | 55 °C | 210 x 76 x 30 mm | 0.5 kg |
| FESS-B016A | 2.9 mA (0.37mA control) | 55 °C | 230 x 104 x 40 mm | 1.0 kg |
| FESW-B005A | 2.9 mA (0.37mA control) | 55 °C | 210 x 76 x 35 mm | 0.6 kg |
| FESW-B011A | 2.9 mA (0.37mA control) | 55 °C | 210 x 76 x 35 mm | 0.6 kg |
| FESW-B012A | 2.9 mA (0.37mA control) | 55 °C | 210 x 104 x 40 mm | 1 kg |
| FESC-B011A | 2.9 mA (0.37mA control) | 55 °C | 210 x 104 x 40 mm | 1 kg |
| FESC-B012A | 2.9 mA (0.37mA control) | 55 °C | 210 x 139 x 40 mm | 1 kg |

# Molded-case Circuit Breakers and Fuses

## Using an AC Power Supply

Use a molded-case circuit breaker and fuse to protect the power supply line. They protect the power line by shutting OFF the circuit when overcurrent is detected. Select these devices based on the information in the following tables.

Note:
The following tables also provide the net values of the current capacity and inrush current.
Select a fuse and a molded-case circuit breaker that meet the following conditions.
- Main circuit and control circuit: No breaking at three times the current value given in the table for 5 s.
- Inrush current: No breaking at the current value given in the table for 20 ms.

## SGD7S SERVOPACKs

| Main Circuit Power Supply | Max. Appl. Motor Capacity [kW] | SGD7S- | Power Supply Capacity per SERVOPACK [kVA]* | Current Capacity | | Inrush Current | | Rated Voltage | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Main Circuit [A]* | Control Power Supply [A] | Main Circuit [A0-p] | Control Power Supply [A0-p] | Fuse [V] | MCCB [V] |
| Three-phase, 200 VAC | 0.05 | R70A | 0.2 | 0.4 | 0.2 | 34 | 34 | 250 | 240 |
| | 0.1 | R90A | 0.3 | 0.8 | | | | | |
| | 0.2 | 1R6A | 0.5 | 1.3 | | | | | |
| | 0.4 | 2R8A | 1.0 | 2.5 | | | | | |
| | 0.5 | 3R8A | 1.3 | 3.0 | | | | | |
| | 0.75 | 5R5A | 1.6 | 4.1 | | | | | |
| | 1.0 | 7R6A | 2.3 | 5.7 | | | | | |
| | 1.5 | 120A | 3.2 | 7.3 | | | | | |
| | 2.0 | 180A | 4.0 | 10 | 0.25 | | | | |
| | 3.0 | 200A | 5.9 | 15 | | | | | |
| | 5.0 | 330A | 7.5 | 25 | 0.3 | 68 | | | |
| | 6.0 | 470A | 10.7 | 29 | | | | | |
| | 7.5 | 550A | 14.6 | 37 | | | | | |
| | 11 | 590A | 21.7 | 54 | 0.4 | 114 | | | |
| | 15 | 780A | 29.6 | 73 | | | | | |
| Single-phase, 200 VAC | 0.05 | R70A | 0.2 | 0.8 | 0.2 | 34 | | | |
| | 0.1 | R90A | 0.3 | 1.6 | | | | | |
| | 0.2 | 1R6A | 0.6 | 2.4 | | | | | |
| | 0.4 | 2R8A | 1.2 | 5.0 | | | | | |
| | 0.75 | 5R5A | 1.9 | 8.7 | | | | | |
| | 1.5 | 120A□ □□008 | 4.0 | 16 | 0.25 | | | | |

* This is the net value at the rated load.

## SGD7W SERVOPACKs

| Main Circuit Power Supply | Max. Appl. Motor Capacity [kW] | SGD7W- | Power Supply Capacity per SERVOPACK [kVA]*1 | Current Capacity | | Inrush Current | | Rated Voltage | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Main Circuit [A]*1 | Control Power Supply [A] | Main Circuit [A0-p] | Control Power Supply [A0-p] | Fuse [V] | MCCB [V] |
| Three-phase, 200 VAC | 0.2 | 1R6A | 1.0 | 2.5 | 0.25 | 34 | 34 | 250 | 240 |
| | 0.4 | 2R8A | 1.9 | 4.7 | | | | | |
| | 0.75 | 5R5A | 3.2 | 7.8 | | | | | |
| | 1.0 | 7R6A | 4.5 | 11 | | | | | |
| Single-phase, 200 VAC | 0.2 | 1R6A | 1.3 | 5.5 | | | | | |
| | 0.4 | 2R8A | 2.4 | 11 | | | | | |
| | 0.75 | 5R5A*2 | 2.7 | 12 | | | | | |

*1. This is the net value at the rated load.
*2. If you use the SGD7W-5R5A with a single-phase 200-VAC power supply input, derate the load ratio to 65%. Anexample is given below.
If the load ratio of the first axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65% ((90% + 40%)/2 = 65%).

## SGD7C SERVOPACKs

| Main Circuit Power Supply | Max. Appl. Motor Capacity [kW] | SGD7C- | Power Supply Capacity per SERVOPACK [kVA]*1 | Current Capacity | | Inrush Current | | Rated Voltage | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Main Circuit [A]*1 | Control Power Supply [A] | Main Circuit [A0-p] | Control Power Supply [A0-p] | Fuse [V] | MCCB [V] |
| Three-phase, 200 VAC | 0.2 | 1R6A | 1.0 | 2.5 | 0.25 | 34 | 34 | 250 | 240 |
| | 0.4 | 2R8A | 1.9 | 4.7 | | | | | |
| | 0.75 | 5R5A | 3.2 | 7.8 | | | | | |
| | 1.0 | 7R6A | 4.5 | 11 | | | | | |
| Single-phase, 200 VAC | 0.2 | 1R6A | 1.3 | 5.5 | | | | | |
| | 0.4 | 2R8A | 2.4 | 11 | | | | | |
| | 0.75 | 5R5A*2 | 2.7 | 12 | | | | | |

*1. This is the net value at the rated load.
*2. If you use the SGD7W-5R5A with a single-phase 200-VAC power supply input, derate the load ratio to 65%. Anexample is given below.
If the load ratio of the first axis is 90%, use a load ratio of 40% for the second axis so that average load ratio for both axes is 65% ((90% + 40%)/2 = 65%).

## Using a DC Power Supply

This section gives the power supply specifications for using a DC power supply input. Use the Fuses given in the following tables to protect the power supply line and SERVOPACK. They protect the power line by shutting OFF the circuit when overcurrent is detected.

Note: The following tables provide the net values of the current capacity and inrush current.

## SGD7S SERVOPACKs

| Main Circuit Power Supply | SGD7S- | Power Supply Capacity per SERVOPACK [kVA]* | Current Capacity | | Inrush Current | | External Fuse | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Main Circuit [A]*1 | Control Power Supply [A] | Main Circuit [A0-p] | Control Power Supply [A0-p] | Order Number*2 | Current Rating [A] | Voltage Rating [Vdc] |
| 270 VDC | R70A | 0.2 | 0.5 | 0.2 | 34 | 34 | 3,5URGJ17/16UL | 16 | 400 |
| | R90A | 0.3 | 1.0 | | | | | | |
| | 1R6A | 0.5 | 1.5 | | | | | | |
| | 2R8A | 1.0 | 3.0 | | | | 3,5URGJ17/20UL | 20 | |
| | 3R8A | 1.3 | 3.8 | | | | 3,5URGJ17/40UL | 40 | |
| | 5R5A | 1.6 | 4.9 | | | | | | |
| | 7R6A | 2.3 | 6.9 | | | | | | |
| | 120A | 3.2 | 11 | | | | | | |
| | 120A□□□008 | | | 0.25 | | | 3,5URGJ17/63UL | 63 | |
| | 180A | 4.0 | 14 | | | | | | |
| | 200A | 5.9 | 20 | | | | | | |
| | 330A | 7.5 | 34 | 0.3 | 68*3 (5Ω external) | | 3,5URGJ17/100UL | 100 | |
| | 470A | 10.7 | 36 | | | | 3,5URGJ23/160UL | 160 | |
| | 550A | 14.6 | 48 | | | | | | |
| | 590A | 21.7 | 68 | 0.4 | 114*3 (3Ω external) | | 3,5URGJ23/200UL | 200 | |
| | 780A | 29.6 | 92 | | | | | | |

*1. This is the net value at the rated load.
*2. These Fuses are manufactured by MERSEN Japan.
*3. If you use a DC power supply input with any of the following SERVOPACKs, externally connect an inrush current limiting circuit and use the power ON and OFF sequences recommended by YASKAWA: SGD7S-330A, -470A, -550A, -590A, or -780A.
There is a risk of equipment damage. For information on the power ON and OFF sequences, refer to the product manual for the type of references used by your SERVOPACK.

## SGD7W SERVOPACKs

| Main Circuit Power Supply | SGD7S- | Power Supply Capacity per SERVOPACK [kVA]* | Current Capacity | | Inrush Current | | External Fuse | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Main Circuit [A]*1 | Control Power Supply [A] | Main Circuit [A0-p] | Control Power Supply [A0-p] | Order Number*2 | Current Rating [A] | Voltage Rating [Vdc] |
| 270 VDC | 1R6A | 1.0 | 3.0 | 0.25 | 34 | 34 | 3,5URGJ17/40UL | 40 | 400 |
| | 2R8A | 1.9 | 5.8 | | | | | | |
| | 5R5A | 3.2 | 9.7 | | | | 3,5URGJ17/63UL | 63 | |
| | 7R6A | 4.5 | 14 | | | | | | |

*1. This is the net value at the rated load.
*2. These Fuses are manufactured by MERSEN Japan.

# Regenerative Resistors

## Types of Regenerative Resistors

The following regenerative resistors can be used.

- Built-in regenerative resistors: Some models of SERVOPACKs have regenerative resistors built into them.
- External regenerative resistors: These resistors are used when the smoothing capacitor and builtin regenerative resistor in the SERVOPACK cannot consume all of the regenerative power. Use YASKAWA SigmaSize+, an AC Servo drive capacity selection program, to determine if a regenerative resistor is required.

Note: If you use an External Regenerative Resistor, you must change the setting of the Pn600 (Regenerative Resistor Capacity) or Pn603 (Regenerative Resistance) parameters.

## Selection Table

| SERVOPACK Model | | | Built-In Regenerative Resistor | External Regenerative Resistor | Contents |
|---|---|---|---|---|---|
| SGD7S- | SGD7W- | SGD7C- | | | |
| R70A, R90A, 1R6A, 2R8A, R70F, R90F, 2R1F, 2R8F | – | – | – | Basically not required | There is no built-in regenerative resistor, but normally an external regenerative resistor is not required.<br>Install an external regenerative resistor when the smoothing capacitor in the SERVOPACK cannot process all the regenerative power.*1 |
| 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A | 1R6A, 2R8A, 5R5A, 7R6A | 1R6A, R8A, 5R5A, 7R6A | Standard feature*2 | Basically not required | A built-in regenerative resistor is provided as a standard feature. Install an external regenerative resistor when the built-in regenerative resistor cannot process all the regenerative power.*1 |
| 470A, 550A, 590A, 780A | – | – | – | Required*3 | A built-in regenerative resistor is not provided. An External Regenerative Resistor is required. If the External Regenerative Resistor is not connected to the SERVOPACK, a Regeneration Alarm (A.300) will occur. |

*1. Use YASKAWA SigmaSize+, an AC Servo drive capacity selection program, to select an external regenerative resistor.
*2. Refer to the Built-In Regenerative Resistor section for the specifications of built-in regenerative resistors.
*3. Regenerative Resistor Units are available. Refer to that section for details.

## Built-In Regenerative Resistor

The following table gives the specifications of the built-in regenerative resistors in the SERVOPACKs and the amount of regenerative power (average values) that they can process.

| SERVOPACK Model | | | Built-In Regenerative Resistor | | Regenerative Power Processing Capacity of Built-In Regenerative Resistor [W] | Minimum Allowable Resistance [Ω] |
|---|---|---|---|---|---|---|
| SGD7S- | SGD7W- | SGD7C- | Resistance [Ω] | Capacity [W] | | |
| R70A, R90A, 1R6A, 2R8A, R70F, R90F, 2R1F, 2R8F | – | – | – | – | – | 40 |
| 3R8A, 5R5A, 7R6A | 1R6A, 2R8A | 1R6A, 2R8A | 40 | 40 | 8 | 40 |
| 120A | – | – | 20 | 60 | 10 | 20 |
| 120A□□□008, 180A, 200A | 5R5A, 7R6A | 5R5A, 7R6A | 12 | 60 | 16 | 12 |
| 330A | – | – | 8 | 180 | 36 | 8 |
| 470A | – | – | (6.25)*1 | (880)*1 | (180)*1 | 5.8 |
| 550A, 590A, 780A | – | – | (3.13)*2 | (1,760)*2 | (350)*2 | 2.9 |

*1. Values in parentheses are for the optional JUSP-RA04-E Regenerative Resistor Unit.
*2. Values in parentheses are for the optional JUSP-RA05-E Regenerative Resistor Unit.

## External Regenerative Resistors

| Model | Specification | Mass | Wire Size | Manufacturer | Inquiries |
|---|---|---|---|---|---|
| RH120 | 70 W, 1 Ω to 100 Ω | 282 g | AWG16 (1.25 mm$^2$) | Iwaki Musen Kenkyusho Co., Ltd. | YASKAWA Controls Co., Ltd. |
| RH150 | 90 W, 1 Ω to 100 Ω | 412 g | | | |
| RH220 | 120 W, 1 Ω to 100 Ω | 500 g | | | |
| RH220B | 120 W, 1 Ω to 100 Ω | 495 g | AWG14 (2.0 mm$^2$) | | |
| RH300C | 200 W, 1 Ω to 10 kΩ | 850 g | | | |
| RH450 | 150 W, 1 Ω to 100 Ω | 880 g | | | |
| RH450FY | 150 W, 2 Ω to 100 Ω | 1.3 kg | | | |
| RH500 | 300 W, 2 Ω to 50 Ω | 1.4 kg | | | |

Note:
1. Consult YASKAWA Controls Co., Ltd. if you require a RoHS-compliant resistor.
2. Consult YASKAWA Controls Co., Ltd. for the model numbers and specifications of resistors with Thermal Protector.

RH120 (Model) 10Ω (Resistance) J

| Resistance Tolerance | |
|---|---|
| Code | Specification |
| K | ±10% |
| J | ±5% |
| H* | ±3% |

* There is no RH450FY model that has a resistance tolerance of H (±3%).

