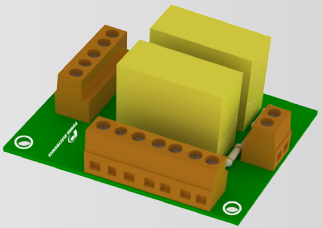
SD 700
Series

ACCESSORIES



Getting Started Manual

Safety Stop Optional Board (STO)

POWER ELECTRONICS®

SD700 Series

ACCESSORIES

Getting Started Manual

Safety Stop Optional Board (STO)

Edition: May 2013

SD70IM06BI Rev. B

SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.

	This symbol means improper operation may results in serious personal injury or death.
	Identifies shock hazards under certain conditions. Particular attention should be given because dangerous voltage may be present. Maintenance operation should be done by qualified personnel.
	Identifies potential hazards under certain conditions. Read the message and follow the instructions carefully.

Edition of May 2013

This publication could present technical imprecision or misprints. The information here included will be periodically modified and updated, and all those modifications will be incorporated in later editions.
To consult the most updated information of this product you might access through our website www.power-electronics.com where the latest version of this manual can be downloaded.

Revisions

Date	Revision	Description
21 / 12 / 2012	A	First edition
03 / 05 / 2013	B	Figure updating

INDEX

ENGLISH

SAFETY INSTRUCTIONS

IMPORTANT!

- Safety instructions showed in this manual are useful to teach user how to use the product in a correct and safety way with the purpose of preventing possible personal injuries or property damages.
- Safety messages included here are classified as it follows:

WARNING

Be sure to take ESD (Electrostatic Discharge) protection measures when you touch the board.
Otherwise, the optional board may get damaged due to static charges.

Implement wiring change on the optional board after checking that the power supply is off.
Otherwise, there is a danger of connecting error and damage to the board.

Be sure to connect correctly the optional board to the drive.
Otherwise, there is a danger of connecting error and damage to the board.

Do not remove the cover while the power is applied or the unit is in operation.
Otherwise, electric shock could occur.

Do not run the drive with the front cover removed.
Otherwise, you may get an electric shock due to the high voltage terminals or exposure of charged capacitors.

Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.
Otherwise, you may access the charged circuits and get an electric shock.

Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power and after checking the DC Link voltage is discharged with a meter (below 30VDC).
Otherwise, you may get an electric shock.

Operate the switches with dry hands.
Otherwise, you may get an electric shock.

Do not use cables with damaged insulation.
Otherwise, you may get an electric shock.

Do not subject the cables to the abrasions, excessive stress, heavy loads or pinching.
Otherwise, you may get an electric shock.

CAUTION

Install the drive on a non-flammable surface. Do not place flammable material nearby.
Otherwise, fire could occur.

Disconnect the input power if the drive gets damaged.
Otherwise, it could result in a secondary accident or fire.

After the input power is applied or removed, the drive will remain hot for a couple of minutes.
Touching hot parts may result in skin burns.

Do not apply power to a damaged drive or to a drive with parts missing even if the installation is complete.
Otherwise, fire or accident could occur.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the drive.
Otherwise, fire or accident could occur.

WARNINGS

RECEPTION

- Material of Power Electronics is carefully tested and perfectly packed before leaving the factory.
- In the event of transport damage, please ensure that you notify the transport agency and POWER ELECTRONICS: 902 40 20 70 (International +34 96 136 65 57) or your nearest agent, within 24hrs from receipt of the goods.

UNPACKING

- Make sure received merchandise corresponds with delivery note, models and serial numbers.
- Each optional board is supplied with a technical manual.

RECYCLING

- The packing of the drives must be recycled. For this reason it is necessary to separate different materials (plastics, paper, cardboard, wood …) and settle them in corresponding containers.
- The residual parts of electrical devices must be collected in a selective manner in order to warranty the correct environmental treatment.

CONNECTION PRECAUTIONS

- To ensure correct operation of the inverter it is recommended to use a SCREENED CABLE for the control wiring.
- For EMERGENCY STOP, make sure supply circuitry is open.
- Do not disconnect motor cables if input power supply remains connected. The internal circuits of the SD700 Series will be damaged if the incoming power is connected and applied to output terminals (U, V, W).
- It is not recommended to use a 3-wire cable for long distances. Due to increased leakage capacitance between conductors, over-current protective feature may operate malfunction.

- Do not use power factor correction capacitors, surge suppressors, or RFI filters on the output side of the inverter. Doing so may damage these components.
- Always check whether the DC Link LED is OFF before wiring terminals. The charge capacitors may hold high-voltage even after the input power is disconnected. Use caution to prevent the possibility of personal injury.

