

## Advanced Safety Module for Sigma-7 SERVOPACK SGD7S-□□□DA0□8□□F91, 400 V Product Note on Application Limitation

Model: SGD7S-OSB01A  
SGD7S-OSB02A

To properly use the product, read this document thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this document.



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# 1 Scope

This document informs about application restriction of the two ASM7 safety modules SGD7S-OSB01A and SGD7S-OSB02A. This restriction applies to firmware version **0007** which can be verified by the window product information of SigmaWin+.

Example for SGD7S-OSB02A:

Safety Option Module	Model/Type	Serial Number	Manufacturing Date	SW Ver.	Remarks
Option Module	SGD7S-OSB02A	D0218P753510008	2021.08	0007	Specification] : Standard

The following notes are intended to describe the issue, the restriction in use, and under which conditions it may occur (risk).

# 2 Issue

The issue affects all applications that use the SLP (Safely Limited Position) and SCA (Safe Cam) safety functions in combination with *Encoder Type* "Absolute" and *Motor Encoder Usage* "Absolute Multi-Turn". SLP and SCA safety functions itself are working correctly.

However, after performing **SHP** (Safe Home Position) followed by **power off/on** the calculation of the actual position at power-up can cause following issue:

The safe homing position is shifted in case of failure. In this case, the configured **safe position limits** applied with SLP and SCA may be exceeded.

All *Motor Encoder Usage* settings of "Absolute Single-Turn" or "Incremental" are **not** affected. With one of these settings, it does not matter if *Encoder Type* "Absolute" or "Incremental" is used.

# 3 Resulting Impacts and Risks

The following table provides an overview of the effects and risks depending on the system configuration:

Encoder Type <sup>1</sup>	Motor Encoder Usage <sup>1</sup>	Affected Safety Functions	Parameter Setting Motor Direction Pn000	Multi-Turn Limit <sup>1</sup> Pn205	Monitor Value Absolute Encoder Multiturn during SHP	Impact	Risk
Incremental (F) <sup>2</sup>	Incremental	none	n/a	n/a	n/a	No impact	No risk
	Absolute Single-Turn	none	n/a	n/a	n/a	No impact	No risk
Absolute (7) <sup>2</sup>	Incremental	none	n/a	n/a	n/a	No impact	No risk
	Absolute Single-Turn	none	n/a	n/a	n/a	No impact	No risk
	Absolute Multi-Turn	SLP, SCA	CCW (forward)	65535 (default)	≥ 0 (positive) To be detected as described in chapter 4	No impact	No risk if the instructions in chapter 4 are followed
			CCW (forward)	65535 (default)	< 0 (negative) To be detected as described in chapter 4	The configured safety limit will be skipped -> Machine may move outside the safety limits	Safety relevant risk To be detected as described in chapter 4
			CW (reverse)	65535 (default)	n/a	The configured safety limit will be skipped -> Machine may move outside the safety limits	Safety relevant risk Do not use! This configuration is not allowed to use!
n/a			0 - 65534	n/a	The configured safety limit will be skipped -> Machine may move outside the safety limits	Safety relevant risk Do not use! This configuration is not allowed to use!	

Notes:

<sup>1</sup> *Encoder Type*, *Motor Encoder Usage* and *Multi-Turn Limit* are settings to be made in the Safety Module Parameter Editor in Parameter Group "Motor and Encoder Parameters".

<sup>2</sup> Ordering option "F" is the motor designation for motors with incremental encoder; ordering option "7" for motors with absolute encoder.



Example Slot 1 Parameters: Safe Home Position (SHP)

Slot 1 Parameters

- Safety Function: SHP
- Activation Input: Safe Port A: Digital Input
- Data Input: Safe Port B: Digital Input
- Output Signal Type: None
- Output Signal Behaviour: None

Rotary Application

Motor Encoder, Zero Position, Offset to Home, Home Position, External Encoder, Cam, To Safety Module

Activation Input (SHP), Data Input (Safe Homing Switch), SHP Status, Home Position

Safety Function Parameters

Waiting Time t1 (ms): 50	Speed Limit s1 (rpm): 0	Distance Limit p1 (degree): 0	Torque Limit tq1 (-): 0
Monitoring Time t2 (ms): 0	Speed Limit s2 (rpm): 0	Distance Limit p2 (degree): 0	Temperature Limit tp1 (-): 0
Safe Homing Position (SHP) Position Difference (deg.): 1	Offset to Home (degree): 0	Acceleration Limit a1 (rpm/s): 0	Distance Limit p3 (degree): 0
			Temperature Limit tp2 (-): 0

Offset to Home must be 0.