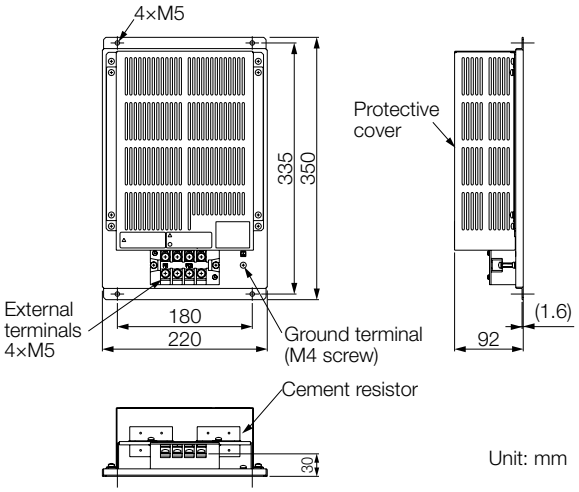
## Regenerative Resistor Units

| SERVOPACK Model SGD7S- | Regenerative Resistor Unit Model | Specifications | Allowable Power Loss |
|---|---|---|---|
| 470A | JUSP-RA04-E | 6.25 Ω, 880 W | 180 W |
| 550A, 590A or 780A | JUSP-RA05-E | 3.13 Ω, 1,760 W | 350 W |

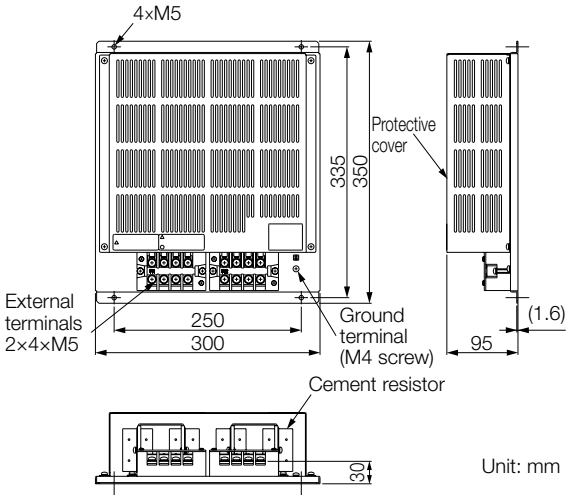
Note: If you use only the above Regenerative Resistor Units, you do not need to change the setting of the Pn600 (Regenerative Resistor Capacity) or Pn603 (Regenerative Resistance) parameters.

## External Dimensions

### JUSP-RA04-E




### JUSP-RA05-E



# Batteries for Servomotors with Absolute Encoders

If you use an absolute encoder, you can use an Encoder Cable with a Battery Case connected to it to supply power and retain the absolute position data.
You can also retain the absolute position data by supplying power from a battery on the host controller.

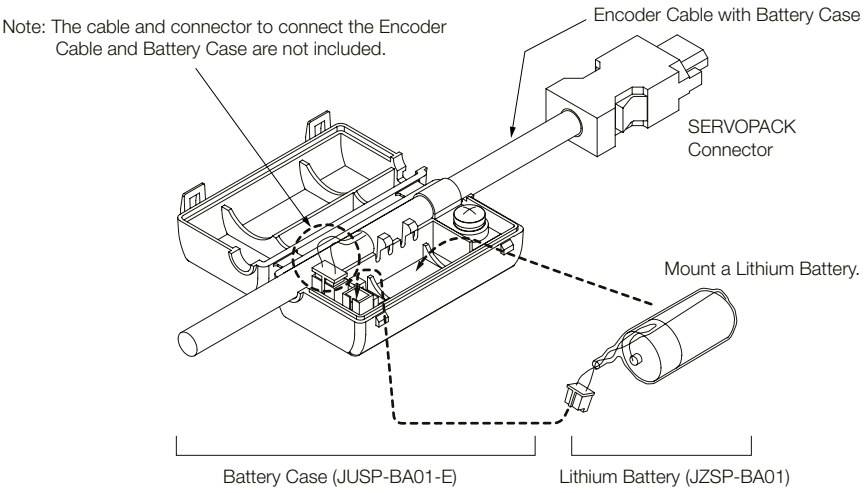
Note: A Battery Case is not required if you use a Servomotor with a Batteryless Absolute Encoder and connect a battery to the host controller.

## Using Encoder Cables with Battery Cases

A Battery Case is attached to an Encoder Cable with a Battery Case. To replace the battery, obtain a Lithium Battery (JZSP-BA01) and mount it in the Battery Case.

Important

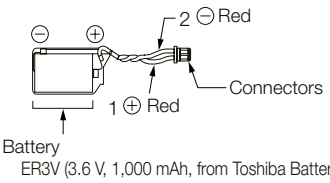
1. You cannot attach the Battery Case to an Incremental Encoder Cable.
2. Install the Battery Case where the surrounding air temperature is between -5°C and 60°C.




## Selection Table

| Description | Order Number | Contents |
|---|---|---|
| Battery Case (case only) | JUSP-BA01-E | The Encoder Cable and Battery are not included.<br>(This is a replacement part for a damaged Battery Case.) |
| Lithium Battery | JZSP-BA01 | This is a special battery that is mounted into the Battery Case. |

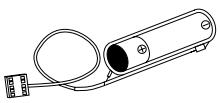
## Lithium Battery Dimensional Drawing




ER3V (3.6 V, 1,000 mAh, from Toshiba Battery Co., Ltd.)

## When Installing a Battery on the Host Controller

Use a battery that meets the specifications of the host controller.
Use the recommended Battery given in the following table or the equivalent.



# Inrush Current Suppression Devices

Inrush current suppression devices prevent equipment from being damaged by inrush current. They are used only when using a SERVOPACK of 5 kW or higher (SGD7S-330A, -470A, -550A, -590A, or -780A) with a DC power supply input.

## Selection Tables

### External Inrush Current Suppression Resistors

| Main Circuit Power Supply | SERVOPACK Model: SGD7S- | External Inrush Current Suppression Resistor | | | Manufacturer | Inquiries |
|---|---|---|---|---|---|---|
| | | Order Number | Resistance [Ω] | Rated Power [W] | | |
| 270 VDC | 330A | RH120-5ΩJ | 5 | 70 | Iwaki Musen Kenkyusho Co., Ltd. | YASKAWA Controls Co., Ltd. |
| | 470A | | | | | |
| | 550A | | | | | |
| | 590A | RH120-3ΩJ | 3 | | | |
| | 780A | | | | | |

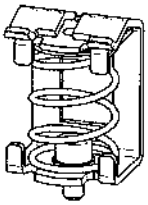
### Inrush Current Suppression Resistor Short Relays

| Main Circuit Power Supply | SERVOPACK Model: SGD7S- | Main Circuit DC Current [A] | Contact Specification | Recommended Inrush Current Suppression Resistor Short Relay | | | Manufacturer |
|---|---|---|---|---|---|---|---|
| | | | | Model | Voltage Rating [Vdc] | Current Rating [A] | |
| 270 VDC | 330A | 34 | NO | G9EA-1-B | 400 | 60 | OMRON Corporation |
| | 470A | 36 | | | | | |
| | 550A | 48 | | G9EA-1-B-CA | | 100 | |
| | 590A | 68 | | G9EA-1-B-CA*1<br>G9EC-1-B*2 | | 200 | |
| | 780A | 92 | | | | | |

*1. Connect two Relays in parallel. Also, maintain the same resistance between the DC power supply and SERVOPACK for the wiring for each Relay.
*2. This Relay is applicable only when the temperature of the Relay installation environment is 50°C or less.

## Motor Power Cable Shielding Clamp

Contact your YASKAWA representative for more information.

| SERVOPACK Model | Order No. | |
|---|---|---|
| SGD7S 200V 1.5 kW 1ph<br>SGD7W 200V-5R5A | KLBUE_4-13.5_SC |  |
| SGD7S 200V up to 750W<br>SGD7W 200W-1R6A to 2R8A | KLBUE_4-13.5_SET | |

## SERVOPACK Connector Kit

Contact your YASKAWA representative for more information.

| SERVOPACK Model | Order No. | |
|---|---|---|
| SGD7S-<br>R70A□□□ to -2R8A□□□ | EUOP-M92019 | |
| SGD7S-5R5A□□□ | EUOP-M92020 | |
| SGD7W-<br>1R6A□□□ to -7R6A□□□ | EUOP-M92021 | |

# Software

## SigmaSize+: AC Servo Capacity Selection Program

You can use the SigmaSize+ to select Servomotors and SERVOPACKs. There are two versions of the software: A cloud version* and a stand-alone version. The software supports all standard servo products sold by YASKAWA.

* SigmaSize+ is available in Japan only. Contact your YASKAWA representative for information on this program.

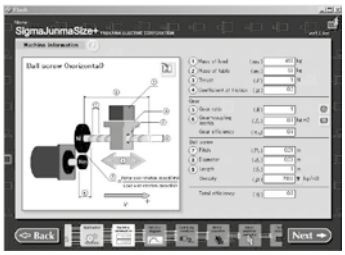
## Features

- Provides a vast amount of new product information.
- Lets you select servo products with a wizard.
- You can access and reuse previously entered data.

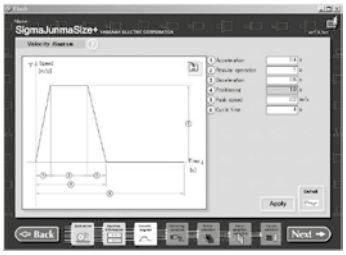
## Examples of the Servo Selection Interface

### Mechanism Selection View

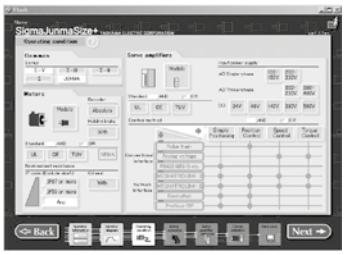
### Machine Specification Entry View



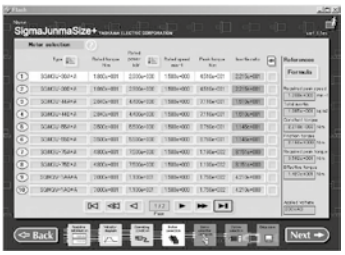
### Speed Diagram Entry View



### Operating Conditions Selection View



### Servomotor Selection View



### SERVOPACK Selection View

## System Requirements

| Item | System Requirement |
|---|---|
| Browser | Internet Explorer version 10 or later |
| OS | Windows Vista or Windows 7 (32-bit or 64-bit edition)* |
| CPU | Pentium 200 MHz min. |
| Memory | 64 MB min. (96 MB or greater recommended) |
| Available Hard Disk Space | 20 MB min. |

* 64-bit OS is applicable only for the stand-alone version.

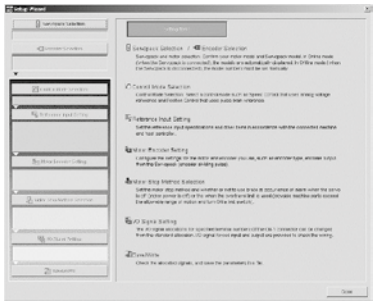
# SigmaWin+: AC Servo Drive Engineering Tool

The SigmaWin+ Engineering Tool is used to set up and optimally tune YASKAWA Sigma-series Servo Drives.

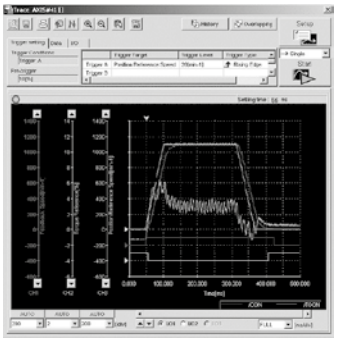
## Features

- Set parameters with a wizard.
- Display SERVOPACK data on a computer just like you would on a oscilloscope.
- Estimate moments of inertia and measure vibration frequencies.
- Display alarms and alarm diagnostics.

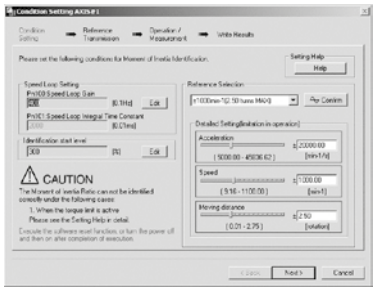
### Setting Parameters with a Wizard



### Displaying SERVOPACK Data on a Computer just like you would on an Oscilloscope



### Estimating Moments of Inertia and Measuring Vibration Frequencies




### Displaying Alarms and Alarm Diagnostics

## System Requirements

| Item | System Requirement | |
|---|---|---|
| | Ver.5 | Ver.7 |
| Supported Languages | English and Japanese | Japanese, English, and Chinese (simplified) |
| OS | Windows XP, Windows Vista, or Windows 7 (32-bit or 64-bit edition) | Windows 10, Windows 8, Windows 8.1, or Windows 7 (32-bit or 64-bit edition) |
| Software Environment | – | .NET Framework 4.5, .NET Framework 4.6 |
| CPU | Pentium 200 MHz min. | 1 GHz min. (recommended) |
| Memory | 64 MB min. (96 MB or greater recommended) | 1 GB min. (recommended) |
| Available Hard Disk Space | For Standard Setup: 350 MB min. (400 MB or greater recommended for installation) | 500 MB min. |
| Browser used to display Help | – | Internet Explorer 9 or higher |

# MPE720 System Integrated Engineering Tool

MPE720 Ver.7 is a system integrated Engineering Tool that provides the complete development functionality to set up, adjust, program, maintain, and inspect not only Controller programs but also all of the devices necessary to design machine installations, including Servo Drives, AC Drives, and Distributed I/O Devices.
It is installed in a PC and operated on a PC interface through a connection between the PC and Machine Controller.

## Features

### Complete Adjustment and Maintenance of Equipment Drive Devices

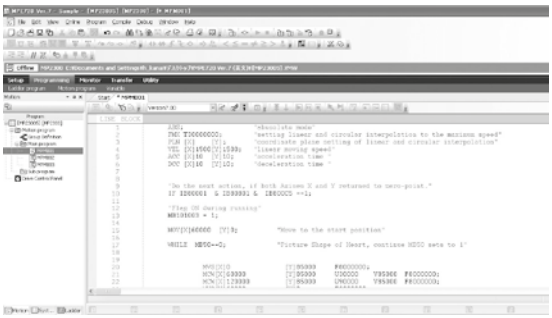
MPE720 Ver.7 connected to the Sigma-7C or MP series machine controllers can be used to set up, adjust, and maintain Servo Drives, AC Drives, and I/O Devices connected to a network. There is no need to change connections, which increases efficiency.

### Greater Efficiency with the Best Programming Method

Ladder Programming

- The new user interface lets just about anyone easily use the MPE720.
- An improved EXPRESSION instruction simplifies programming calculation in ladder diagrams.
- Support is provided for all types of control, including position, speed, torque, and phase-control.

Motion Programming



- Positioning and interpolation can be programmed with one instruction.
- Programs can be very easily edited using expressions in a text format.
- New variable programming can provide PC-like programming.

## System Requirements

| Item | Specification |
|---|---|
| CPU | 1 GHz or more recommended (manufactured by Intel or other companies) |
| Memory Capacity | 1 GB or more recommended* |
| Available Hard Disk Space | 700 MB or more (includes standard workspace memory after installation of MPE720) |
| Display Resolution | 1280 × 800 pixels or more recommended |
| CD Drive | 1 (only for installation) |
| Communication Ports | RS-232C, Ethernet, MP2100 bus, and USB |
| OS | Windows 10, Windows 8, Windows 8.1, or Windows 7 (32-bit or 64-bit) |
| .NET Environment | .NET Framework 4.5 |
| Supported Languages | English and Japanese |

* Expand memory if other application programs are run simultaneously with MPE720 on the same computer.
Performance may be slow due to the use of memory by multiple application programs that are run simultaneously.

# Appendix

Capacity Selection for Servomotors 526
Capacity Selection for Regenerative Resistors 534
International Standards 552
Warranty 553

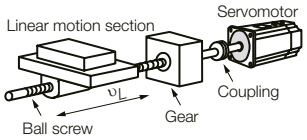
# Selecting the Servomotor Capacity

Use YASKAWA SigmaSize+, an AC servo drive capacity selection program, to select the Servomotor capacity. With the SigmaSize+, you can find the optimum Servomotor capacity by simply selecting and entering information according to instructions from a wizard.