EARTH CONNECTION

- The inverter is a high frequency switching device, and leakage current may flow. Ground the inverter to avoid electrical shock. Use caution to prevent the possibility of personal injury.
- Connect only to the dedicated ground terminal of the inverter. Do not use the case or the chassis screw for grounding.
- When installing, grounding wire should be connected first and removed last.
- The earth cable must have a minimal cross sectional area that meets local country electrical regulations.
- Motor ground must be connected to the drive ground terminal and not to the installation's ground. We recommend that the section of the ground connection cable should be equal or higher than the active conductor.
- Installation ground must be connected to the drive ground terminal.

1. INTRODUCTION

This document is a mounting guide of the STO board (Safe torque off) implemented on SD700 drives of Power Electronics.

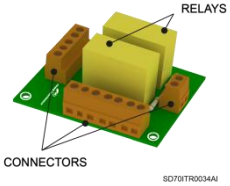


Figure 1.1 Board STO

The STO function is defined as follows:

Power, that can cause rotation, is not applied to the motor. The frequency will not provide energy to the motor, which can generate torque.

For three-phase asynchronous motor, that means to stop supplying alternating tree-phase power to the stator.

This function corresponds with an Emergency Stop Category 0 according to IEC 60204-1. When the drive is running and the STO function is applied, the motor will freely stop by its own inertia.

Based on the study of each application and a risk assessment, the designer should define the safety function required and each safety level. The STO safety has been certified by Tüv Rheiland according to IEC/EN 61800-5-2.

The SD700's STO optional board permits to achieve two Safety Levels for the STO function. To achieve the safety integrity level SIL3 (PLe),in addition to the STO kit, the use of an external SELV/PELV 24 V_{DC} source, emergency push button, and a safety relay SIL3 certified with feedback is needed. To achieve the safety integrity level SIL1 (PLe), the use of a safety relay SIL3 certified with feedback is not needed

2. TECHNICAL CHARACTERISTICS

2.1. Compatible Boards

In order to install the STO Kit, it is compulsory that the PCB version of the installed Power board would be:

- C0162E for frame 1 and 2
- C0148F for frame 3
- C0028N for the others

Furthermore, it must be verify that the installed power board allows the STO assembly. The power board has to mount the J804-J805 connector with 5 pins. In case that this connector is not available at the power board, it is necessary to update the power board version compatible with the model.

2.2. Packing list

The STO Kit is delivered with the following content:

- 1 x STO board
- 4 x stand-off
- 4 x screw
- 4 x nut
- 5 x connection wire
- 1 x Technical Manual

3. INSTALLATION AND CONNECTION

3.1. Installation

The STO board is designed for the SD700 series. It is directly located on the control board.

Install the STO board according to the mounting image.

CAUTION

Motor controllers of Power Electronics operate with AC and DC high voltage.

Make sure the power supply has been disconnected guarantee that DC Link voltage is discharged, before installing the STO board. Otherwise, you may get personal injuries or an accident could occur.

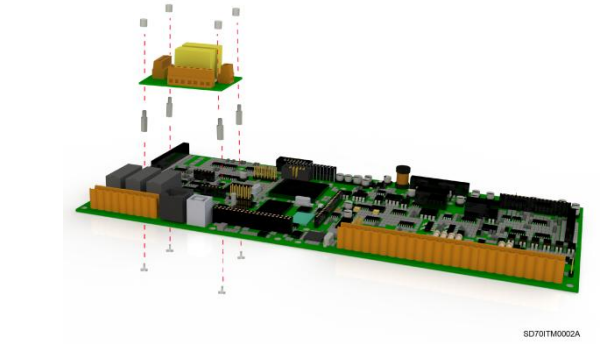


Figure 3.1 Installation of Optional STO Board on the Control board

Make sure that the stand-offs are mounted properly on the control board.

Then the STO board is mounted on the stand-offs. The correct setting of the card on the stand-offs must be ensured.

3.2. Connectors description

The following figure describes board connectors.

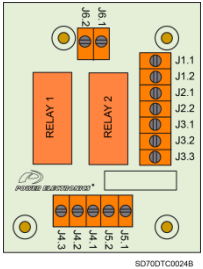


Figure 3.2 Location of connectors on the STO board

It is recommended to use double-shielded twisted pair cable for external 24V_{DC} and safety channels.

CON.	Terminal	Description
J1	J1.1 (STO O1)	STO Output channel 1
	J1.2 (STO O2)	STO Output channel 2
J2	J2.1 (GND)	Ground
	J2.2 (STO I1)	STO Input channel 1
J3	J3.1 (STO I2)	STO Input channel 2
	J3.2 (FB1)	Feedback 1 contact
	J3.3 (FB2)	Feedback 2 contact
J6	J6.1 (+24Vdc)	24V_{DC} power supply (24 V_{DC}, Max:2W)
	J6.2 (GND)	0 V_{DC} power supply

CAUTION

To ensure a correct drive response when a fault occurs, J3.1 terminal must be connected to the digital input 5 of the SD700, previously set as external fault (G4.1.9 option 24 EXTERN EMERGE).