- (1) If the value of *Offset to Home* is “not equal to 0” there is a risk of failure and the **SLP** and **SCA** functions are **not allowed to use!**
- (2) If the value of *Offset to Home* is “0” the distance limits must be **checked by test** for all configured safety functions of SLP and SCA. Please open and check all *Parameter Groups* “Slot n Parameter” in which safety function SLP or SCA is configured.

On the next pages, examples for safety functions SLP and SCA are shown.

Example Slot 2 Parameters: Safely Limited Position (SLP)

**Slot 2 Parameters**

**Safety Function**  
 SLP i

**Activation Input**  
 Safe Port C: Digital Input i

**Data Input**  
 None i

**Output Signal Type**  
 Port D1: EDM Output i

**Output Signal Behaviour**  
 HIGH after limit violation i

**Safety Function Parameters**

Waiting Time t1 (ms) <input type="text" value="100"/> <span style="float: right;">i</span>	Speed Limit s1 (rpm) <input type="text" value="0"/> <span style="float: right;">i</span>	Distance Limit p1 (degree) <input style="border: 2px solid red;" type="text" value="270"/> <span style="float: right;">i</span>	Torque Limit tq1 (-) <input type="text" value="0"/> <span style="float: right;">i</span>
Monitoring Time t2 (ms) <input type="text" value="0"/> <span style="float: right;">i</span>	Speed Limit s2 (rpm) <input type="text" value="0"/> <span style="float: right;">i</span>	Distance Limit p2 (degree) <input style="border: 2px solid red;" type="text" value="90"/> <span style="float: right;">i</span>	Temperature Limit tp1 (-) <input type="text" value="0"/> <span style="float: right;">i</span>
Safe Homing Position (SHP) Position Difference (deg.) <input type="text"/> Offset to Home (degree) <input type="text"/> <span style="float: right;">i</span>		Acceleration Limit a1 (rpm/s) <input type="text" value="0"/> <span style="float: right;">i</span>	Distance Limit p3 (degree) <input type="text" value="0"/> <span style="float: right;">i</span>
		Temperature Limit tp2 (-) <input type="text" value="0"/> <span style="float: right;">i</span>	

Upper Distance Limit must be < 11.796.120 deg

Lower Distance Limit must be > -11.796.480 deg

The allowed range for the *Distance Limits* ( $p1$ ,  $p2$ ) is “-32768 to 32767” motor revolutions, i.e. range is “-11796480 to 11796120” degree.

Example Slot 3 Parameters: Safe Cam (SCA)

**Slot 3 Parameters**

**Safety Function**  
SCA i

**Activation Input**  
Virtual Input 0 i

**Data Input**  
None i

**Output Signal Type**  
Virtual Output 1 i

**Output Signal Behaviour**  
HIGH after limit violation i

Please note that this function does not activate a stopping method after a limit violation.

**Safety Function Parameters**

Waiting Time t1 (ms) <input type="text" value="0"/> <span style="float: right;">i</span>	Speed Limit s1 (degree/s) <input type="text" value="0"/> <span style="float: right;">i</span>	Distance Limit p1 (degree) <input style="border: 2px solid red;" type="text" value="360"/> <span style="float: right;">i</span>	Torque Limit tq1 (-) <input type="text" value="0"/> <span style="float: right;">i</span>
Monitoring Time t2 (ms) <input type="text" value="0"/> <span style="float: right;">i</span>	Speed Limit s2 (degree/s) <input type="text" value="0"/> <span style="float: right;">i</span>	Distance Limit p2 (degree) <input style="border: 2px solid red;" type="text" value="-360"/> <span style="float: right;">i</span>	Temperature Limit tp1 (-) <input type="text" value="0"/> <span style="float: right;">i</span>
Safe Homing Position (SHP) Position Difference (deg.) <input type="text"/> Offset to Home (degree) <input type="text"/> <span style="float: right;">i</span>	Acceleration Limit a1 (deg/s <sup>2</sup> ) <input type="text" value="0"/> <span style="float: right;">i</span>	Distance Limit p3 (degree) <input type="text" value="30"/> <span style="float: right;">i</span>	Temperature Limit tp2 (-) <input type="text" value="0"/> <span style="float: right;">i</span>