Refer to the following selection examples to select Servomotor capacities with manual calculations rather than with the above software.

## Capacity Selection Example for a Rotary Servomotor: For Speed Control

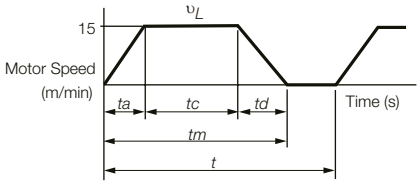
### 1. Mechanical Specifications




| Item | Code | Value |
|---|---|---|
| Load Speed | $v_L$ | 15 m/min |
| Linear Motion Section Mass | m | 250 kg |
| Ball Screw Length | $\ell_B$ | 1.0 m |
| Ball Screw Diameter | $d_B$ | 0.02 m |
| Ball Screw Lead | $P_B$ | 0.01 m |
| Ball Screw Material Density | ρ | 7.87 x $10^3$ kg/$m^3$ |
| Gear Ratio | R | 2 (gear ratio: 1/2) |
| External Force on Linear Motion Section | F | 0 N |

| Item | Code | Value |
|---|---|---|
| Gear and Coupling Moment of Inertia | $J_G$ | 0.40 ×$10^{-4}$ kg·$m^2$ |
| Number of Feeding Operations | n | 40 operations/min |
| Feeding Distance | $\ell$ | 0.275 m |
| Feeding Time | tm | 1.2 s max. |
| Friction Coefficient | μ | 0.2 |
| Mechanical Efficiency | η | 0.9 (90%) |

### 2. Operation Pattern




$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (s)}$$

If ta = td,

$$ta = tm - \frac{60\,\ell}{v_L} = 1.2 - \frac{60 \times 0.275}{15} = 1.2 - 1.1 = 0.1 \text{ (s)}$$

$$tc = 1.2 - 0.1 \times 2 = 1.0 \text{ (s)}$$

### 3. Motor Speed

- Load shaft speed $n_L = \frac{v_L}{P_B} = \frac{15}{0.01} = 1{,}500 \text{ (min}^{-1}\text{)}$
- Motor shaft speed $n_M = n_L \cdot R = 1{,}500 \times 2 = 3{,}000 \text{ (min}^{-1}\text{)}$

### 4. Load Torque

$$T_L = \frac{(9.8 \cdot \mu \cdot m + F) \cdot P_B}{2\pi R \cdot \eta} = \frac{(9.8 \times 0.2 \times 250 + 0) \times 0.01}{2\pi \times 2 \times 0.9} = 0.43 \text{ (N·m)}$$

### 5. Load Moment of Inertia

- Linear motion section

$$J_{L1} = m\left(\frac{P_B}{2\pi R}\right)^2 = 250 \times \left(\frac{0.01}{2\pi \times 2}\right)^2 = 1.58 \times 10^{-4}\ (\text{kg·m}^2)$$

- Ball screw

$$J_B = \frac{\pi}{32}\rho \cdot \ell_B \cdot d_B^4 \cdot \frac{1}{R^2} = \frac{\pi}{32} \times 7.87 \times 10^3 \times 1.0 \times (0.02)^4 \cdot \frac{1}{2^2} = 0.31 \times 10^{-4}\ (\text{kg·m}^2)$$

- Coupling JG = 0.40 $\times 10^{-4}$ kg·m$^2$
- Load moment of inertia at motor shaft

  $J_L = J_{L1} + J_B + J_G = (1.58 + 0.31 + 0.40) \times 10^{-4} = 2.29 \times 10^{-4}$ kg·m$^2$

### 6. Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 3{,}000 \times 0.43}{60} = 135\ (\text{W})$$

### 7. Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 3{,}000\right)^2 \times \frac{2.29 \times 10^{-4}}{0.1} = 226\ (\text{W})$$

### 8. Servomotor Provisional Selection

① Selection Conditions

- TL ≤ Motor rated torque
- $\frac{(Po + Pa)}{2}$ < Provisionally selected Servomotor rated output < ($Po + Pa$)
- $n_M$ ≤ Rated motor speed
- $J_L$ ≤ Allowable load moment of inertia

The following Servomotor meets the selection conditions.

- SGM7J-02A Servomotor

② Specifications of the Provisionally Selected Servomotor

| Item | Value |
|---|---|
| Rated Output | 200 (W) |
| Rated Motor Speed | 3,000 (min$^{-1}$) |
| Rated Torque | 0.637 (Nm) |
| Instantaneous Maximum Torque | 2.23 (Nm) |
| Motor Moment of Inertia | 0.263 x $\times 10^{-4}$ kg·m$^2$ |
| Allowable Load Moment of Inertia | 0.263 x $10^{-4}$ x 15 = 3.94 $\times 10^{-4}$ kg·m$^2$ |

### 9. Verification of the Provisionally Selected Servomotor

- Verification of required acceleration torque:

$$T_P = \frac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \frac{2\pi \times 3{,}000 \times (0.263 + 2.29) \times 10^{-4}}{60 \times 0.1} + 0.43$$

≈ 1.23 (N·m) < Maximum instantaneous torque...Satisfactory

- Verification of required deceleration torque:

$$T_S = \frac{2\pi n_M (J_M + J_L)}{60td} - T_L = \frac{2\pi \times 3{,}000 \times (0.263 + 2.29) \times 10^{-4}}{60 \times 0.1} - 0.43$$

≈ 0.37 (N·m) < Maximum instantaneous torque...Satisfactory

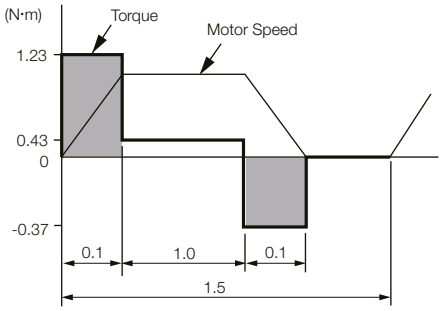
- Verification of effective torque value:

$$Trms = \sqrt{\frac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(1.23)^2 \times 0.1 + (0.43)^2 \times 1.0 + (0.37)^2 \times 0.1}{1.5}}$$

$\approx 0.483$ (N·m) < Rated torque...Satisfactory

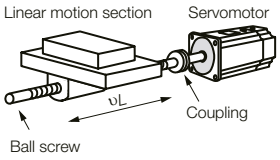
### 10. Result

It has been verified that the provisionally selected Servomotor is applicable.
The torque diagram is shown below.




## Capacity Selection Example for a Rotary Servomotor: For Position Control

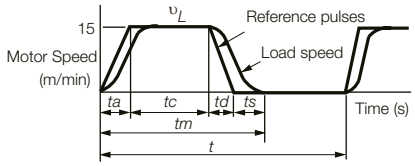
### 1. Mechanical Specifications




| Item | Code | Value |
|---|---|---|
| Load Speed | $\upsilon_L$ | 15 m/min |
| Linear Motion Section Mass | m | 80 kg |
| Ball Screw Length | $\ell_B$ | 0.8 m |
| Ball Screw Diameter | $d_B$ | 0.016 m |
| Ball Screw Lead | $P_B$ | 0.005 m |
| Ball Screw Material Density | ρ | 7.87 x $10^3$ kg/$m^3$ |
| External Force on Linear Motion Section | F | 0 N |
| Coupling Mass | $m_C$ | 0.3 kg |

| Item | Code | Value |
|---|---|---|
| Coupling Outer Diameter | $d_C$ | 0.03 m |
| Number of Feeding Operations | n | 40 rotations/min |
| Feeding Distance | $\ell$ | 0.25 m |
| Feeding Time | tm | 1.2 s max. |
| Electrical Stopping Precision | δ | ±0.01 mm |
| Friction Coefficient | μ | 0.2 |
| Mechanical Efficiency | η | 0.9 (90%) |

### 2. Speed Diagram




$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (s)}$$

If ta = td and ts = 0.1 (s),

$$ta = tm - ts - \frac{60\,\ell}{\upsilon_L} = 1.2 - 0.1 - \frac{60 \times 0.25}{15} = 0.1 \text{ (s)}$$

$$tc = 1.2 - 0.1 - 0.1 \times 2 = 0.9 \text{ (s)}$$

### 3. Motor Speed

- Load shaft speed $n_L = \frac{v_L}{P_B} = \frac{15}{0.005} = 3{,}000\ (\text{min}^{-1})$
- Motor shaft speed Direct coupling gear ratio 1/R = 1/1
  $n_M = n_L \cdot R = 3{,}000 \times 1 = 3{,}000\ (\text{min}^{-1})$

### 4. Load Torque

$$T_L = \frac{(9.8\,\mu \cdot m + F) \cdot P_B}{2\pi R \cdot \eta} = \frac{(9.8 \times 0.2 \times 80 + 0) \times 0.005}{2\pi \times 1 \times 0.9} = 0.139\ (\text{N·m})$$

### 5. Load Moment of Inertia

- Linear motion section $J_{L1} = m\left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.005}{2\pi \times 1}\right)^2 = 0.507 \times 10^{-4}\ (\text{kg·m}^2)$
- Ball screw $J_B = \frac{\pi}{32}\rho \cdot \ell_B \cdot d_B{}^4 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 0.8 \times (0.016)^4 = 0.405 \times 10^{-4}\ (\text{kg·m}^2)$
- Coupling $Jc = \frac{1}{8} m_C \cdot d_C{}^2 = \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.338 \times 10^{-4}\ (\text{kg·m}^2)$
- Load moment of inertia at motor shaft
  $J_L = J_{L1} + J_B + J_G = (1.58 + 0.31 + 0.40) \times 10^{-4} = 2.29 \times 10^{-4}\ \text{kg·m}^2$

### 6. Load Moving Power

$$P_O = \frac{2\pi n_M \cdot T_L}{60} = \frac{2\pi \times 3{,}000 \times 0.139}{60} = 43.7\ (\text{W})$$

### 7. Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} n_M\right)^2 \frac{J_L}{ta} = \left(\frac{2\pi}{60} \times 3{,}000\right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4\ (\text{W})$$

### 8. Servomotor Provisional Selection

① Selection Conditions

- TL ≤ Motor rated torque
- $\frac{(Po + Pa)}{2}$ < Provisionally selected Servomotor rated output < $(Po + Pa)$
- $n_M$ ≤ Rated motor speed
- $J_L$ ≤ Allowable load moment of inertia

The following Servomotor meets the selection conditions.

- SGM7J-01A Servomotor

② Specifications of the Provisionally Selected Servomotor

| Item | Value |
|---|---|
| Rated Output | 100 (W) |
| Rated Motor Speed | 3,000 ($\text{min}^{-1}$) |
| Rated Torque | 0.318 (Nm) |
| Instantaneous Maximum Torque | 1.11 (Nm) |
| Motor Moment of Inertia | 0.0659 $\times 10^{-4}$ kg·m$^2$ |
| Allowable Load Moment of Inertia | 0.0659 x $10^{-4}$ x 35 = 2.31 $\times 10^{-4}$ kg·m$^2$ |
| Encoder Resolution | 16,777,216 pulses/rev [24 bits] |

### 9. Verification of the Provisionally Selected Servomotor

- Verification of required acceleration torque:

$$T_P = \frac{2\pi n_M (J_M + J_L)}{60ta} + T_L = \frac{2\pi \times 3{,}000 \times (0.0659 + 1.25) \times 10^{-4}}{60 \times 0.1} + 0.139$$

$\approx 0.552$ (N·m) < Maximum instantaneous torque...Satisfactory

- Verification of required deceleration torque:

$$T_S = \frac{2\pi n_M (J_M + J_L)}{60td} - T_L = \frac{2\pi \times 3{,}000 \times (0.0659 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139$$

$\approx 0.274$ (N·m) < Maximum instantaneous torque...Satisfactory

- Verification of effective torque value:

$$Trms = \sqrt{\frac{T_P^2 \cdot ta + T_L^2 \cdot tc + Ts^2 \cdot td}{t}} = \sqrt{\frac{(0.552)^2 \times 0.1 + (0.139)^2 \times 0.9 + (0.274)^2 \times 0.1}{1.5}}$$

$\approx 0.192$ (N·m) < Rated torque...Satisfactory

It has been verified that the provisionally selected Servomotor is applicable in terms of capacity. Position control is considered next.

### 10. Positioning Resolution

The electrical stopping precision $\delta$ is ±0.01 mm, so the positioning resolution $\Delta\ell$ is 0.01 mm. The ball screw lead $P_B$ is 0.005 m, so the number of pulses per motor rotation is calculated with the following formula.

$$\text{The number of pulses per revolution (pulses)} = \frac{P_B}{\Delta\ell} = \frac{5 \text{ mm/rev}}{0.01 \text{ mm}} = 500 \text{ (pulses/rev)} < \text{Encoder resolution [16777216 (pulses/rev)]}$$

The number of pulses per motor rotation is less than the encoder resolution (pulses/rev), so the provisionally selected Servomotor can be used.

### 11. Reference Pulse Frequency

The load speed $\upsilon L$ is 15 m/min, or 1,000 × 15/60 mm/s and the positioning resolution (travel distance per pulse) is 0.01 mm/pulse, so the reference pulse frequency is calculated with the following formula.

$$vs = \frac{1{,}000\upsilon L}{60 \times \Delta\ell} = \frac{1{,}000 \times 15}{60 \times 0.01} = 25{,}000 \text{ (pps)}$$

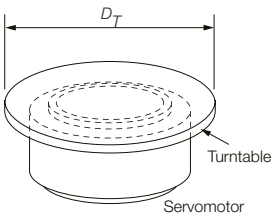
The reference pulse frequency is less than the maximum input pulse frequency,* so the provisionally selected Servomotor can be used.

* Refer to the specifications in the SERVOPACK manual for the maximum input pulse frequency.

It has been verified that the provisionally selected Servomotor is applicable for position control.

# Capacity Selection Example for Direct Drive Servomotors

## 1. Mechanical Specifications



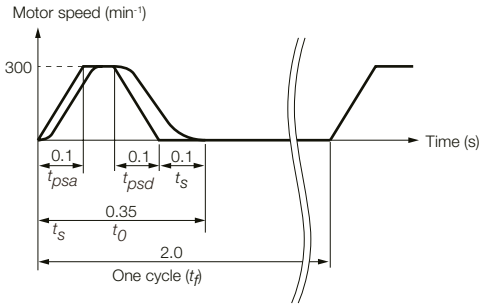

| Item | Code | Value |
|---|---|---|
| Turntable Mass | W | 12 kg |
| Turntable Diameter | $D_T$ | 300 mm |
| Rotational Angle per Cycle | θ | 270 deg |
| Positioning Time | $t_0$ | 0.35 s |

| Item | Code | Value |
|---|---|---|
| Acceleration/ Deceleration Time | $t_p$ = $t_{psa}$ = $t_{psd}$ | 0.1 s |
| Operating Frequency | $t_f$ | 2 s |
| Load Torque | $T_L$ | 0 Nm |
| Settling Time | $t_s$ | 0.1 s |

## 2. Motor Speed of Direct Drive Servomotor

$$N_O = \frac{\theta}{360} \times \frac{60}{(t_0 - t_p - t_s)} = \frac{270}{360} \times \frac{60}{(0.35 - 0.1 - 0.1)} = 300\ (\text{min}^{-1})$$

## 3. Operation Pattern




## 4. Load Moment of Inertia

$$J_L = \frac{1}{8} \times D_T^2 \times W = \frac{1}{8} \times (300 \times 10^{-3})^2 \times 12 = 0.135\ (\text{kg·m}^2)$$

## 5. Load Acceleration/Deceleration Torque

$$T_a = J_L \times 2\pi \times \frac{N_O/60}{t_p} = 0.135 \times 2\pi \times \frac{300/60}{0.1} = 42.4\ (\text{N·m})$$

## 6. Provisional Selection of Direct Drive Servomotor

① Selection Conditions

- Load acceleration/deceleration torque < Instantaneous maximum torque of Direct Drive Servomotor
- Load moment of inertia < Allowable load moment of inertia ratio ($J_R$) x Moment of inertia of Direct Drive Servomotor ($J_M$)

The following Servomotor meets the selection conditions.

