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PSS 3075-3 Series

Programmable control systems PSS®

pilz

Operating Manual – Item No. 21 071-10

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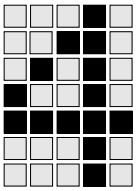
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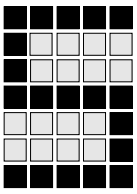
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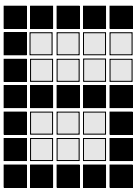
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Introduction

This operating manual explains the function and operation of the programmable safety system, describes the installation and provides guidelines on how to connect the digital inputs, digital outputs and test pulse outputs on programmable safety systems from the PSS 3075-3 series. A PSS in the PSS SB 3075-3 series is a 3rd generation programmable safety system.

Depending on the unit type, an interface is available for connection to the safety-related bus system SafetyBUS p. The SafetyBUS p interface is described in this manual.

Different interfaces are available for connection to various non-safety-related standard bus systems, depending on the unit type. These interfaces are described in separate operating manuals.
The necessary operating manuals are supplied with the relevant unit types.

Please refer to the PSS-range manuals, in particular the information and requirements stated in the “PSS-Range Safety Manual”, “FS System Description”, “ST System Description” and also the “SafetyBUS p Installation Manual” from the Safety BUS p manual package.

You will need to be conversant with the information in these manuals in order to fully understand this manual.

This documentation is intended for instruction and should be retained for future reference.

Introduction

Validity of documentation

This documentation is valid for the following programmable safety systems from the PSS 3075-3 series:

- PSS 3075-3 from Version 1.0
- PSS 3075-3 DP-S from Version 1.0
- PSS 3075-3 NR from Version 1.0
- PSS SB 3075-3 from Version 1.0
- PSS SB 3075-3 CANopen from Version 3.0
- PSS SB 3075-3 DP-S from Version 1.0
- PSS SB 3075-3 ETH-2 from Version 1.0
- PSS SB 3075-3 ETH-2 CANopen from Version 1.0
- PSS SB 3075-3 ETH-2 SE from Version 1.0

It is valid until new documentation is published. The latest documentation is always enclosed with the unit.

Overview of documentation

1 Introduction
The introduction is designed to familiarise you with the contents, structure and specific order of this manual.

2 Overview
This chapter provides information on the most important features of the programmable safety systems.

3 Safety
This chapter **must** be **read** as it contains important information on safety regulations and intended use.

4 Function Description
This chapter describes the individual components of the programmable safety systems: CPU, inputs, outputs and test pulse outputs.

5 Installation
This chapter explains how to install the programmable safety systems.

6 Supply Voltage

This chapter explains what you need to consider when connecting the supply voltage.

7 Wiring the Inputs and Outputs
This chapter describes the safety-related wiring of the inputs, outputs and test pulse outputs.

8 Interfaces
This chapter describes the configuration of the available interfaces.

9 Operation and Maintenance
This chapter explains how to commission the safety systems and advises on what to do if a fault occurs.

10 Technical Details

11 Appendix

Introduction

Definition of symbols

Information in this manual that is of particular importance can be identified as follows:



DANGER!

This warning must be heeded! It warns of a **hazardous situation that poses an immediate threat of serious injury and death** and indicates preventive measures that can be taken.



WARNING!

This warning must be heeded! It warns of a **hazardous situation that could lead to serious injury and death** and indicates preventive measures that can be taken.



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



NOTICE
This describes a situation in which the unit(s) could be damaged and also provides information on preventive measures that can be taken.



INFORMATION
This gives advice on applications and provides information on special features, as well as highlighting areas within the text that are of particular importance.

Overview

A PSS from the PSS 3075-3 series is a complete programmable safety system in a single unit.
The device descriptions provide information on their function.
The description are made up of combinations of letters and numbers.

- The **PSS 3075-3** contains:
  - Power supply
  - CPU
  - 48 digital inputs, 6 of which are alarm inputs
  - 18 single-pole outputs, 4 of which are test pulse outputs
  - 9 dual-pole outputs
  - Programming device interface (combined RS 232/RS 485 interface)
  - User interface (combined RS 232/RS 485 interface)
- In addition to the features on the PSS 3075-3, the **PSS SB 3075-3** contains:
  - SafetyBUS p-interface

Additional functions

- DP-S
  Interface for connection to PROFIBUS-DP
- ETH-2
  Interface for connection to Ethernet
- CANopen
  Interface for connection to CANopen
- SE
  The name "SE“ can be found only on the type label of the PSS (e. g. PSS SB 3075-3 ETH-2 SE). It is a PSS that is identical to the corresponding serial device (e. g. PSS SB 3075-3 ETH-2). The PSS however is intended for use with SafetyEYE and therefore delivered with a preinstalled user program.
- NR
  Safety system without battery
  Operation without a battery results in the following restrictions:
  - FS section: Remanant data blocks cannot be used.
  - ST section: A general reset is performed each time the section switches from STOP-RUN.
  - Each time the PSS is restarted (voltage switched off and then on again), the system time is reset to zero.

Overview

Example:
PSS SB 3075-3 ETH-2
Safety systems PSS 3075-3 with SafetyBUS p- and Ethernet interface.

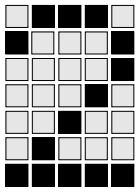
The digital inputs can be used for local emergency stop monitoring, for example. They are suitable for connecting single or dual-channel input devices, with or without test pulses. The test pulse outputs are suitable for testing input devices.
The single or dual-pole outputs can be used to drive valves, for example.

SafetyBUS p enables you to establish a safe decentralised network of several programmable safety systems and/or to connect decentralised modules. The PSS can perform the function of a Management, Logic or Input/Output Device on SafetyBUS p.

