Application note

SLIO Safety test pulse suppression at STO input of Yaskawa servo amplifiers
Topic

System SLIO Safety 022-1SDx0, Yaskawa Servo Sigma-V, -7, -X
Affected products

Application note
Document type

Introduction

With the System SLIO safety output modules, each output is continuously checked by means of a test pulse as soon as it has the output status "1" to see whether it can still be switched off. Wiring faults are detected, e.g. short circuit to DC 24V or to signal lines nearby. The *test pulse length* must be set depending on the cable capacitance and the load current as specified in the operating manual of the System SLIO safety output module.

Currently, when using the System SLIO safety output modules on STO inputs of Yaskawa servo amplifiers, unintentional STO triggers occur, causing the drive to de-energize the motor. The reason for this is the large test pulse length for this low load current in the System SLIO safety output module, which cannot be filtered for the STO inputs of the Yaskawa servo amplifier.

We therefore recommend to use an external filter block to filter the test pulse for the STO inputs of a Yaskawa servo amplifiers.

Using filter terminal block from PHOENIX CONTACT

Filter terminal block PSR-FTB/1.5/11.5 - 2904476

To filter test pulses, connect the output signal DO x of your System SLIO Safety module to the *'IN'* input. The filtered signal is obtained on terminal *'OUT2'*, which should be connected to the servo amplifier STO input.

> ⚠️ **DANGER**
>
> **Danger to life due to electric shock!**
>
> Never work when voltage is applied!

Mounting and connection

1. Mount a filter terminal block on your DIN rail for each STO input. Please observe the following maximum cable lengths:
   - Distance between safety module and filter terminal block: < 100m
   - Distance between filter terminal block and servo amplifier: < 1000m

2. If you haven't already done so, remove the jumper on the front of the filter terminal blocks.
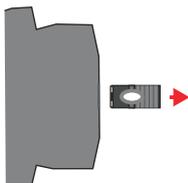
   ➡ The filter capacitance is now 1.5µF.

3. For two-channel operation, wire the filter terminal blocks as follows:
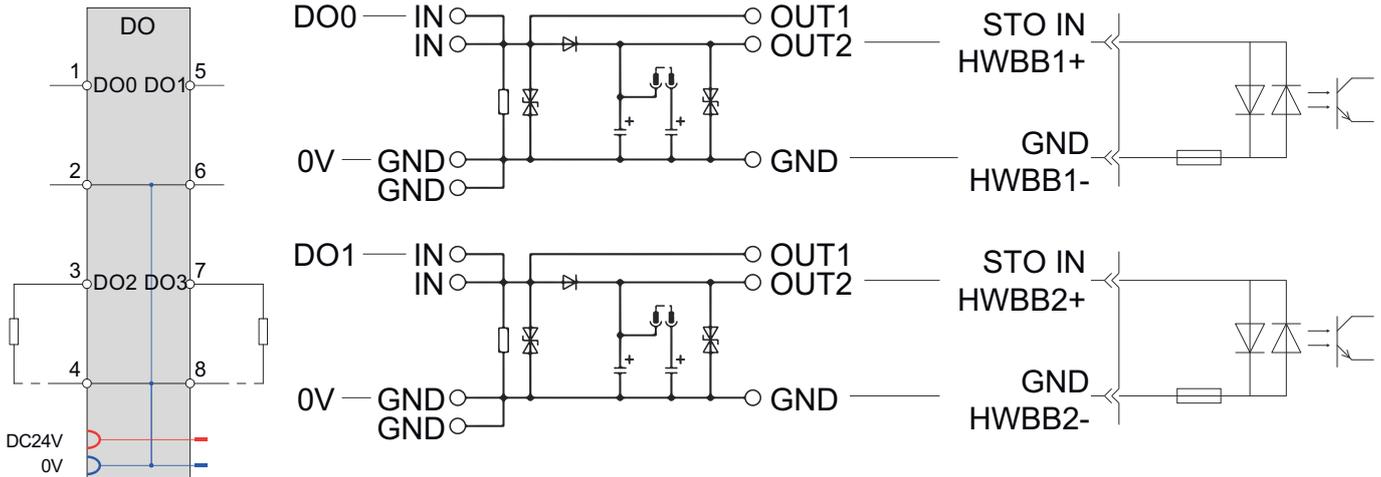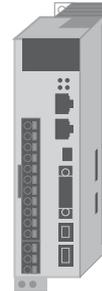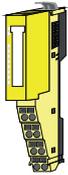
4. ▶ Parametrize a *test pulse length* of 3ms for your System SLIO Safety module.

> ℹ️ *In case of a single-channel control of the STO function, two filter terminal blocks must still be used. The same DO signal must be connected to the 'IN' inputs of both filter terminal blocks.*

5. ▶ Validate the parameters and transfer your project to your master system.

➡ After startup, the test pulse for the servo amplifier is filtered by the filter terminal blocks without affecting the System SLIO Safety module. This circuit can be used for all STO inputs with a minimum input resistance of 4kΩ, provided their maximum current does not exceed 7mA.

⚠️ **DANGER**

Increased response time!

When assessing the risk and calculating the reaction time, please note that using the filter terminal block increases the reaction time by 20ms!

⚠️ **DANGER**

No diagnosis of the safety semiconductor outputs

Observe the following points in the risk evaluation and take appropriate additional measures during installation:

- No diagnosis regarding short circuit to DC 24V or short circuit to other signal lines is possible between the filter terminal block and servo amplifier!
- The diagnosis remains between the safety semiconductor output and the filter terminal block.
- The correctly connected filter terminal block cannot fail dangerously due to component faults.

ⓘ   − *When carrying out the risk evaluation of the system, please refer to the relevant product manuals for PFD, PFH, and other specifications relevant to the Safe Disable function.*
  − *To facilitate the safety integrity evaluation of machines, a SISTEMA Software Assistant library is available for Yaskawa products. This library includes parameters for safety functions of Yaskawa products, and can be downloaded from the Yaskawa website.*

ⓘ   *The installation of the filter terminal block does not affect either the SIL or the PL, nor does it need to be taken into account for calculating the failure rates (safety relevant parameters) of the overall safety function, since the filter terminal block always fails safely when wired correctly.*