- SGMCV-17CEA11

② Specifications of the Provisionally Selected Servomotor

| Item | Value |
|---|---|
| Rated Torque | 17 (Nm) |
| Instantaneous Maximum Torque | 51 (Nm) |
| Moment of Inertia ($J_M$) | 0.00785 (kgm$^2$) |
| Allowable Load Moment of Inertia Ratio ($J_R$) | 25 |

### 7. Verification of the Provisionally Selected Servomotor

- Verification of required acceleration torque:

$$T_{Ma} = \frac{(J_L + J_M) \times N_O}{9.55 \times t_{psa}} = \frac{(0.135 + 0.00785) \times 300}{9.55 \times 0.1}$$

$\approx$ 44.9 (N·m) < Maximum instantaneous torque...Satisfactory

- Verification of required deceleration torque:

$$T_{Md} = -\frac{(J_L + J_M) \times N_O}{9.55 \times t_{psd}} = -\frac{(0.135 + 0.00785) \times 300}{9.55 \times 0.1}$$

$\approx$ -44.9 (N·m) < Maximum instantaneous torque...Satisfactory

- Verification of effective torque value:

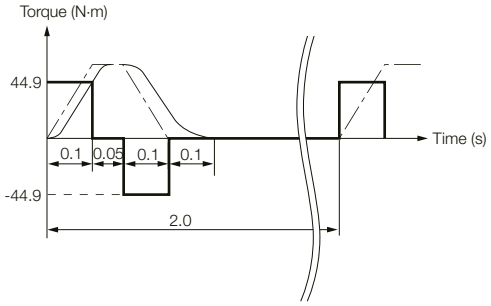
$$Trms = \sqrt{\frac{T_{Ma}^2 \times t_{psa} + T_L^2 \times t_c + T_{Md}^2 \times t_{psd}}{tf}} = \sqrt{\frac{44.9^2 \times 0.1 + 0^2 \times 0.05 + (-44.9)^2 \times 0.1}{2}}$$

$\approx$ 14.2 (N·m) < Rated torque...Satisfactory

$t_c$ =Time of constant motor speed = $t_0 - t_s - t_{psa} - t_{psd}$

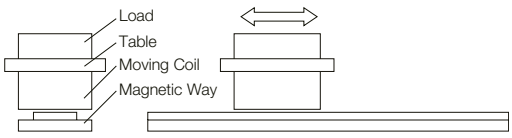
### 8. Result

It has been verified that the provisionally selected Servomotor is applicable.
The torque diagram is shown below.




## Capacity Selection Example for Linear Servomotors

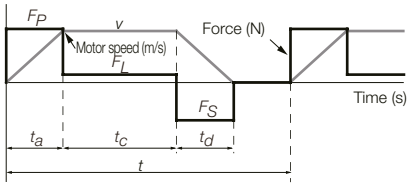
### 1. Mechanical Specifications




| Item | Code | Value |
|---|---|---|
| Load Mass | $m_W$ | 1 kg |
| Table Mass | $m_T$ | 2 kg |
| Motor Speed | v | 2 m/s |
| Feeding Distance | l | 0.76 m |
| Friction Coefficient | μ | 0.2 |

| Item | Code | Value |
|---|---|---|
| Acceleration Time | $t_a$ | 0.02 s |
| Constant-speed Time | $t_c$ | 0.36 s |
| Deceleration Time | $t_d$ | 0.02 s |
| Cycle Time | t | 0.5 s |
| External Force on Linear Motion Section | F | 0 N |

### 2. Operation Pattern



### 3. Steady-State Force (Excluding Servomotor Moving Coil)

$F_L = \{9.8 \times \mu \times (m_W + m_T)\} + F = 9.8 \times 0.2 \times (1 + 2) + 0 = 5.88$ (N)

### 4. Acceleration Force (Excluding Servomotor Moving Coil)

$$F_P = (m_W + m_T) \times \frac{v}{t_a} + F_L = (1 + 2) \times \frac{2}{0.02} + 5.88 = 305.88 \text{ (N)}$$

### 5. Provisional Selection of Linear Servomotor

① Selection Conditions

- $F_P \leq$ Maximum force x 0.9
- $F_s \leq$ Maximum force x 0.9
- $F_{rms} \leq$ Rated force x 0.9

The following Servomotor Moving Coil and Magnetic Way meet the selection conditions.

- SGLGW-60A253CP-E Linear Servomotor Moving Coil
- SGLGM-60□□□C-E Linear Servomotor Magnetic Way

② Specifications of the Provisionally Selected Servomotor

| Item | Value |
|---|---|
| Maximum Force | 440 (N) |
| Rated Force | 140 (N) |
| Moving Coil Mass ($m_M$) | 0.82 (kg) |
| Servomotor Magnetic Attraction ($F_{att}$) | 0 (N) |

### 6. Verification of the Provisionally Selected Servomotor

- Steady-State Force

  $F_L = \mu \{9.8 \times (m_W + m_T + m_M) + F_{att}\} = 0.2 \{9.8 \times (1 + 2 + 0.82) + 0\} = 7.5$ (N)

- Verification of Acceleration Force

$$F_P = (m_W + m_T + m_M) \times \frac{v}{t_a} + F_L = (1 + 2 + 0.82) \times \frac{2}{0.02} + 7.5$$

$= 389.5$ (N) ≤ Maximum force × 0.9 (= 396 N)… Satisfactory

- Verification of Deceleration Force

$$F_S = (m_W + m_T + m_M) \times \frac{v}{t_a} - F_L = (1 + 2 + 0.82) \times \frac{2}{0.02} - 7.5$$

$= 374.5$ (N) ≤ Maximum force × 0.9 (= 396 N)… Satisfactory

- Verification of Effective Force

$$F_{rms} = \sqrt{\frac{F_P^2 \cdot t_a + F_L^2 \cdot t_c + F_S^2 \cdot t_d}{t}} = \sqrt{\frac{389.5^2 \times 0.02 + 7.5^2 \times 0.36 + 374.5^2 \times 0.02}{0.5}}$$

$= 108.3$ (N) ≤ Rated force × 0.9 (= 132.3 N)… Satisfactory

### 7. Result

It has been verified that the provisionally selected Servomotor is applicable.

# Capacity Selection for Regenerative Resistors

If the regenerative power exceeds the amount that can be absorbed by charging the smoothing capacitor, a regenerative resistor is used.

## Regenerative Power and Regenerative Resistance

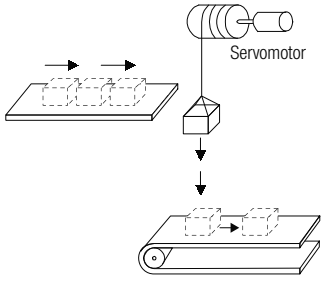
The rotational energy of a driven machine such as a Servomotor that is returned to the SERVOPACK is called regenerative power. The regenerative power is absorbed by charging a smoothing capacitor. When the regenerative power exceeds the capacity of the capacitor, it is consumed by a regenerative resistor. (This is called resistance regeneration.) The Servomotor is driven in a regeneration state in the following circumstances:

- While decelerating to a stop during acceleration/deceleration operation
- While performing continuous downward operation on a vertical axis
- During continuous operation in which the Servomotor is rotated by the load (i.e., a negative load)

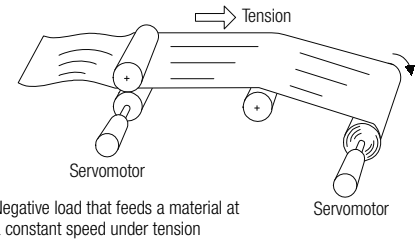
**Important**

You cannot use the resistance regeneration provided by the SERVOPACK for continuous regeneration. For continuous operation with a negative load, you must design a system that also includes a Power Regenerative Converter or Power Regenerative Unit (for example, YASKAWA model D1000 or R1000). If regenerative power is not appropriately processed, the regenerative energy from the load will exceed the allowable range and damage the SERVOPACK.
Examples of negative loads are shown below.

• Motor Drive to Lower Objects without a Counterweight




• Motor Drive for Feeding




Negative load that feeds a material at a constant speed under tension

## Types of Regenerative Resistors

The following regenerative resistors can be used.

- Built-in regenerative resistor: A regenerative resistor that is built into the SERVOPACK. Not all SERVOPACKs have built-in regenerative resistors.
- External Regenerative Resistor: A regenerative resistor that is connected externally to a SERVOPACK. These resistors are used when the smoothing capacitor and built-in regenerative resistor in the SERVOPACK cannot consume all of the regenerative power.

| SERVOPACK Model | | Built-in Regenerative Resistor | External Regenerative Resistor |
|---|---|---|---|
| SGD7S- | R70A, R90A, 1R6A, 2R8A, R70F, R90F, 2R1F, 2R8F | None | Basically not required |
| | 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A | Standard feature *1 | Basically not required |
| | 470A, 550A, 590A, 780A | None | Required *2 |
| SGD7W- | 1R6A, 2R8A, 5R5A, 7R6A | Standard feature *1 | Basically not required |
| SGD7C- | 1R6A, 2R8A, 5R5A, 7R6A | Standard feature *1 | Basically not required |

*1. Refer to the "Built-In Regenerative Resistor" section for the specifications of the regenerative resistors built into SERVOPACKs.
*2. An optional external Regenerative Resistor Unit is required.

# Selecting External Regenerative Resistor

Use YASKAWA SigmaJunmaSize+, an AC servo drive capacity selection program, to determine if you need an External Regenerative Resistor.
You can use one of the following two methods to manually calculate whether an External Regenerative Resistor is required. Refer to the following information if you do not use the SigmaJunmaSize+.

- Refer to chapter “Simple Calculation”.
- Refer to chapter “Calculating the Regenerative Energy”.

## Simple Calculation

When driving a Servomotor with a horizontal shaft, check if an External Regenerative Resistor is required using the following calculation method.
Note: If you use the SGD7S-470A, -550A, -590A, or -780A, always connect an External Regenerative Resistor.

### SERVOPACKs without Built-in Regenerative Resistors:

### SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F

The total amount of energy that can be charged in the capacitors is given in the following table. If the rotational energy (ES) of the Servomotor and load exceeds the value in the following table, then connect an External Regenerative Resistor.

| Applicable SERVOPACK | | Processable Regenerative Energy (Joules) | Remarks |
|---|---|---|---|
| SGD7S- | R70A, R90A, 1R6A | 24.2 | Value when main circuit input voltage is 200 VAC |
| | 2R8A | 31.7 | |

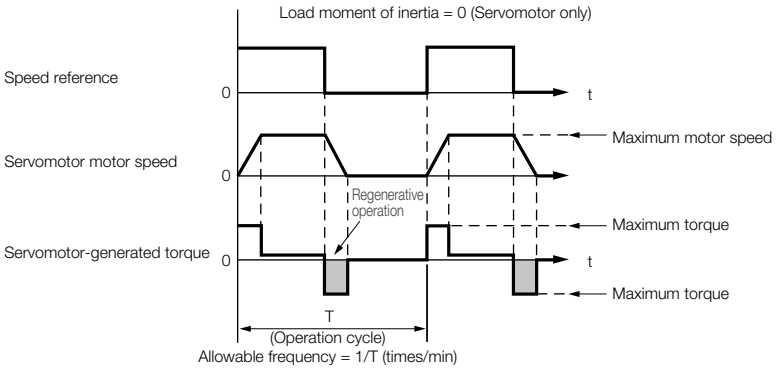
Calculate the rotational energy ($E_S$) of the servo system with the following equation:

$E_S = J \times (n_M)^2/182$ (Joules)

- $J = J_M + J_L$
- $J_M$: Servomotor moment of inertia (kg × $m^2$)
- $J_L$: Load moment of inertia at motor shaft (kg × $m^2$)
- $n_M$: Servomotor operating motor speed ($min^{-1}$)

### SERVOPACKs with Built-in Regenerative Resistors:
### SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, and -330A
### SGD7W-1R6A, -2R8A, -5R5A, and -7R6A
### SGD7C-1R6A, -2R8A, -5R5A, and -7R6A

Use the following equation to calculate the allowable frequency for regenerative operation. The following operating conditions were used: Operation cycle from a speed of 0 to the maximum motor speed to 0 ($min^{-1}$) with acceleration and deceleration operation. If the frequency of the operation cycle (1/T) is lower than the allowable frequency in the calculation results, an External Regenerative Resistor is not necessary. Finally, do the calculation with the actual operating speed and load moment of inertia to determine if an External Regenerative Resistor is required.