For non-safety-related applications, the PSS can be connected to various standard bus systems (e.g. PROFIBUS-DP). The bus interfaces that are available will depend on the unit type.

INFORMATION

- The standard bus interfaces are described in separate operating manuals. The necessary operating manuals are supplied with the relevant unit types.
- Drivers (standard function blocks) from the corresponding Pilz software package will be required in order to connect to the various standard bus systems.



Notes

Overview

Front views

PSS 3075-3, PSS 3075-3 NR

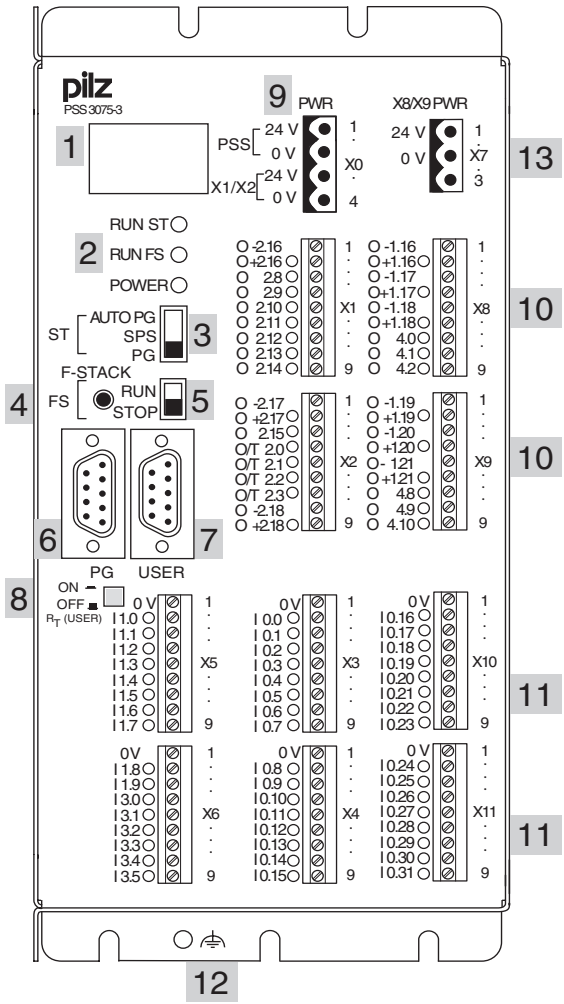


Fig. 2-1: Front view of PSS 3075-3

Key:

1: 4-digit display
2: LEDs for PSS operating mode and supply voltage
3: 3-position switch for selecting the standard section's operating mode
4: Button for scrolling the error stack
5: 2-position switch for selecting the failsafe section's operating mode
6: Programming device interface
RS 232 (minimum configuration: TxD, RxD, GND)/RS 485
7: User interface
RS 232/RS 485
8: Pushbutton for switching on and off the RS 485 termination on the user interface
9: Supply voltage connection (24 VDC) for internal supply of the safety system and the outputs at X1, X2
10: Digital outputs and test pulse outputs
11: Digital inputs
12: Functional earth connection
13: Supply voltage connection (24 VDC) for outputs at X8, X9

Overview

PSS 3075-3 DP-S

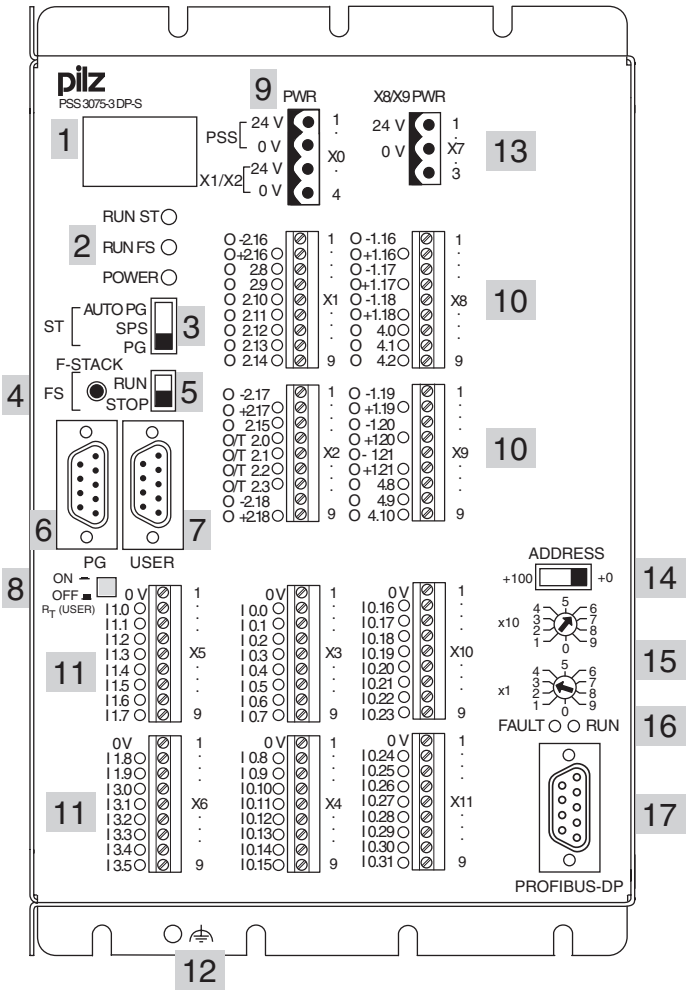


Fig. 2-2: Front view of PSS 3075-3 DP-S

Key:

1: 4-digit display
2: LEDs for PSS operating mode and supply voltage
3: 3-position switch for selecting the standard section's operating mode
4: Button for scrolling the error stack
5: 2-position switch for selecting the failsafe section's operating mode
6: Programming device interface
RS 232 (minimum configuration: TxD, RxD, GND)/RS 485
7: User interface
RS 232/RS 485
8: Pushbutton for switching on and off the RS 485 termination on the user interface
9: Supply voltage connection (24 VDC) for internal supply of the safety system and the outputs at X1, X2
10: Digital outputs and test pulse outputs
11: Digital inputs
12: Functional earth connection
13: Supply voltage connection (24 VDC) for outputs at X8, X9
14: 2-position switch for selecting the station address (PROFIBUS-DP)
15: Rotary switch for setting the station address (PROFIBUS-DP)
16: LED for status of PROFIBUS-DP
17: PROFIBUS-DP interface

INFORMATION
Please refer also to the manual: "PROFIBUS-DP for Compact 3rd Generation PSS".

Overview

PSS SB 3075-3

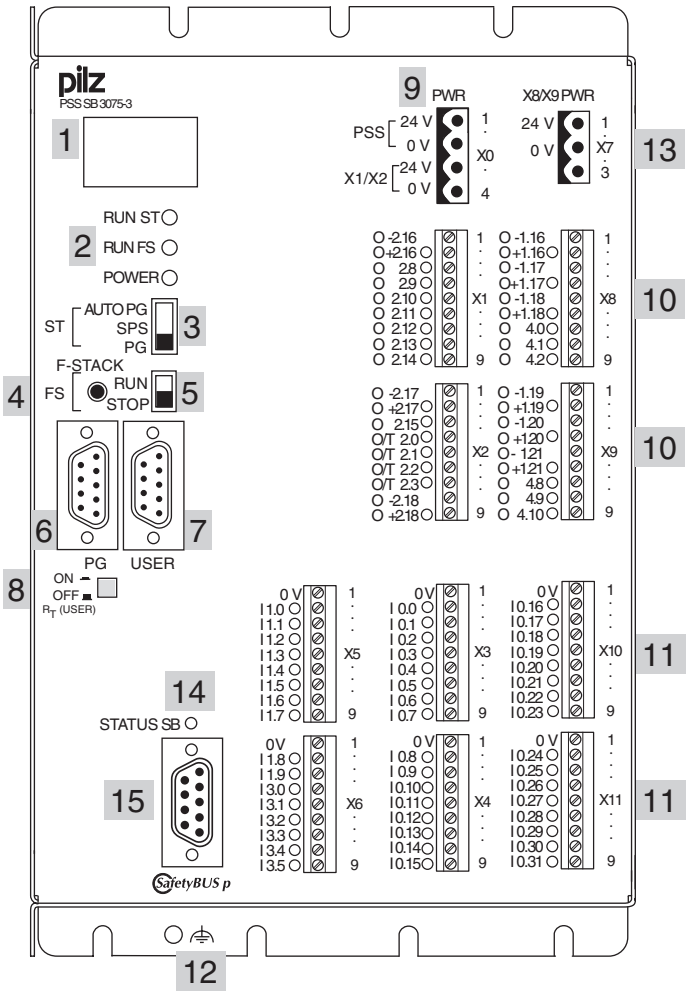


Fig. 2-3: Front view of PSS SB 3075-3

Key:

1: 4-digit display
2: LEDs for PSS operating mode and supply voltage
3: 3-position switch for selecting the standard section's operating mode
4: Button for scrolling the error stack
5: 2-position switch for selecting the failsafe section's operating mode
6: Programming device interface
RS 232 (minimum configuration: TxD, RxD, GND)/RS 485
7: User interface
RS 232/RS 485
8: Pushbutton for switching on and off the RS 485 termination on the user interface
9: Supply voltage connection (24 VDC) for internal supply of the safety system and the outputs at X1, X2
10: Digital outputs and test pulse outputs
11: Digital inputs
12: Functional earth connection
13: Supply voltage connection (24 VDC) for outputs at X8, X9
14: LED for status of SafetyBUS p
15: SafetyBUS p interface