Upper Distance Limit must be < 11.796.120 deg      Lower Distance Limit must be > -11.796.480 deg

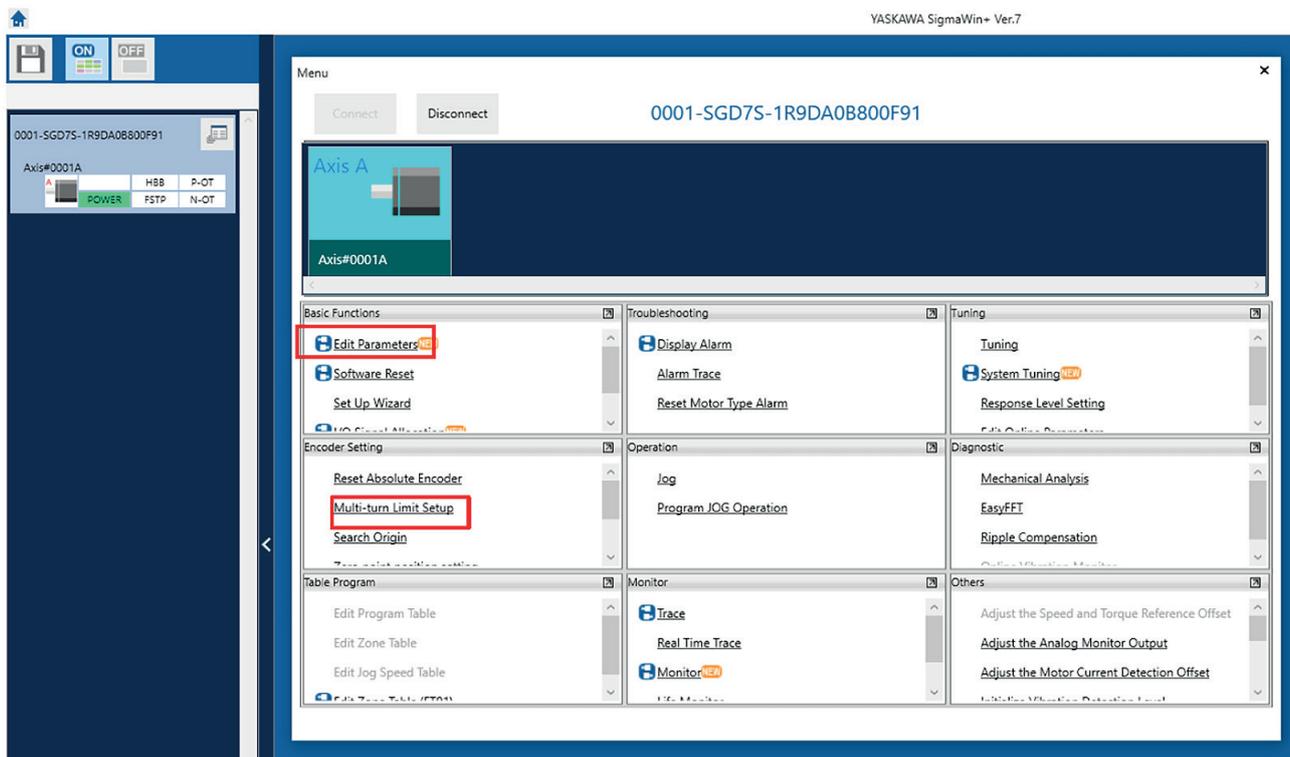
The allowed range for the *Distance Limits* ( $p1$ ,  $p2$ ) is “-32768 to 32767” motor revolutions, i.e. range is “-11796480 to 11796120” degree.