### Operating Conditions for Calculating the Allowable Regenerative Frequency

$$\text{Allowable frequency} \frac{\text{Allowable frequency for regenerative operation for Servomotor without load*}}{(1+n)} \times \left(\frac{\text{Maximum motor speed}}{\text{Operating motor speed}}\right)^2 \text{(time/min)}$$

- $n = J_L/J_M$
- $J_M$: Servomotor moment of inertia ($kg \times m^2$)
- $J_L$: Load moment of inertia at motor shaft ($kg \times m^2$)

* Assign the related value given in the table in Allowable Frequency for Regenerative Operation for Servomotor without Load

## Allowable Frequency for Regenerative Operation for Servomotors without Load

- Rotary Servomotors

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Operations/Min) | |
|---|---|---|---|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W and SGD7C (Simultaneous Operation of Two Axes) |
| SGMMV- | A1A | - | - |
| | A2A | - | - |
| | A3A | - | - |
| SGM7J- | A5A | - | 300 |
| | 01A | - | 180 |
| | C2A | - | 130 |
| | 02A | - | 46 |
| | 04A | - | 25 |
| | 06A | 30 | 30 |
| | 08A | 15 | 15 |
| SGM7A- | A5A | - | 560 |
| | 01A | - | 360 |
| | C2A | - | 260 |
| | 02A | - | 87 |
| | 04A | - | 56 |
| | 06A | 77 | 77 |
| | 08A | 31 | 31 |
| | 10A | 31 | - |
| | 15A | 15 | - |
| | 20A | 19 | - |
| | 25A | 15 | - |
| | 30A | 6.9 | - |
| | 40A | 11 | - |
| | 50A | 8.8 | - |
| | 70A | 86 | - |

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Operations/Min) | |
|---|---|---|---|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W and SGD7C (Simultaneous Operation of Two Axes) |
| SGM7P- | 01A | - | 200 |
| | C2A | - | 46 |
| | 04A | - | 29 |
| | 08A | 11 | 11 |
| SGM7G- | 15A | 7.5 | - |
| | 03A | 39 | 39 |
| | 05A | 29 | 29 |
| | 09A | 6.9 | 6.9 |
| | 13A | 6.1 | - |
| | 20A | 7.4 | - |
| | 30A | 9.5 | - |
| | 44A | 6.4 | - |
| | 55A | 24 | - |
| | 75A | 34 | - |
| | 1AA | 39 | - |
| | 1EA | 31 | - |

## Allowable Frequency for Regenerative Operation for Servomotors without Load

- Direct Drive Servomotors

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Operations/Min) | |
|---|---|---|---|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W and SGD7C (Simultaneous Operation of Two Axes) |
| SGM7D- | 01G | - | - |
| | 1AF | 120 | - |
| | 1CI | 74 | - |
| | 1ZI | 91 | - |
| | 02K | – | - |
| | 03H | – | - |
| | 05G | – | - |
| | 06J | 350 | - |
| | 06L | – | - |
| | 06K | – | - |
| | 08G | 430 | - |
| | 08K | – | - |
| | 09J | 250 | - |
| | 12L | – | - |
| | 18G | 350 | - |
| | 18J | 210 | - |
| | 20J | 200 | - |
| | 24G | 270 | - |
| | 28I | 52 | - |
| | 2BI | 89 | - |
| | 2DI | 110 | - |
| | 30F | 210 | - |
| | 30L | 63 | - |
| | 38J | 150 | - |
| | 34G | 220 | - |
| | 45G | 190 | - |
| | 58F | 170 | - |
| | 70I | 100 | - |
| | 90F | 140 | - |
| SGM7E- | 02B | – | 62 |
| | 05B | – | 34 |
| | 07B | – | 22 |
| | 04C | – | 22 |
| | 08D | – | 6.1 |
| | 10C | – | 19 |
| | 14C | – | 22 |
| | 17D | – | 7 |
| | 25D | – | 9.3 |
| | 16E | 3.7 | 3.7 |
| | 35E | 9.7 | 9.7 |

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Operations/Min) | |
|---|---|---|---|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W and SGD7C (Simultaneous Operation of Two Axes) |
| SGM7F- | 02A | - | 150 |
| | 05A | - | 83 |
| | 07A | - | 62 |
| | 04B | - | 75 |
| | 08C | - | 21 |
| | 10B | - | 48 |
| | 14B | 65 | 65 |
| | 16D | 13 | 13 |
| | 17C | 30 | 30 |
| | 25C | 31 | 31 |
| | 35D | 19 | 19 |
| | 45M | 25 | 25 |
| | 80M | 19 | - |
| | 1AM | 8.9 | - |
| | 80N | 22 | - |
| | 1EN | 11 | - |
| | 2ZN | 9.1 | - |
| SGMCV- | 04B | - | 75 |
| | 08C | - | 21 |
| | 10B | - | 48 |
| | 14B | 65 | 65 |
| | 16D | 13 | 13 |
| | 17C | 30 | 30 |
| | 25C | 31 | 31 |
| | 35D | 19 | 19 |
| SGMCS- | 02B | - | 62 |
| | 05B | - | 34 |
| | 07B | - | 22 |
| | 04C | - | 22 |
| | 08D | - | 6.1 |
| | 10C | - | 19 |
| | 14C | - | 22 |
| | 17D | - | 7 |
| | 25D | - | 9.3 |
| | 16E | 3.7 | 3.7 |
| | 35E | 9.7 | 9.7 |
| | 45M | 25 | 25 |
| | 80M | 19 | - |
| | 80N | 8.9 | - |
| | 1AM | 22 | - |
| | 1EN | 11 | - |
| | 2ZN | 9.1 | - |

## Allowable Frequency for Regenerative Operation for Servomotors without Load

- Linear Servomotors

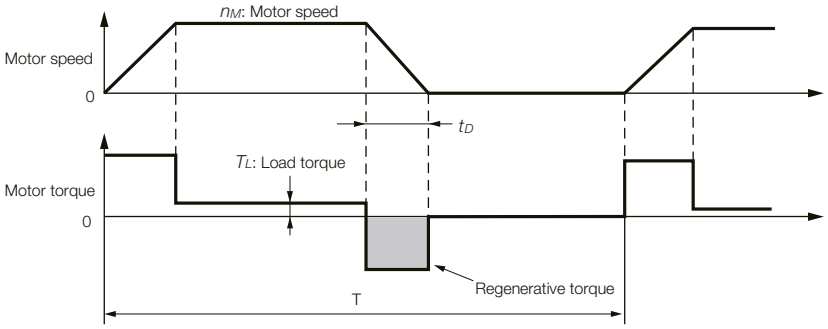
| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Operations/Min) | |
|---|---|---|---|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W and SGD7C (Simultaneous Operation of Two Axes) |
| SGLGW- Using a Standard-Force Magnetic Way | 30A050C | - | 190 |
| | 30A080C | - | 120 |
| | 40A140C | - | 56 |
| | 40A253C | - | 32 |
| | 40A365C | - | 22 |
| | 60A140C | - | 49 |
| | 60A253C | - | 27 |
| | 60A365C | 37 | 37 |
| | 90A200C | 34 | - |
| | 90A370C | 33 | - |
| | 90A535C | 24 | - |
| SGLGW- Using a High-Force Magnetic Way | 40A140C | - | 80 |
| | 40A253C | - | 45 |
| | 40A365C | 62 | 62 |
| | 60A140C | - | 64 |
| | 60A253C | 71 | 71 |
| | 60A365C | 49 | 49 |
| SGLFW- | 20A090A | - | 27 |
| | 20A120A | - | 21 |
| | 35A120A | - | 14 |
| | 35A230A | 16 | 16 |
| | 50A200B | 10 | 10 |
| | 50A380B | 6.9 | - |
| | 1ZA200B | 7.8 | - |
| | 1ZA380B | 6.6 | - |

| Servomotor Model | | Allowable Frequencies in Regenerative Operation (Operations/Min) | |
|---|---|---|---|
| | | SERVOPACK Model: SGD7S | SERVOPACK Model: SGD7W and SGD7C (Simultaneous Operation of Two Axes) |
| SGLFW2- | 30A070A | - | 38 |
| | 30A120A | - | 21 |
| | 30A230A | 22 | 11 |
| | 45A200A | 16 | 16 |
| | 45A380A | 10.*1 | - |
| | | 17*2 | - |
| | 90A200A | 14 | - |
| | 90A380A | 11 | - |
| | 90A560A | 18 | - |
| | 1DA380A | 21 | - |
| | 1DA560A | 32 | - |
| SGLTW- | 20A170A | 15 | 15 |
| | 20A320A | 8.3 | 8.3 |
| | 20A460A | 7.1 | - |
| | 35A170A | 10 | 10 |
| | 35A170H | 8.5 | 8.5 |
| | 35A320A | 7 | - |
| | 35A320H | 5.9 | - |
| | 35A460A | 7.6 | - |
| | 40A400B | 13 | - |
| | 40A600B | 19 | - |
| | 50A170H | 15 | 15 |
| | 50A320H | 11 | - |
| | 80A400B | 28 | - |
| | 80A600B | 180 | - |

*1. This value is in combination with the SGD7S-120A.
*2. This value is in combination with the SGD7S-180A.

## Calculating the Regenerative Energy

This section shows how to calculate the regenerative resistor capacity for the acceleration/deceleration operation shown in the following figure.




### Calculation Procedure for Regenerative Resistor Capacity

| Step | Item | Code | Formula |
|---|---|---|---|
| 1 | Calculate the rotational energy of the Servomotor. | $E_S$ | $E_S = Jn_M^2/182$ |
| 2 | Calculate the energy consumed by load loss during the deceleration period | $E_L$ | $E_L = (\pi/60)\, n_M T_L t_D$<br>Note: If the load loss is unknown, calculate the value with $E_L$ set to 0. |
| 3 | Calculate the energy lost from Servomotor winding resistance. | $E_M$ | (Value calculated from the graphs in Servomotor Winding Resistance Loss) x $t_D$ |
| 4 | Calculate the energy that can be absorbed by the SERVOPACK. | $E_C$ | Calculate from the graphs in u SERVOPACK-absorbable Energy |
| 5 | Calculate the energy consumed by the regenerative resistor. | $E_K$ | $E_K = E_S - (E_L + E_M + E_C)$ |
| 6 | Calculate the required regenerative resistor capacity (W). | $W_K$ | $W_K = E_K/(0.2 \times T)$ |

*1. The 0.2 in the equation for calculating WK is the value when the regenerative resistor's utilized load ratio is 20%.
*2. The units for the various symbols are given in the following table.

| Code | Description |
|---|---|
| $E_S$ to $E_K$ | Energy in joules (J) |
| $W_K$ | Required regenerative resistor capacity (W) |
| J | $= J_M + J_L$ ($kgm^2$) |
| $n_M$ | Servomotor motor speed ($min^{-1}$) |

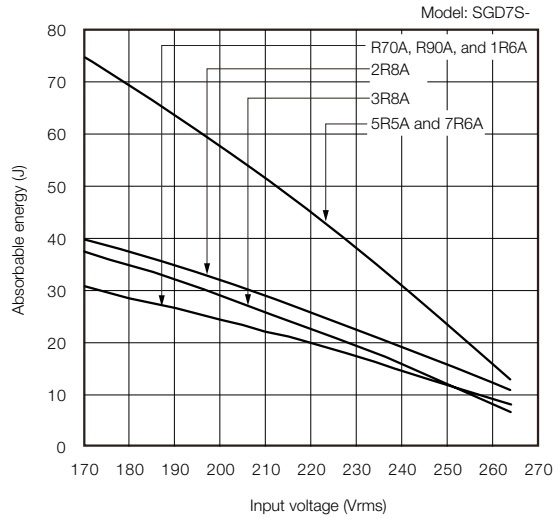
| Code | Description |
|---|---|
| $T_L$ | Load torque (Nm) |
| $t_D$ | Deceleration stopping time (s) |
| T | Servomotor repeat operation cycle (s) |

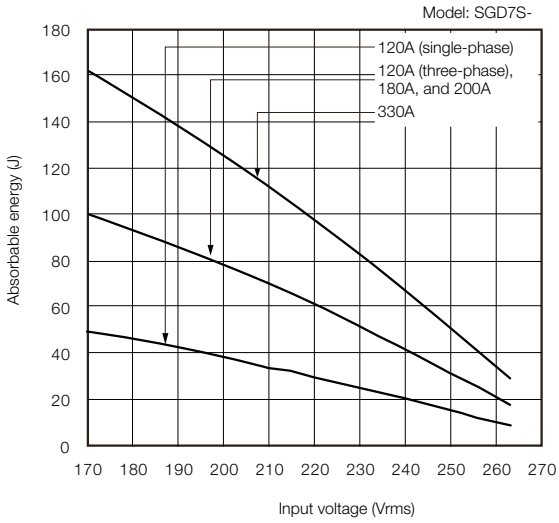
If the value of $W_K$ does not exceed the capacity of the built-in regenerative resistor of the SERVOPACK, an External Regenerative Resistor is not required. If the value of $W_K$ exceeds the capacity of the built-in regenerative resistor, install an External Regenerative Resistor with a capacity equal to the value for W calculated above.

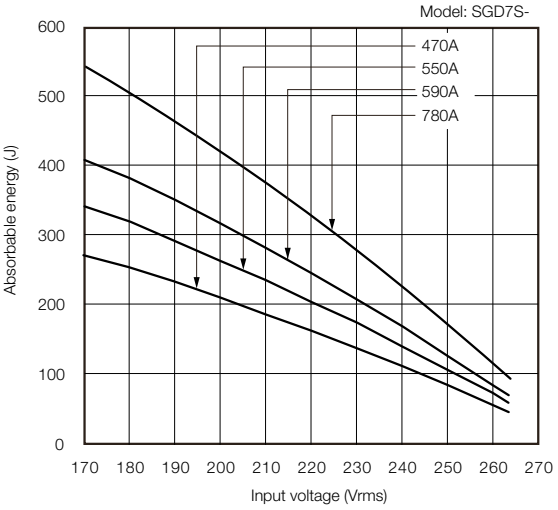
## SERVOPACK-absorbable Energy

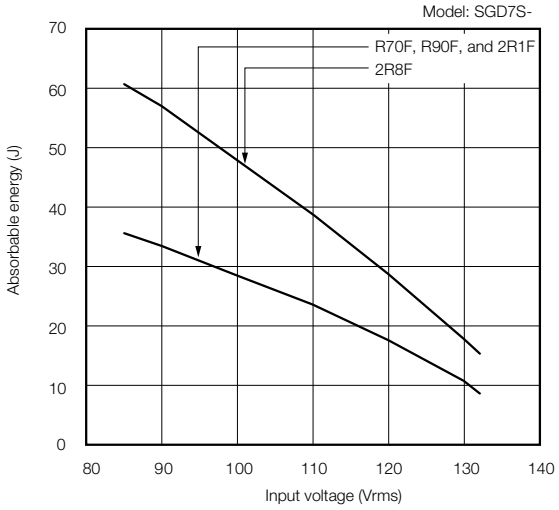
The following figures show the relationship between the SERVOPACK's input power supply voltage and its absorbable energy.

### Sigma-7S SERVOPACKs

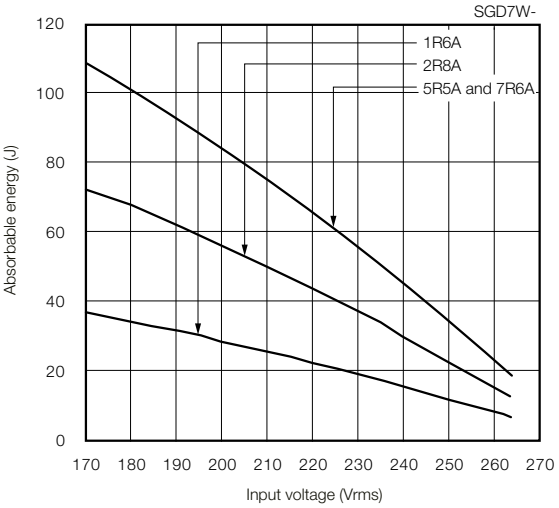


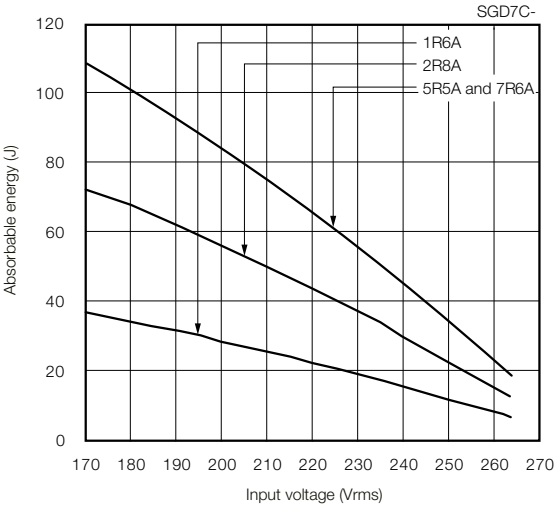




### Sigma-7W SERVOPACKs




### Sigma-7C SERVOPACKs



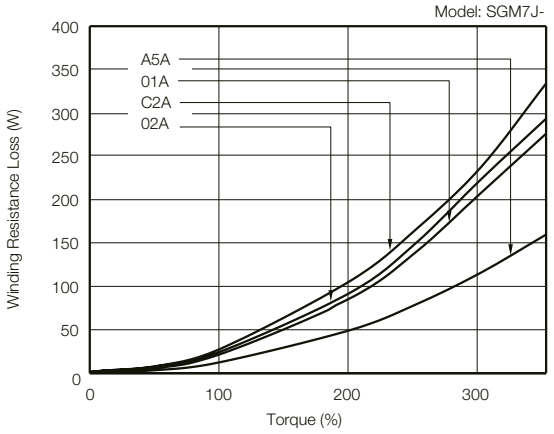
## Servomotor Winding Resistance Loss

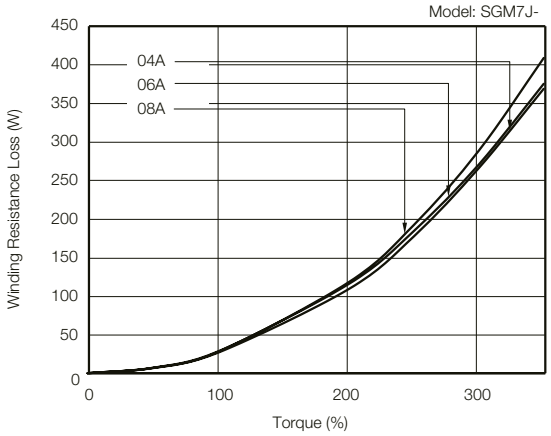
The following figures show the relationship for each Servomotor between the Servomotor's generated torque and the winding resistance loss.