Overview

PSS SB 3075-3 DP-S

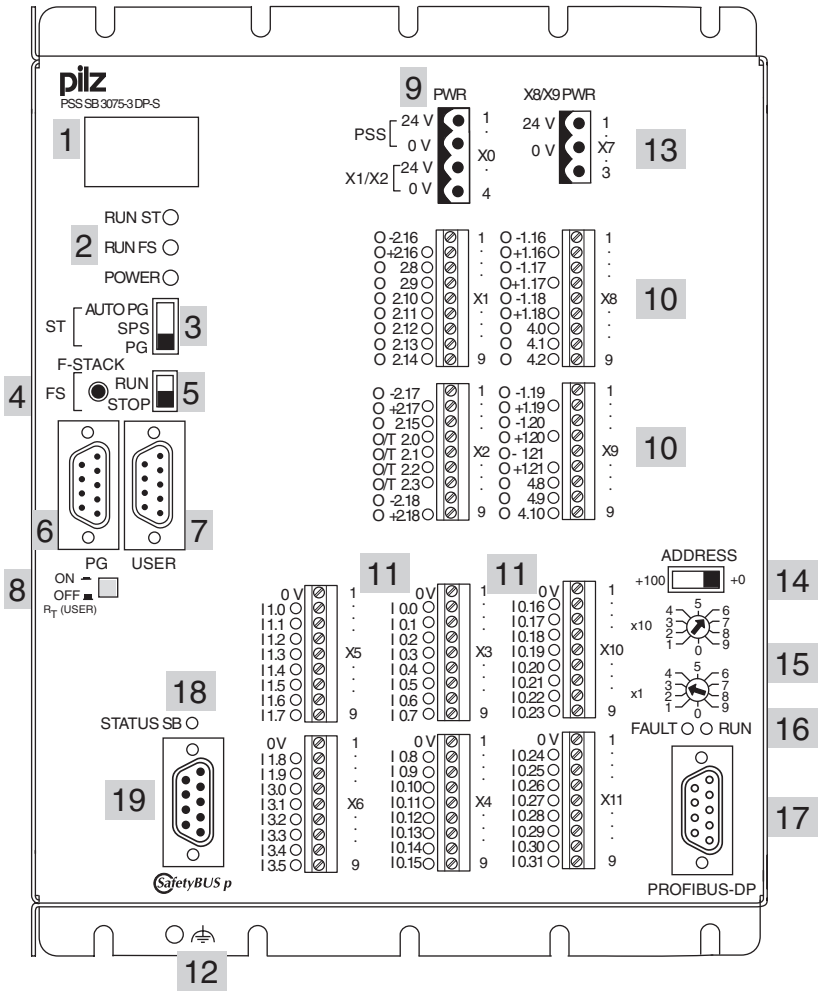


Fig. 2-4: Front view of PSS SB 3075-3 DP-S

Key:

1: 4-digit display
2: LEDs for PSS operating mode and supply voltage
3: 3-position switch for selecting the standard section's operating mode
4: Button for scrolling the error stack
5: 2-position switch for selecting the failsafe section's operating mode
6: Programming device interface
RS 232 (minimum configuration: TxD, RxD, GND)/RS 485
7: User interface
RS 232/RS 485
8: Pushbutton for switching on and off the RS 485 termination on the user interface
9: Supply voltage connection (24 VDC) for internal supply of the safety system and the outputs at X1, X2
10: Digital outputs and test pulse outputs
11: Digital inputs
12: Functional earth connection
13: Supply voltage connection (24 VDC) for outputs at X8, X9
14: 2-position switch for selecting the station address (PROFIBUS-DP)
15: Rotary switch for setting the station address (PROFIBUS-DP)
16: LED for status of PROFIBUS-DP
17: PROFIBUS-DP interface
18: LED for status of SafetyBUS p
19: SafetyBUS p interface

INFORMATION
Please refer also to the manual: "PROFIBUS-DP for Compact 3rd Generation PSS"

Overview

PSS SB 3075-3 ETH-2, PSS SB 3075-3 ETH-2 SE

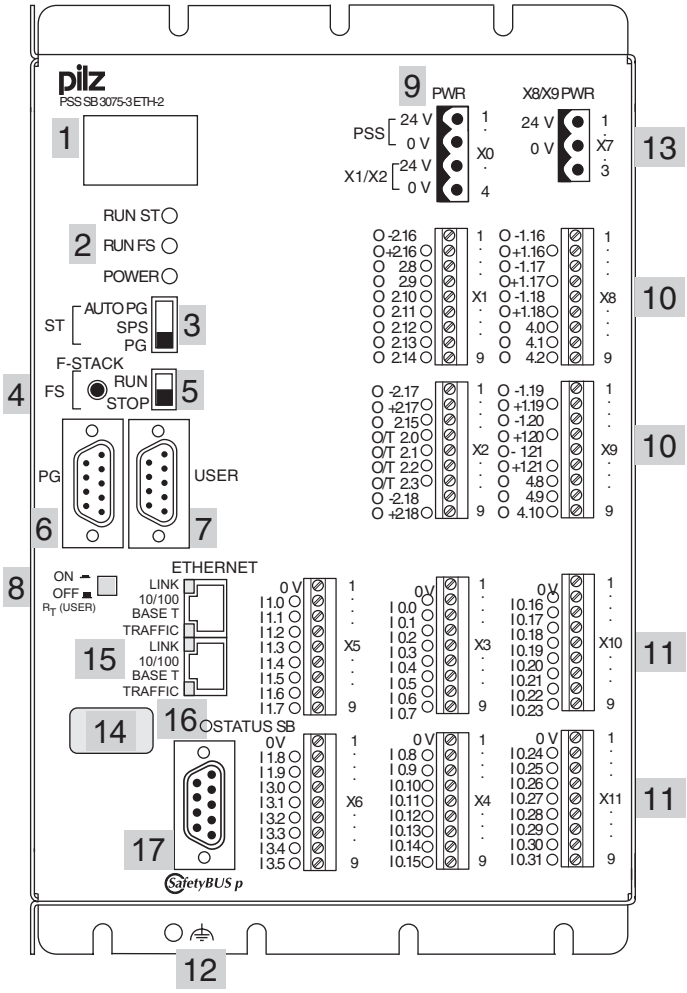


Fig. 2-5: Front view of PSS SB 3075-3 ETH-2

Key:

1: 4-digit display
2: LEDs for PSS operating mode and supply voltage
3: 3-position switch for selecting the standard section's operating mode
4: Button for scrolling the error stack
5: 2-position switch for selecting the failsafe section's operating mode
6: Programming device interface
RS 232 (minimum configuration: TxD, RxD, GND)/RS 485
7: User interface
RS 232/RS 485
8: Pushbutton for switching on and off the RS 485 termination on the user interface
9: Supply voltage connection (24 VDC) for internal supply of the safety system and the outputs at X1, X2
10: Digital outputs and test pulse outputs
11: Digital inputs
12: Functional earth connection
13: Supply voltage connection (24 VDC) for outputs at X8, X9
14: Labelling strip for Ethernet address
15: ETH-2 interface with connection to ETHERNET via integrated switch (2 free ports); LEDs on each port for
- Status of network connection (LINK)
- Status of data traffic (TRAFFIC)
16: LED for status of SafetyBUS p
17: SafetyBUS p interface

INFORMATION
Please refer also to the manual: "ETH-2 for Compact 3rd Generation PSS".