**Continue with chapter 4.2**

## 4.2 SigmaWin+ Settings

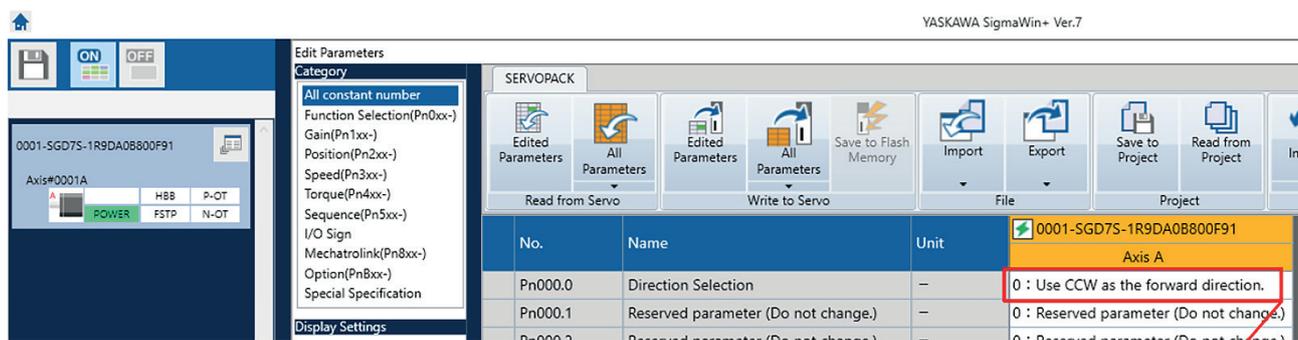
Please check the configuration in the SERVOPACK of the relevant axis which uses one of the safety functions SCA or SLP in combination with Absolute Multi-Turn Encoder.

Open SigmaWin+ (V7.4 or higher) and check the items *Edit Parameters* and *Multi-turn Limit Setup*.