### SGMMV Rotary Servomotors

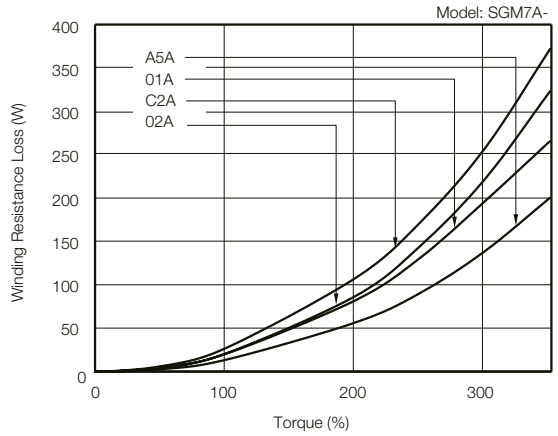
Contact your YASKAWA representative for information on the SGMMV Rotary Servomotors.

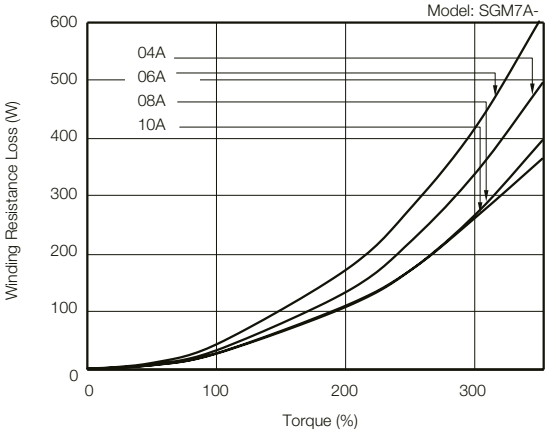
### SGM7J Rotary Servomotors

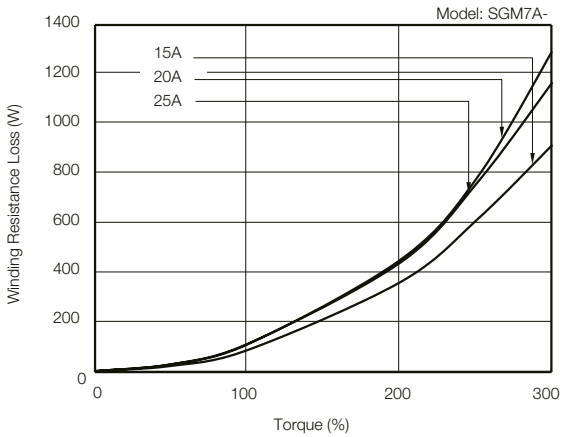


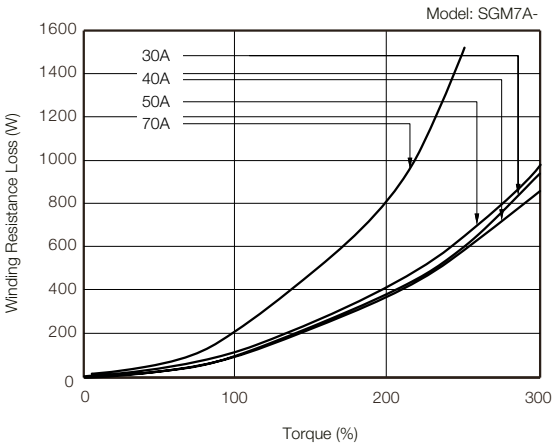




### SGM7A Rotary Servomotors

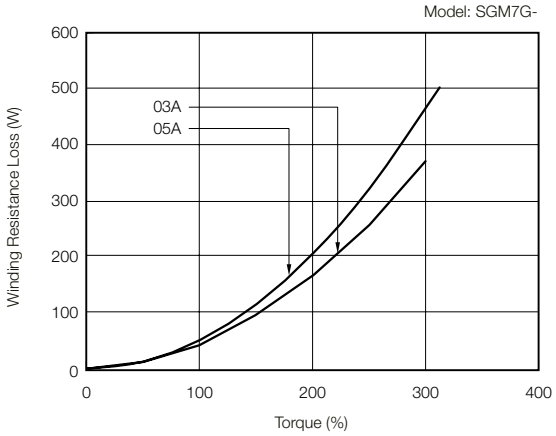


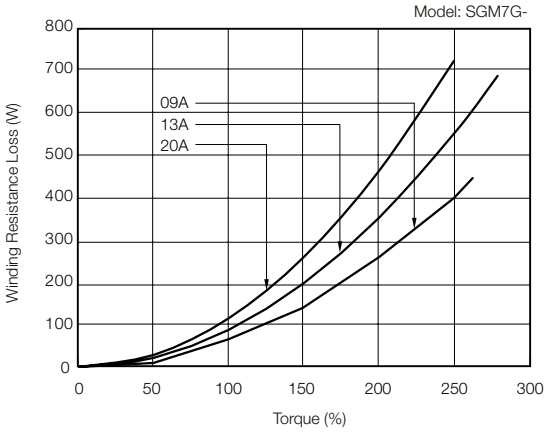



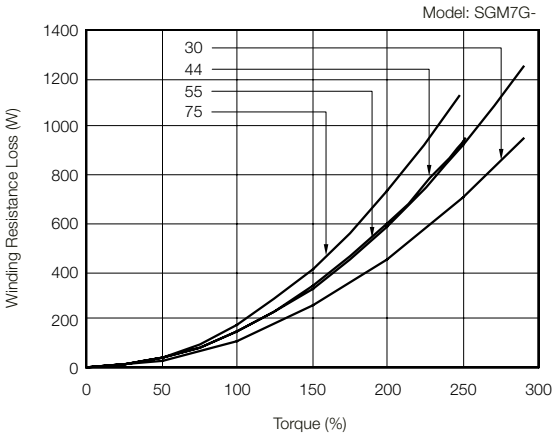



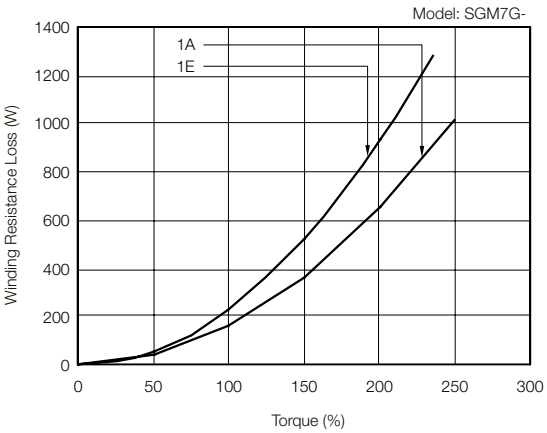



## SGM7G Rotary Servomotors

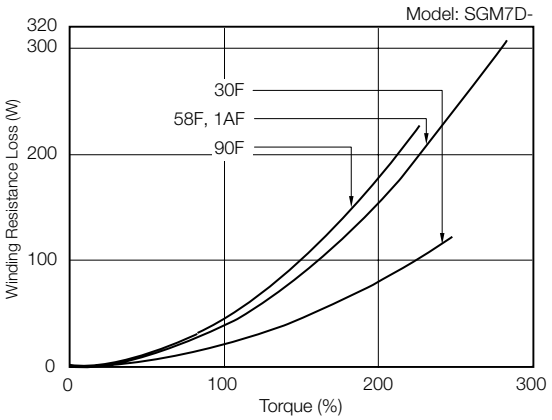


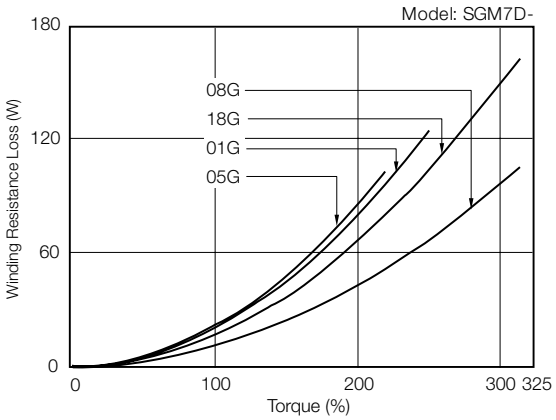



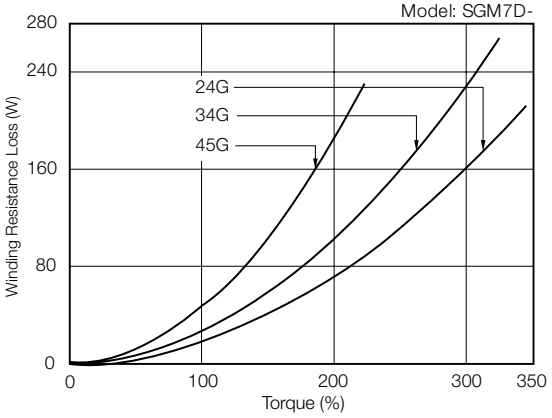



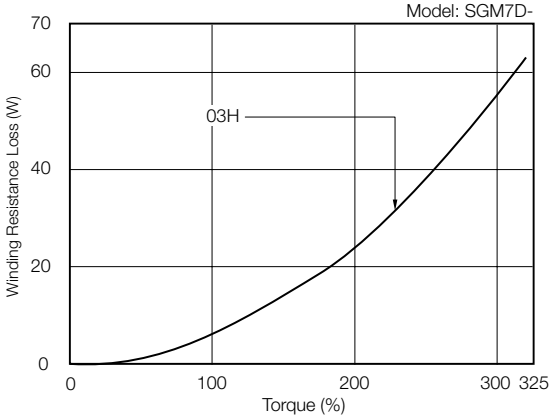



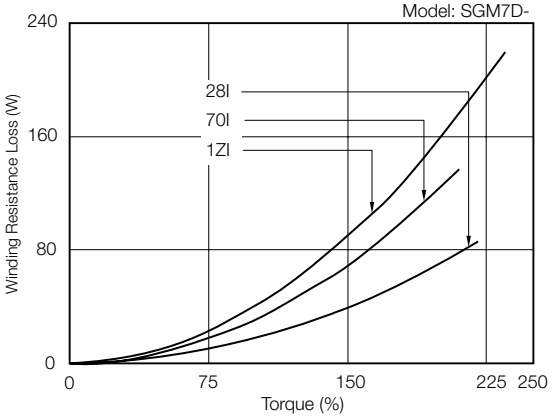
## SGM7D Direct Drive Servomotors

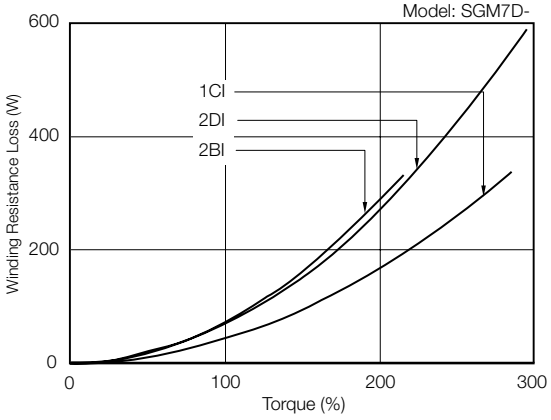


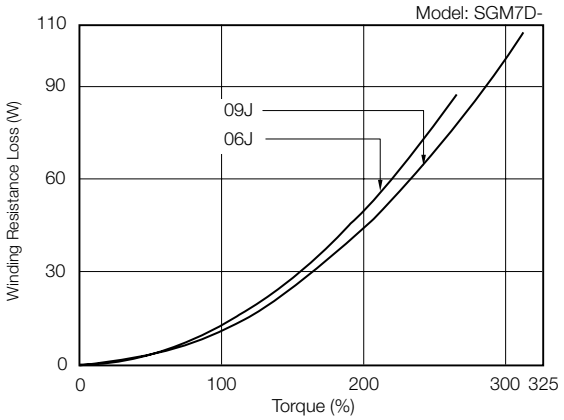



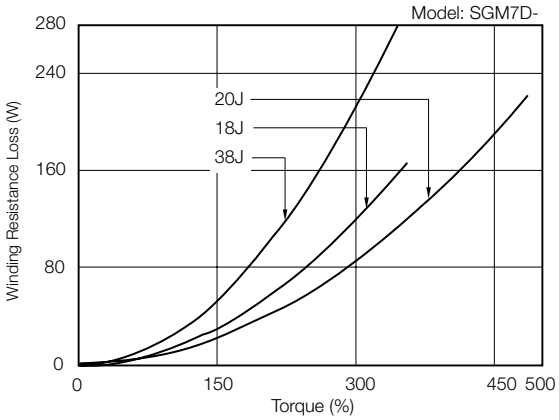



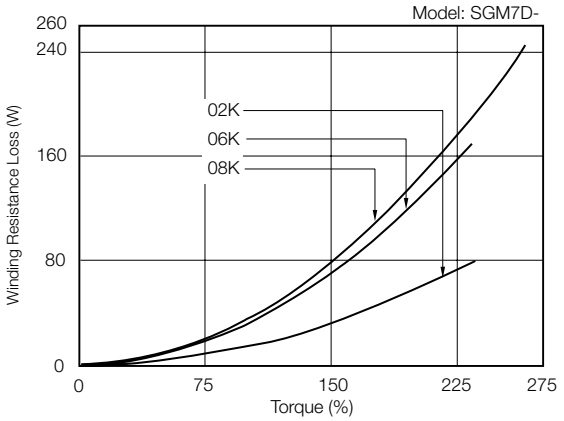



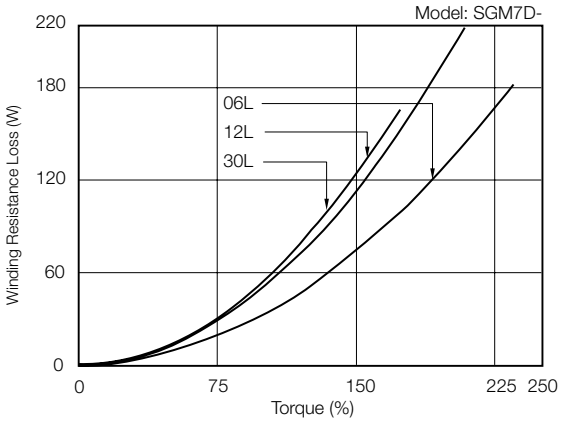



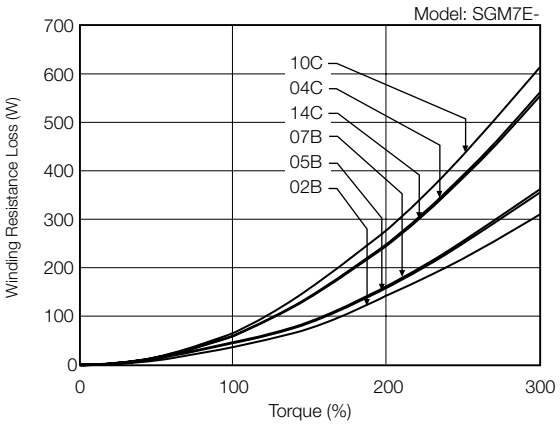

Model: SGM7D-
Winding Resistance Loss (W)
110
90
60
30
0
09J
06J
0
100
200
300 325
Torque (%)