PSS SB 3075-3 CANopen

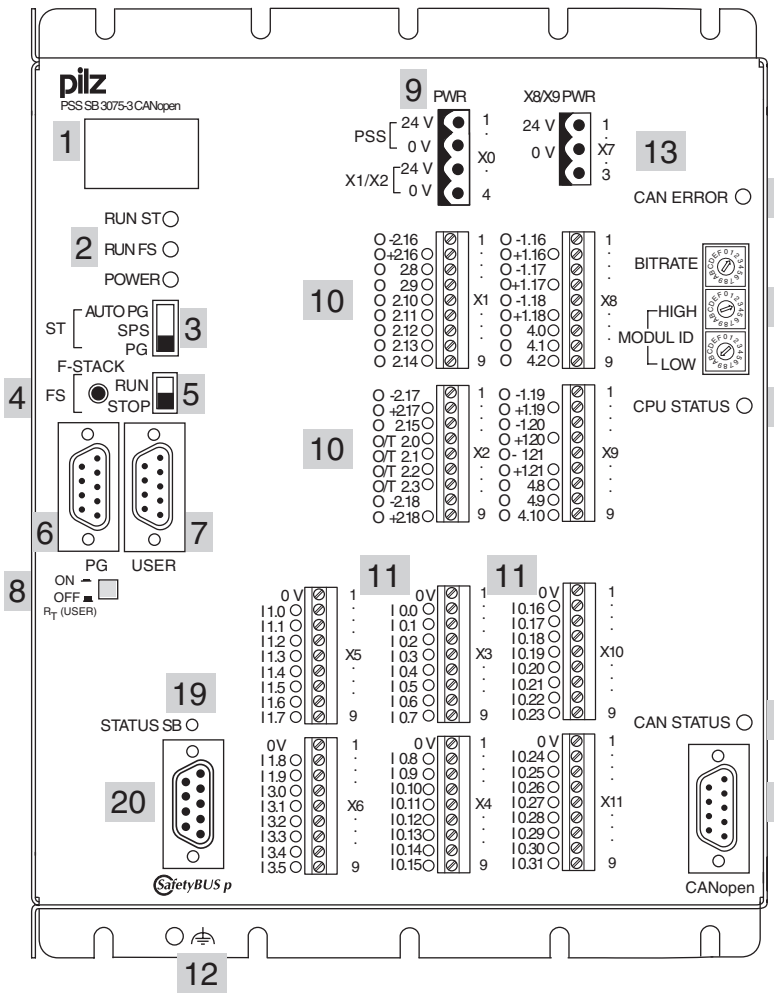


Fig. 2-6: Front view of PSS SB 3075-3 CANopen

Key:

1: 4-digit display
2: LEDs for PSS operating mode and supply voltage
3: 3-position switch for selecting the standard section's operating mode
4: Button for scrolling the error stack
5: 2-position switch for selecting the failsafe section's operating mode
6: Programming device interface
RS 232 (minimum configuration: TxD, RxD, GND)/RS 485
7: User interface
RS 232/RS 485
8: Pushbutton for switching on and off the RS 485 termination on the user interface
9: Supply voltage connection (24 VDC) for internal supply of the safety system and the outputs at X1, X2
10: Digital outputs and test pulse outputs
11: Digital inputs
12: Functional earth connection
13: Supply voltage connection (24 VDC) for outputs at X8, X9
14: LED for data transfer errors
15: Rotary switch for setting the node number Bit rate (1st rotary switch) and the Node-ID (2nd rotary switch)
16: LED for CPU status
17: LED for the CANopen data cable status
18: CANopen interface
19: LED for status of SafetyBUS p
20: SafetyBUS p interface

INFORMATION
Please refer also to the manual: "CANopen for Compact 3rd Generation PSS".

PSS SB 3075-3 ETH-2 CANopen

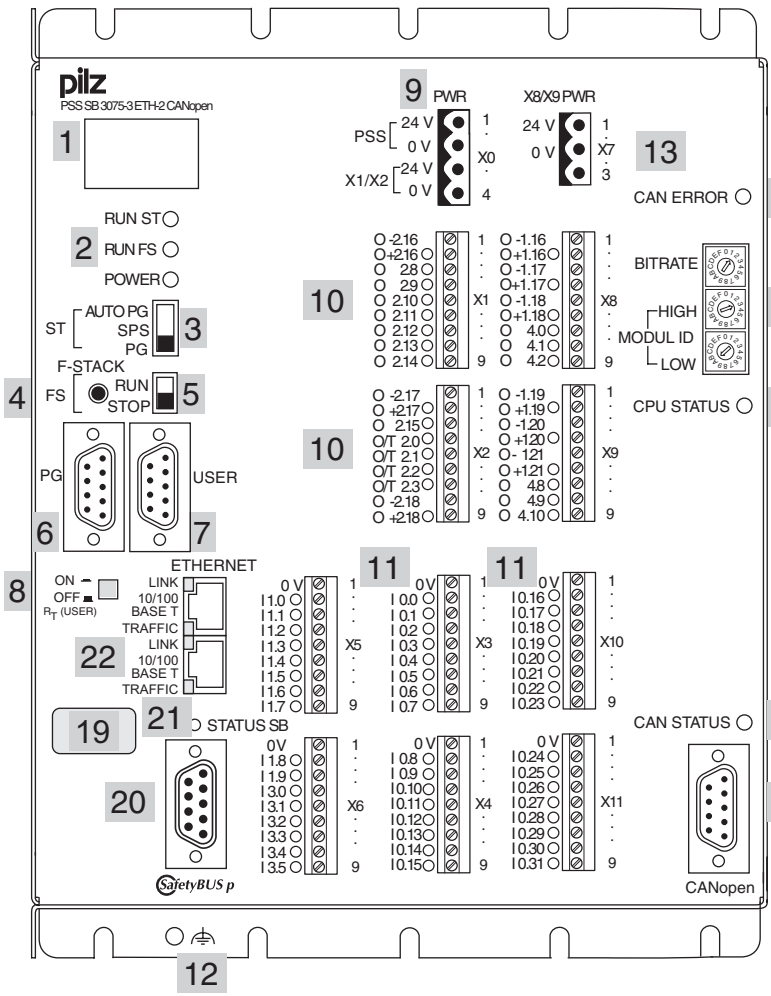
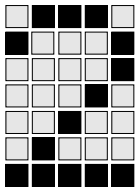