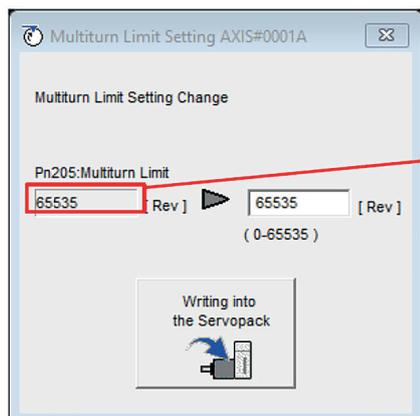
### Edit Parameters

Direction Selection: CCW



### Multi-turn Limit Setup

Value check

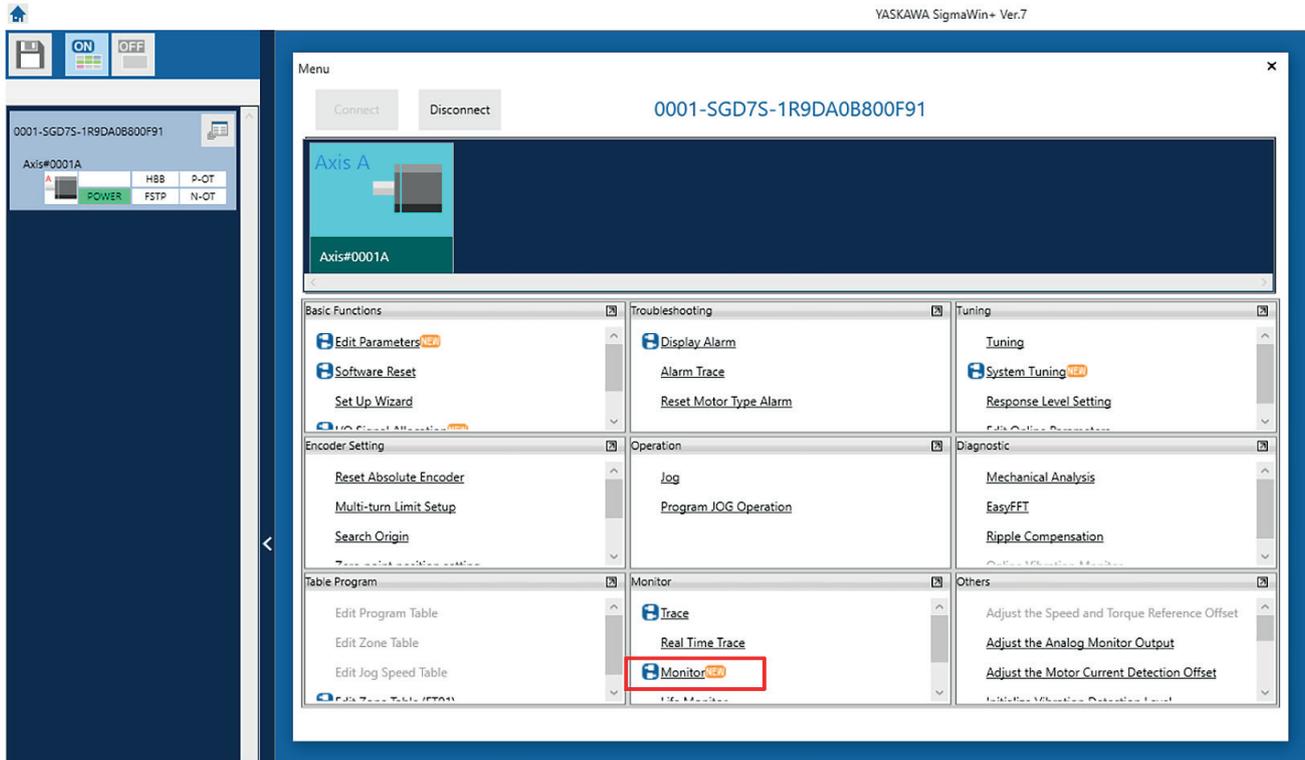


Multi-Turn Limit value must be 65535

Direction Selection must be set to CCW forward direction

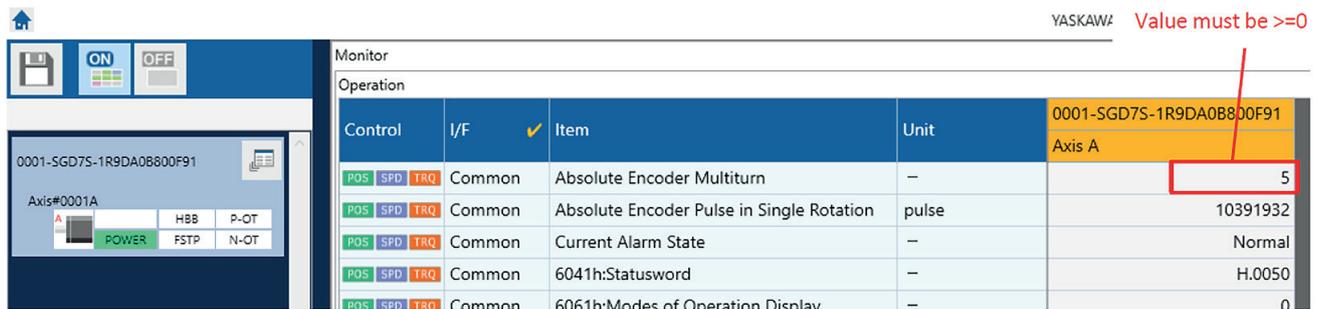
### 4.3 Homing Procedure SHP Check

This verification must be done after every machine homing just before starting the SHP safe homing procedure. Open the *Monitor* menu function.



#### Monitor

Watch the Item *Absolute Encoder Multiturn*.



- (1) If the value of *Absolute Encoder Multiturn* is negative there is a risk of failure and the **SLP** and **SCA** functions are **not allowed to use!**
- (2) If the value of *Absolute Encoder Multiturn* is positive ( $\geq 0$ ) start the SHP function.
- (3) If **all** conditions are fulfilled **for all relevant axes** you can run the machine.

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