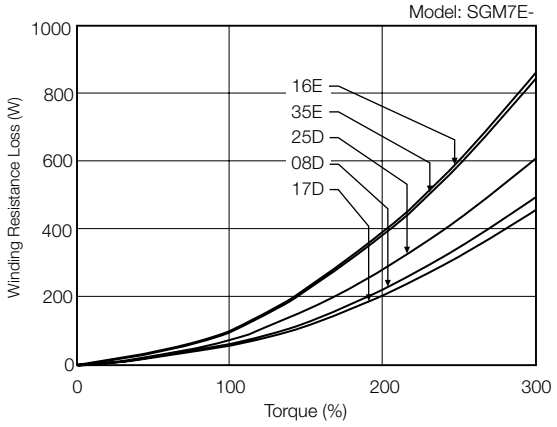

Model: SGM7D-
Winding Resistance Loss (W)
280
240
160
80
0
20J
18J
38J
0
150
300
450 500
Torque (%)


Model: SGM7D-
Winding Resistance Loss (W)
260
240
160
80
0
02K
06K
08K
0
75
150
225
275
Torque (%)

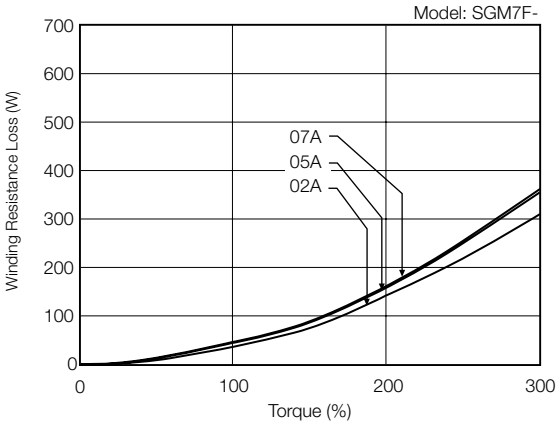

Model: SGM7D-
Winding Resistance Loss (W)
220
180
120
60
0
06L
12L
30L
0
75
150
225 250
Torque (%)