Fig. 2-7: Front view of PSS SB 3075-3 ETH-2 CANopen

Key:

1: 4-digit display
2: LEDs for PSS operating mode and supply voltage
3: 3-position switch for selecting the standard section's operating mode
4: Button for scrolling the error stack
5: 2-position switch for selecting the failsafe section's operating mode
6: Programming device interface
RS 232 (minimum configuration: TxD, RxD, GND)/RS 485
7: User interface
RS 232/RS 485
8: Pushbutton for switching on and off the RS 485 termination on the user interface
9: Supply voltage connection (24 VDC) for internal supply of the safety system and the outputs at X1, X2
10: Digital outputs and test pulse outputs
11: Digital inputs
12: Functional earth connection
13: Supply voltage connection (24 VDC) for outputs at X8, X9
14: LED for data transfer errors
15: Rotary switch for setting the node number Bit rate (1st rotary switch) and the Node-ID (2nd rotary switch)
16: LED for CPU status
17: LED for the CANopen data cable status
18: CANopen interface
19: Labelling strip for Ethernet address
20: SafetyBUS p interface
21: LED for status of SafetyBUS p
22: ETH-2 interface with connection to ETHERNET via integrated switch (2 free ports); LEDs on each port for
- Status of network connection (LINK)
- Status of data traffic (TRAFFIC)

INFORMATION
Please refer also to the manual: "CANopen for Compact 3rd Generation PSS" and "ETH-2 for Compact 3rd Generation PSS".



Notes

Safety

Intended use

Programmable safety systems from the PSS 3075-3 series are intended for use as follows:

- Safety-related applications
  in the PSS failsafe section
- Non-safety-related applications in the
  PSS standard section

INFORMATION
The following system software is required in order to program the safety systems:

- PSS WIN-PRO from Version 1.1.2 for
  - PSS 3075-3
  - PSS 3075-3 DP-S
  - PSS SB 3075-3 DP-S
- PSS WIN-PRO from Version 1.3.1 for
  - PSS SB 3075-3
  - PSS SB 3075-3 ETH-2
  - PSS SB 3075-3 ETH-2 SE
- PSS WIN-PRO from Version 1.5.2 for
  - PSS SB 3075-3 CANopen
- PSS WIN-PRO from Version 1.8.0 for
  - PSS SB 3075-3 ETH-2 CANopen
- PSS WIN-PRO from Version 1.8.2 for
  - PSS 3075-3 NR

INFORMATION
Drivers (standard function blocks) from the corresponding Pilz software package will be required in order to connect to the various standard bus systems:

- ST-SB-DP-S: Driver for PROFIBUS-DP Slave
- ST SB CANopen: Driver for CANopen

For the standard bus interface ETH-2, the Ethernet Configurator is available as part of the PSS WIN-PRO system software from Version 1.3.1.

The following is deemed improper use:

- Any component, technical or electrical modification to the safety system
- Use of the safety system outside the areas described in this manual
- Use of the safety system outside the documented technical details (see chapter entitled “Technical Details”).

Intended use includes making the installation EMC-compliant. Please observe the guidelines given in this manual and in the “Safety Manual” for the PSS-range. The “Safety Manual” also includes check lists designed to help you with the safety-related planning, construction and operation of a plant.

Product modifications

Details of the changes made to a unit from one version to the next are described in the “Product Modifications” file. This file can be found on the “Documentation PSS-Range/SafetyBUS p” CD or on the Internet (www.pilz.com) with the unit’s documentation.

Categories in accordance with EN 954-1



WARNING!

Please note: To achieve the corresponding category or requirement class, the whole system including all safety-related components (parts, devices, user program etc.) must be included in the assessment. For this reason, Pilz cannot accept liability for the correct classification into a category or requirement class.

Digital inputs (DI2)

Depending on the application area and its respective regulations, the inputs may be used without test pulses for applications up to **category 3**, in accordance with EN 954-1. The possibility of a short circuit occurring in the external wiring between different inputs or against L+ must be eliminated through appropriate wiring.

For **category 4** applications, shorts between the input contacts must be detected. This can be achieved through the use of test pulses on the PSS or, depending on the type of input device, through a feasibility test or through detection of shorts across the contacts on the input device (e.g. light barrier) (for connection examples please see Chapter 7, “Wiring the Inputs and Outputs”).

Single-pole outputs (DOS)

An additional shutdown route means that the outputs on the PSS can be used in single-channel operation for applications up to **category 3** in accordance with EN 954-1 (03/97). Please note that in this case a feedback circuit must be used.
To achieve **category 4**, two actuators must be connected in series to two different outputs.

Dual-pole outputs (DOZ)

The dual-pole outputs can be used for applications up to **category 4** in accordance with EN 954-1 (03/97).