3.3. Connection

The wiring will be connected between the power board and the STO board.

- Tree conductors between the J4 terminal (STO board) and J804 terminal (Power board).
- Two conductors between the J5 terminal (STO board) and J805 terminal (Power board).

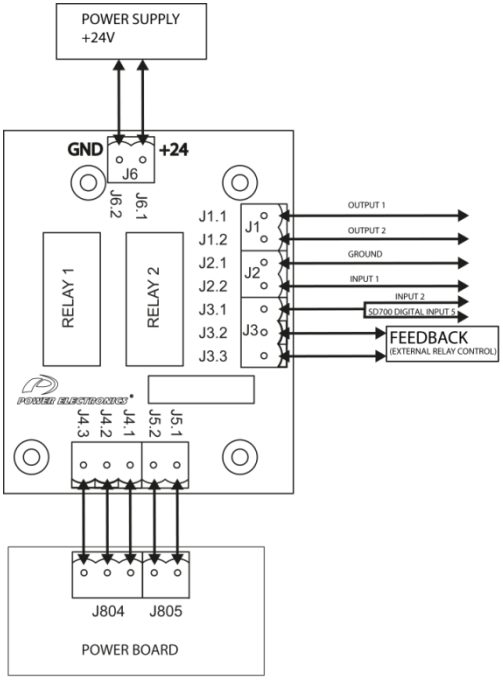


Figure 3.3 STO Board Connections

REMARKS:

- It is imperative that connectors of power supply +24V are properly connected. Do not reverse the polarity.
- The connection between STO board and Power board is the same for the two safety levels.
- In the case of safety level SIL3, J3.2 and J3.3 terminals are connected to the external relay. In the other case (SIL1), it does not happen.
- In the case of safety level SIL3, outputs and inputs of the two STO channels are connected to the external relay, which is the one in charge of activate the emergency push button. In the other case (SIL1), they are directly connected to the emergency push button.
- In the case of safety level SIL3, an external $24V_{DC}$ source feeds the power supply +24V.In the other case (SIL1) we can use the power supply +24V of the Power board.
- To ensure a correct drive response when a fault occurs, J3.1 terminal must be connected to the digital input 5 of the SD700, previously set as external fault (G4.1.9 option 24 EXTERN EMERGE).

The following examples show connections for different safety levels. See the Hardware and Installation Manual of SD700 for more connection details.

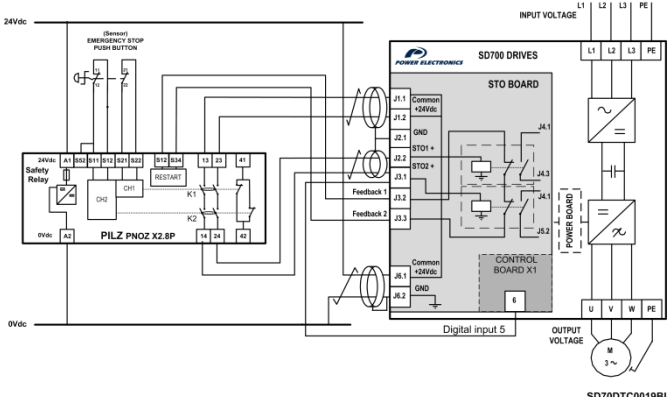


Figure 3.4 Safety Level SIL3 scheme

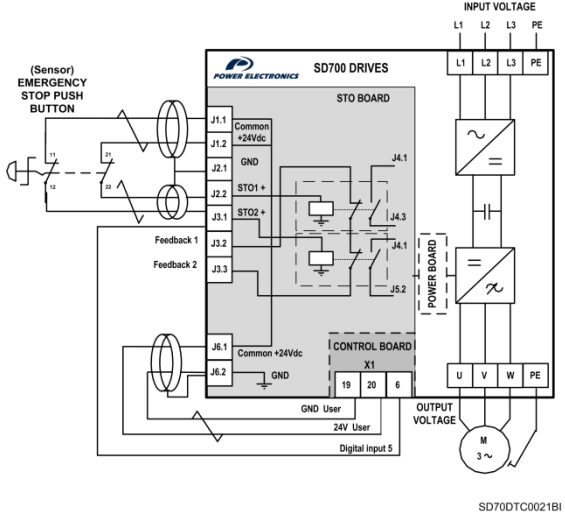


Figure 3.5 Safety level SIL1 scheme

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