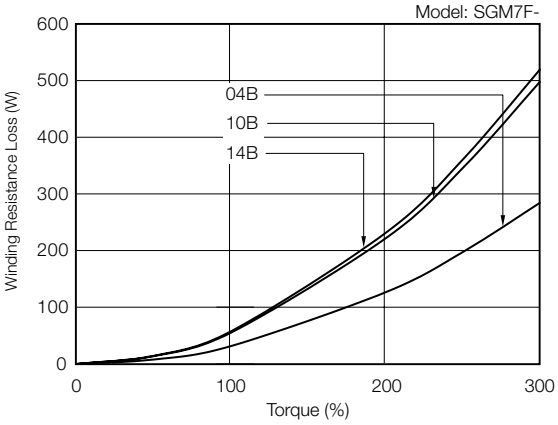
## SGM7E Direct Drive Servomotors

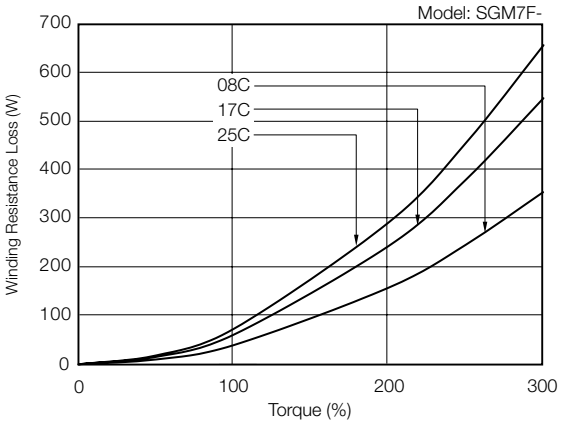


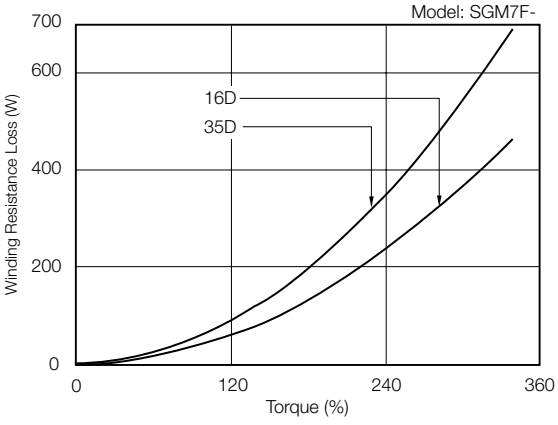



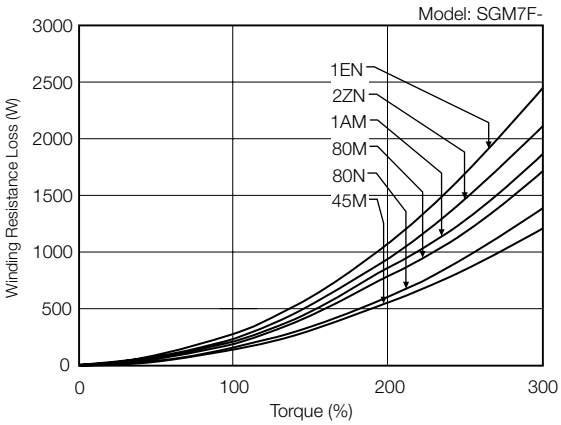

## SGM7F Direct Drive Servomotors



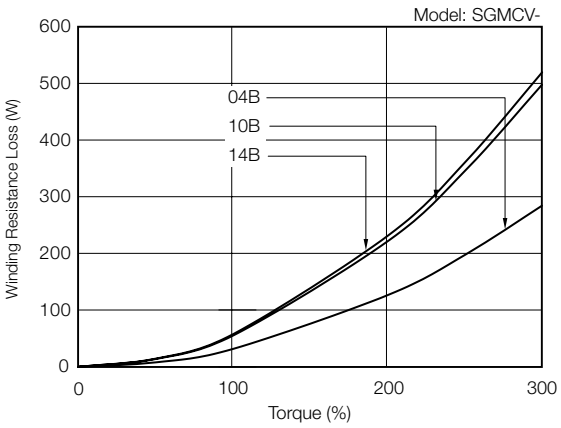



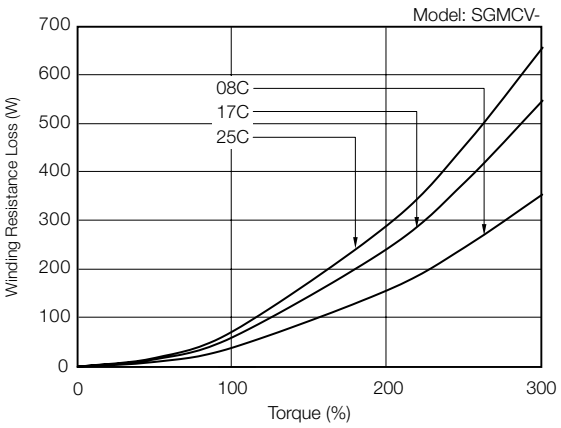



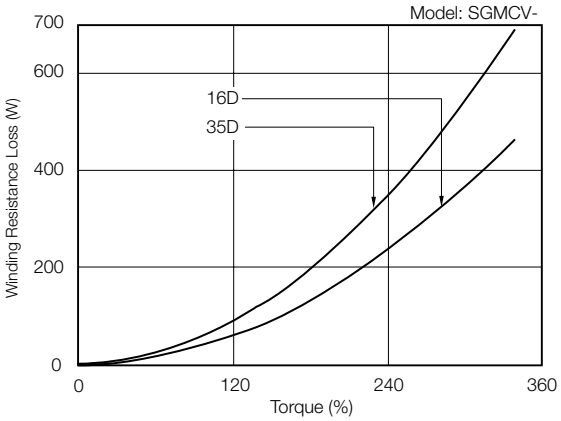



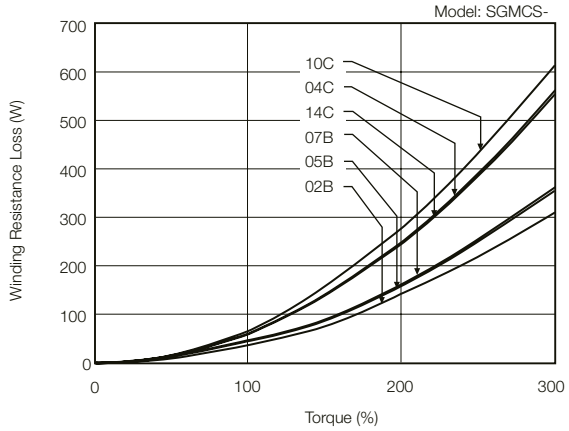
## SGMCV Direct Drive Servomotors

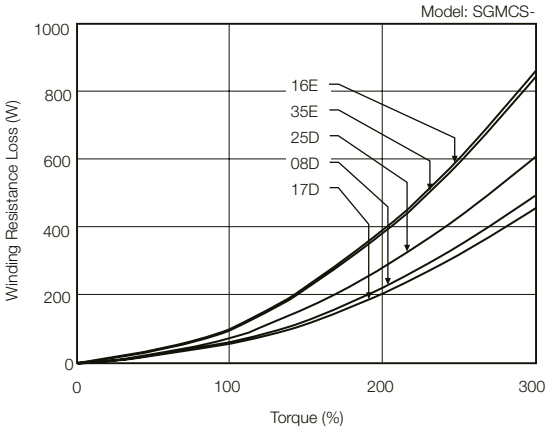


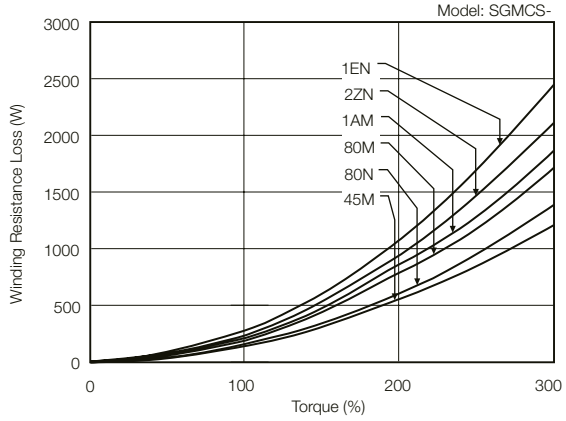




## SGMCS Direct Drive Servomotors

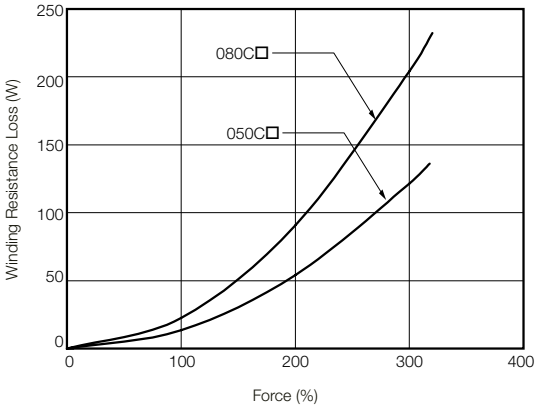


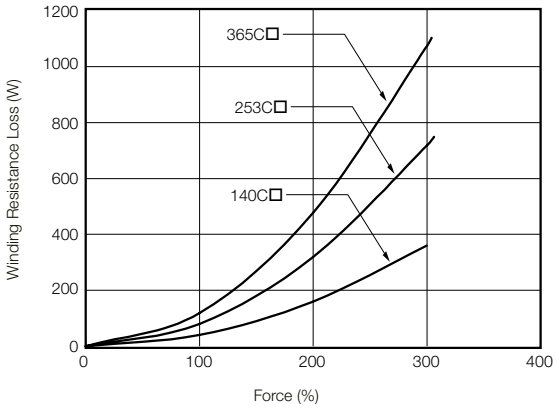



## SGLGW Linear Servomotors

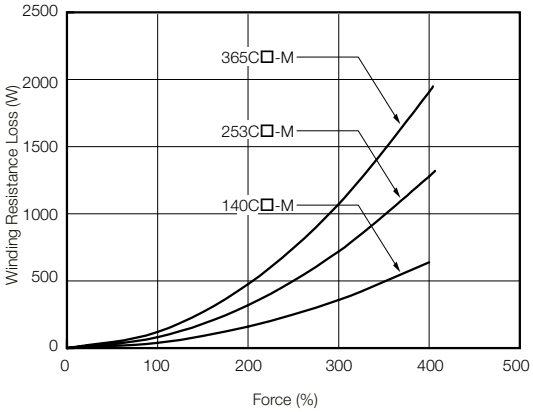
Model: SGLGW-30A



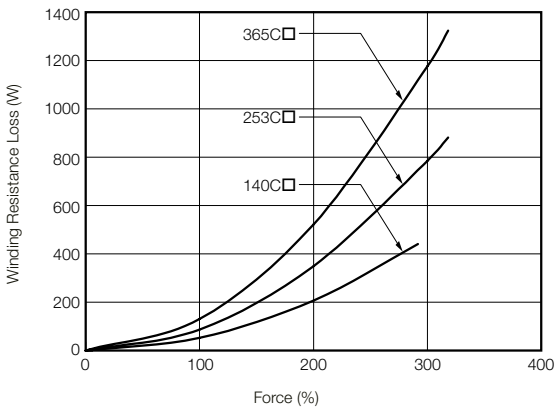

Model: SGLGW-40A



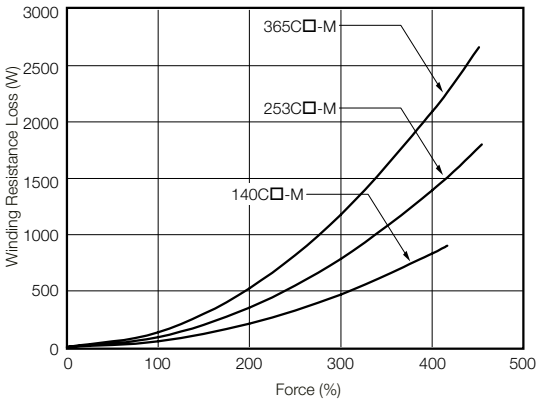

Model: SGLGW-40A



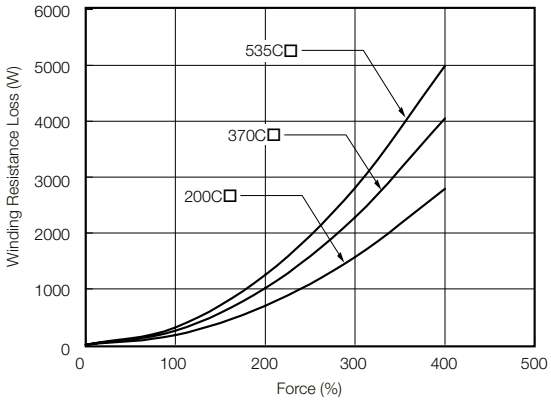

Model: SGLGW-60A



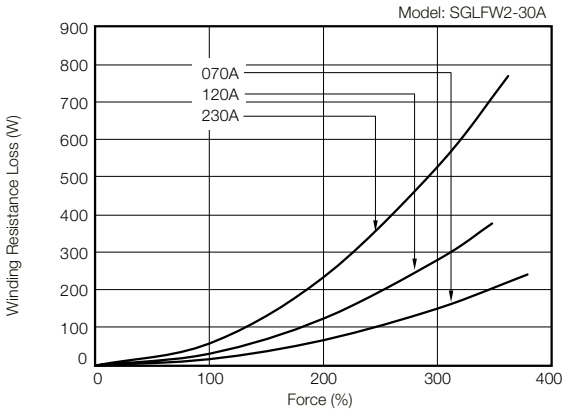

Model: SGLGW-60A

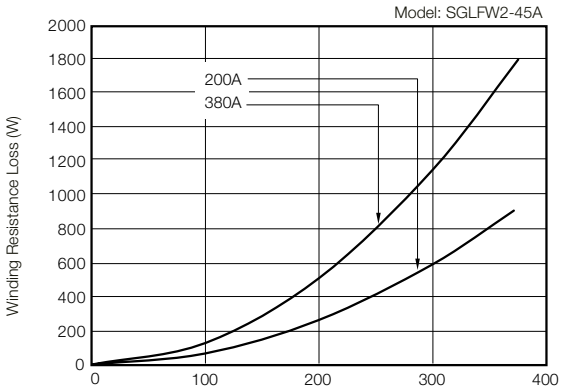


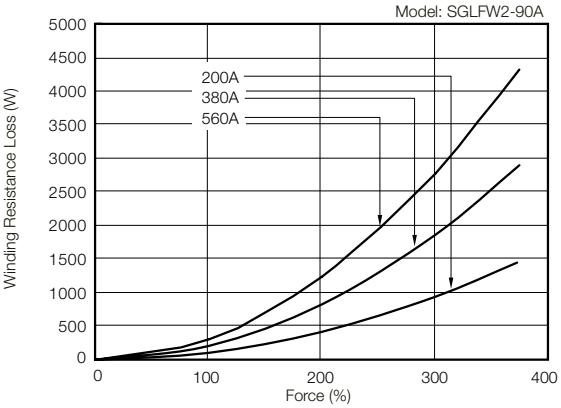

Model: SGLGW-90A

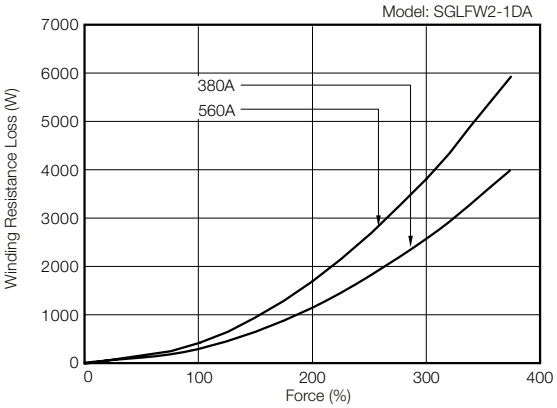


## SGLFW2 Linear Servomotors

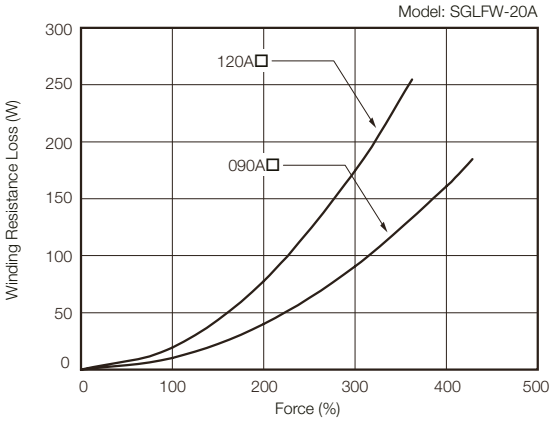


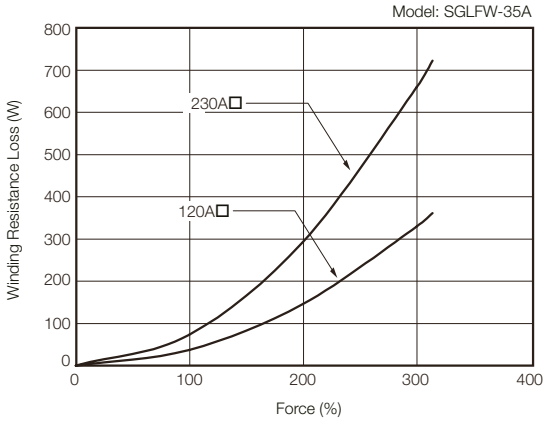



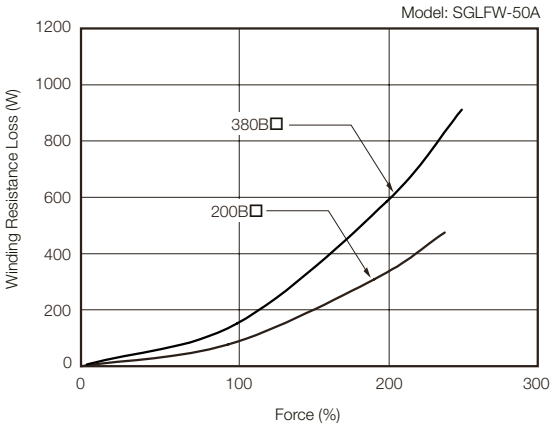



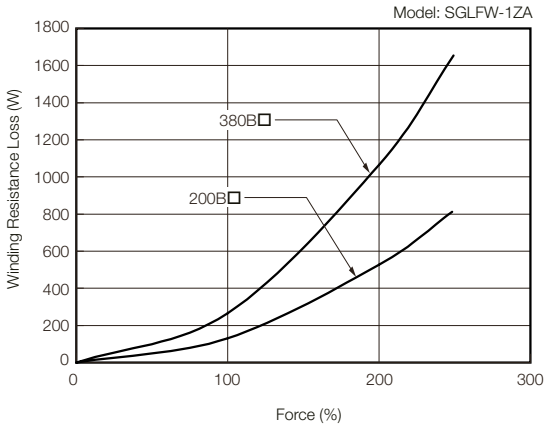



## SGLFW Linear Servomotors



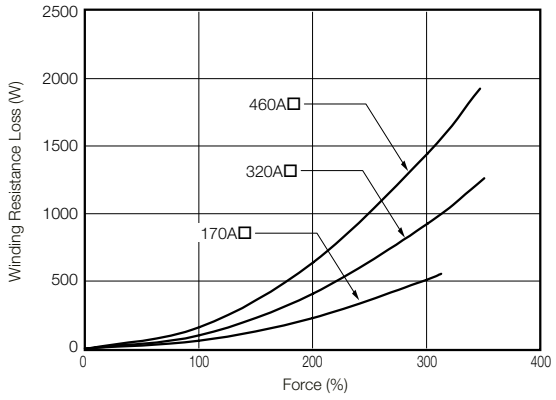



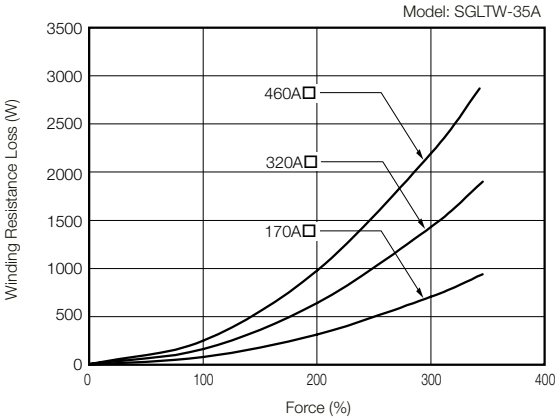



## SGLTW Linear Servomotors

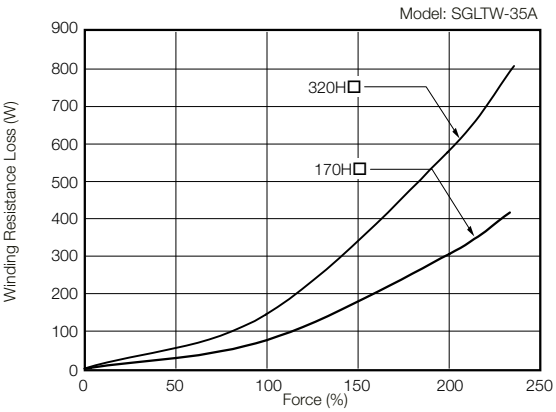
Model: SGLTW-20A



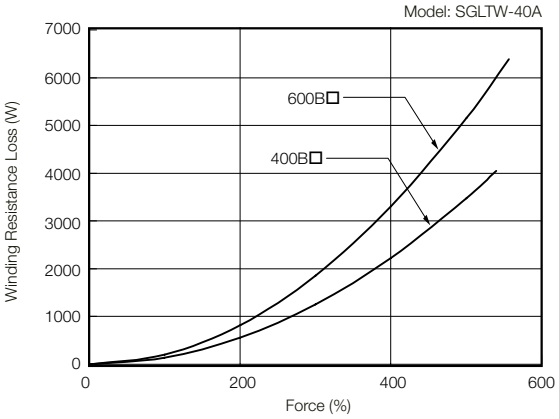

Model: SGLTW-35A



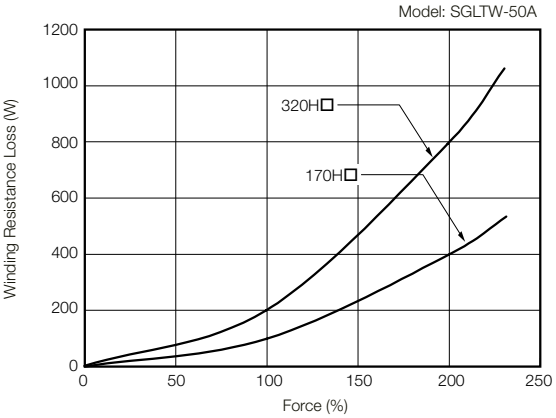

Model: SGLTW-35A



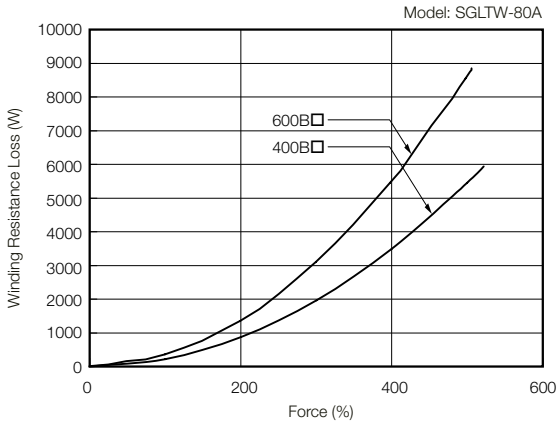

Model: SGLTW-40A




Model: SGLTW-50A




Model: SGLTW-80A



# International Standards

√ : Certified – : Not Certified

| Product | | Model | UL/CSA Standards | CE Marking | KC Mark | RoHS Directive |
|---|---|---|---|---|---|---|
| SERVOPACKs | | SGD7S | √ | √ | √ | √ |
| | | SGD7W | √ | √ | √ | √ |
| | | SGD7C | √ | √ | √ | √ |
| Communications Options | INDEXER Module | SGDV- OCA03A* | √ | √ | √ | √ |
| | DeviceNet Module | SGDV-OCA04A*, -OCA05A* | √ | √ | √ | √ |
| Feedback Option | Fully-Closed Module | SGDV-OFA01A* | √ | √ | √ | √ |
| Safety Option | Safety Module | SGDV-OSA01A* | √ | √ | √ | √ |

* Use this model number to purchase the Option Module separately.

√ : Certified – : Not Certified

| Product | Model | UL/CSA Standards | CE Marking | RoHS Directive |
|---|---|---|---|---|
| Rotary Servomotors | SGMMV | √ | √ | √ |
| | SGM7J | √ | √ | √ |
| | SGM7A | √ | √ | √ |
| | SGM7P | √ | √ | √ |
| | SGM7G | √ | √ | √ |
| Direct Drive Servomotors | SGM7D | – | √ | √ |
| | SGM7E | √ | √ | √ |
| | SGM7F | √*6 | √ | √ |
| | SGMCV | √ | √ | √ |
| | SGMCS | √*5 | √*2 | √*1 |
| Linear Servomotors | SGLGW (SGLGM) *3 | √ | √*1 | √*1 |
| | SGLFW2 (SGLFM2) *3 | √ | √ | √ |
| | SGLFW (SGLFM) *3 | √ | √*1 | √*1 |
| | SGLTW (SGLTM) *3 | √ | √*1 | √*1 |

*1. Estimates are provided for RoHS-compliant products. The model numbers have an "-E" suffix.
*2. CE Marking certification has not yet been received for SGMCS-□□M and SGMCS-□□N Direct Drive Servomotors.
CE Marking certification has been received for the following Direct Drive Servomotors: SGMCS-□□B, SGMCS-□□C, SGMCS-□□D, and SGMCS-□□E.
Contact your YASKAWA representative if the CE Marking label is required.
*3. The model numbers of the Magnetic Ways of Linear Servomotors are given in parentheses.
*4. CE Marking certification has been received. Contact your YASKAWA representative if the CE Marking label is required.
*5. UL Marking certification has been received for all SGMCS models with the exception of SGMCS-□□M and SGMCS-□□N.
*6. UL Marking certification has been received for all SGM7F models with the exception of SGM7F-□□M and SGM7F-□□N.

# Details of Warranty

## Warranty Period

The warranty period for a product that was purchased (hereinafter called the “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the YASKAWA factory, whichever is sooner.

## Warranty Scope

YASKAWA shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period.
This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.
This warranty does not cover failures that result from any of the following causes.

- Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by YASKAWA
- Use of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from YASKAWA
- Events for which YASKAWA is not responsible, such as natural or human-made disasters

## Limitations of Liability

- YASKAWA shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
- YASKAWA shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
- The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
- YASKAWA shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

## Suitability for Use

- It is the customer’s responsibility to confirm conformity with any standards, codes, or regulations that apply if the YASKAWA product is used in combination with any other products.
- The customer must confirm that the YASKAWA product is suitable for the systems, machines, and equipment used by the customer.
- Consult with YASKAWA to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
- Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
- Systems, machines, and equipment that may present a risk to life or property
- Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
- Other systems that require a similar high degree of safety

- Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the YASKAWA product is properly rated and installed.
- The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
- Read and understand all use prohibitions and precautions, and operate the YASKAWA product correctly to prevent accidental harm to third parties.

## Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your YASKAWA representative to confirm the actual specifications before purchasing a product.

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