Safety guidelines

Failure to keep to these guidelines will render all warranty and liability claims invalid:

- All health and safety / accident prevention regulations for the particular area of application must be observed.
- Before using the unit it is necessary to perform a safety assessment in accordance with the Machinery Directive 98/37/EC.

Safety

Use of qualified personnel

The safety system may only be assembled, installed, programmed, commissioned, operated, maintained and decomissioned by qualified personnel. Qualified personnel are people who, because they are:

- Qualified electrical engineers and
- Have received training from qualified electrical engineers,

are suitably experienced to operate devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology.

EMCD

The safety system is designed for use in an industrial environment. Interference may occur if used within a domestic environment.

Warranty and liability

All claims to warranty and liability will be rendered invalid if:

- The safety system was used contrary to the purpose for which it was intended
- Damage can be attributed to not having followed the guidelines in the manual
- Operating personnel are not suitably qualified.
- Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

Disposal

The programmable safety system must be disposed of properly when it reaches the end of its service life.

Function Description

CPU

The CPU controls the outputs, reads the inputs and processes / stores the user program and variable data. The failsafe section is designed to be multi-channel, i.e. different CPUs process the user program independently. A four-digit display and several LEDs provide information on the status of the safety system and indicate any errors.

Interfaces

CPU interfaces

The CPU of each programmable safety system in the PSS 3075-3 series provides the following interfaces:

- Programming device interface
  Combined RS 232 interface (minimum configuration: TxD, RxD, GND)/ RS 485
- User interface
  Combined RS 232/RS 485 interface (termination is selectable)

For further information please refer to the “System Manual for the PSS-Range”.

SafetyBUS p interface

The programmable safety system from the PSS 3075-3 series may have a SafetyBUS p interface, depending on the unit type. For further information on SafetyBUS p, please refer to the “System Manual for SafetyBUS p”.

Interfaces for standard bus systems

Different interfaces are available for connection to various standard bus systems, depending on the unit type. The standard bus interfaces are described in separate operating manuals. The necessary operating manuals are supplied with the relevant unit types.

Function Description

Inputs

Programmable safety systems from the PSS 3075-3 series have 48 digital inputs (DI2), 6 of which can be configured as alarm inputs (DIF).

The digital input signals must show a “High” (“1” signal) of 24 VDC (+15 ... +30 VDC) or a “Low” (“0” signal) of 0 VDC (-3 ... +5 VDC).

LEDs are used as status indicators. An LED lights up as soon as a “1” signal is present at the input. Inputs have input filters and are galvanically isolated from the control electronics through optocouplers.

Digital inputs (DI2)

Internal diagnostic circuitry checks the function of the inputs, including the optocoupler. If an error occurs, the PSS will switch to a STOP condition, switch off the outputs and send a message to the CPU-display.

Alarm inputs (DIF)

The CPU program cycle will be interrupted if there is a signal change at an alarm input. Depending on the configuration, rising, falling or both types of pulse edges may trigger an alarm. Only those alarms triggered by a signal change from “1” to “0” are safety-related. As soon as an alarm signal (signal change) occurs at one of the alarm inputs, the signal is sent to the CPU through a hardware connection. The CPU determines which input triggered the alarm and, if the pulse edge is configured as active, calls up the relevant alarm OB. The user can program whatever measures are necessary into this alarm OB (see “FS System Description”).

Internal diagnostic circuitry checks the function of the inputs. If an error occurs, the PSS will switch to a STOP condition, switch off the outputs and send a message to the CPU-display. The input filter and optocoupler can be tested using test pulses.

INFORMATION
For further information on alarm processing please refer to the “FS System Description” from the “PSS System Manual for the compact/modular PSS”

Outputs

Programmable safety systems from the PSS 3075-3 series have 18 single-pole outputs (DOS) and 9 dual-pole outputs (DOZ). 4 of the single-pole outputs can be configured as test pulse outputs (DOT).

INFORMATION
On programmable safety systems from the PSS 3075-3 series, only outputs O1.16 ... O1.21, O/T2.0 ... O/T2.3, O2.8 ... O2.18, O4.0 ... O4.2 and O4.8 ... O4.10 are available at the terminals.
Please note: Unwired outputs O1.22 ... O1.31, O2.4 ... O2.7, O2.19 ... O2.31, O4.3 ... O4.7 and O4.11 ... O4.15 cannot be configured in the system software.

Single-pole outputs (DOT/DOS)

Programmable safety systems from the PSS 3075-3 series have 18 single-pole outputs with a load capacity of 1.5 A.

The 4 outputs O/T2.0 ... O/T2.3 can be configured together as test pulse outputs.

Outputs configured as test pulse outputs supply the test pulses to check the input filters and optocouplers on the inputs. The CPU checks whether the inputs connected to a test pulse output can detect a signal change.

INFORMATION
Please note that unused test pulses must remain unconnected.

Function Description

Once the CPU sends a “1” signal via the system bus, the PSS will supply 24 VDC to the relevant output. The status of the outputs is displayed through LEDs, which light as soon as a “1” signal (24 VDC) is present at the output.

Internal diagnostic circuitry tests the function of the outputs. During each cycle, the CPU compares the actual status of the outputs with the process image of the outputs. Outputs that are switched on will be switched off during each self test in order to check that the output transistors can be switched. Outputs that are switched off will be switched on during each self test in order to check the monitoring circuit. A test will also be carried out to check for shorts between the outputs of a sub-slot (short circuits are detected only when the outputs are switched on). If an error occurs, the PSS will switch to a STOP condition, switch off the outputs and send a message to the CPU-display.
If a plant is particularly sensitive to the pulses from the power-up test on outputs that are switched off, individual outputs or all single-pole outputs can be excluded from testing. This is achieved using operating system call SB255, function 2 (see overleaf).

If you deactivate the output power-up test, please make sure you observe the following guidelines:



NOTICE
On an output that is switched off, follow the instructions below: At a non-critical point in the program, switch the output on and then off again for one PSS cycle. If the output does not switch correctly, the error will be detected and registered by the operating system. To also detect shorts between outputs that are switched off, outputs must be switched on at an offset of one cycle.



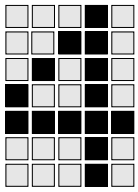
NOTICE
To detect whether an output has been excluded from the output test incorrectly, or whether the output test that the user has programmed is effective, an error simulation must be carried out on each safety-related output during commissioning. To do this, the affected output must be switched off (output’s diode not lit up). If you then generate a short circuit between the output and 0 V, the desired error reaction should occur. In the worst case, the error reaction should occur within 30 minutes.

- The output power-up tests are a component part of the system's self check. The self check is carried out when voltage is returned, on start up (transfer from STOP-RUN) and also during operation.
- Operating system call SB255, function 2 in OB120 is required to deactivate the power-up test on start up. To deactivate the power up-test during operation, the operating system call must be contained in a block that is run as part of each cycle. The power-up test will be performed again as soon as the operating system call is no longer present.



NOTICE
Each time SB255, function 2 is called, data words DW200, DW201 and DW202 must be written in full to ensure that outputs are not excluded from the power-up test unintentionally, due to data words being unwittingly overwritten during the program cycle.

Block	Input	Output	Key
SB255	FUNK = 2	ERG = 1	Deactivate output power-up test in bits Function performed without error Incorrect SB255 calls will lead to a STOP condition
DB003	DW200		Slot number on the PSS 3075-3 series: 2 / 4
	DW201		Masks for outputs 2.00 ... 2.15 / 4.00 ... 4.15 If this is set on a bit belonging to an output, the power-up test for this output will be deactivated. For example: 0101_H -> output 2.0 and 2.8 on the PSS 3075-3 series: • Outputs 2.8 … 2.15, 4.0 ... 4.2 / 4.8 ... 4.10 can be masked • Outputs 2.0 … 2.3 can only be masked if they are not configured as test pulses • Outputs 2.4 … 2.7, 4.3 ... 4.7 / 4.11 ... 4.15 (outputs not available at the terminals) cannot be masked, their bits must always equal 0
	DW202		Masks for outputs 2.16 ... 2.31 / 4.16 ... 4.31 on the PSS 3075-3 series: 0000_H Outputs 2.16 ... 2.31 / 4.16 ... 4.31 cannot be masked, their bits must always equal 0.
DB001		DW200	Fault detection: 0: No error 1: Invalid slot number 2: Slot not occupied 3: Not possible to deactivate the power-up test on the stated outputs 4: Call of SB255, FUNK = 2 not permitted in alarm OB



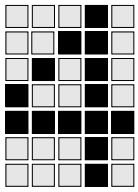
Dual-pole outputs (DOZ)

9 dual-pole outputs are available.

The load must be connected between the “+” and “-” terminals. When the CPU sends a “1” signal via the system bus, the PSS supplies 24 VDC to the relevant output. The status of the outputs is displayed through LEDs, which light as soon as a “1” signal (24 VDC) is present at the output.

Internal diagnostic circuitry tests the function of the connected outputs. On outputs that are switched on, the CPU will alternately switch off the “+” and “-” terminals as part of each cycle. This is to check that the corresponding output transistors can be switched off and that there is no interruption to the load. In addition, outputs that are connected but switched off will be switched on for approx. 100 µs during each self test. If an error occurs, the PSS will switch to a STOP condition, switch off the outputs and send a message to the CPU-display.

All outputs are protected against short-circuit, overload and excess temperature. They can switch both resistive and inductive loads.



Configuration coding

Inputs and outputs are located on a sub-slot, which is allocated a code:

Slot	Sub-slot	Inputs/outputs	Code
0	0	I0.00 - I0.15	$C003_H$
	1	I0.16 - I0.31	$C003_H$
1	2	I1.00 - I1.09	$C003_H$
	3	O1.16 - O1.21	$C011_H$
2	4	O2.00 - O2.03 O2.08 - O2.15	$C017_H$
	5	O2.16 - O2.18	$C011_H$
3	6	I3.00 - I3.05	$D002_H$
	7	...	...
4	8	O4.00 - O4.02 O4.08 - O4.10	$C015_H$ ...
	9	...	...

Installation

General requirements

Please note the following:

- The safety system should be installed in an enclosure, e.g. control cabinet, that conforms to the protection class required for the environment.
- When installing the system in an enclosure such as a control cabinet, the environmental data for the safety system must be taken into account. Details can be found in the chapter entitled “Technical Details”.
- Ensure there is sufficient ventilation to prevent heat building up within the control cabinet. Please note the ambient temperature of 0 ... 60 °C.
- In extreme ambient conditions, additional measures may be required in order to keep within the prescribed value range.
- Use low interference panel lighting for inside the control cabinet.
- The safety system must be installed in such a way that there is adequate protection against buttons and switches being operated unintentionally.



CAUTION!

Risk of burns!
Do **not** touch the metal parts of the housing.
If the safety system is operated at an ambient temperature of more than 45 °C, surface temperatures on the housing may reach more than 80 °C at full load.

Installing the safety system

There are two options for installing the safety system. Both options are shown in the following illustrations. Drill M4 holes in the control cabinet’s mounting plate, as shown in the illustrations (tolerance: +/-0.3 mm/0.012"). Attach the safety system to the mounting plate in your control cabinet, using washers.

Installation

Installing the safety system PSS 3075-3 and PSS 3075-3 NR

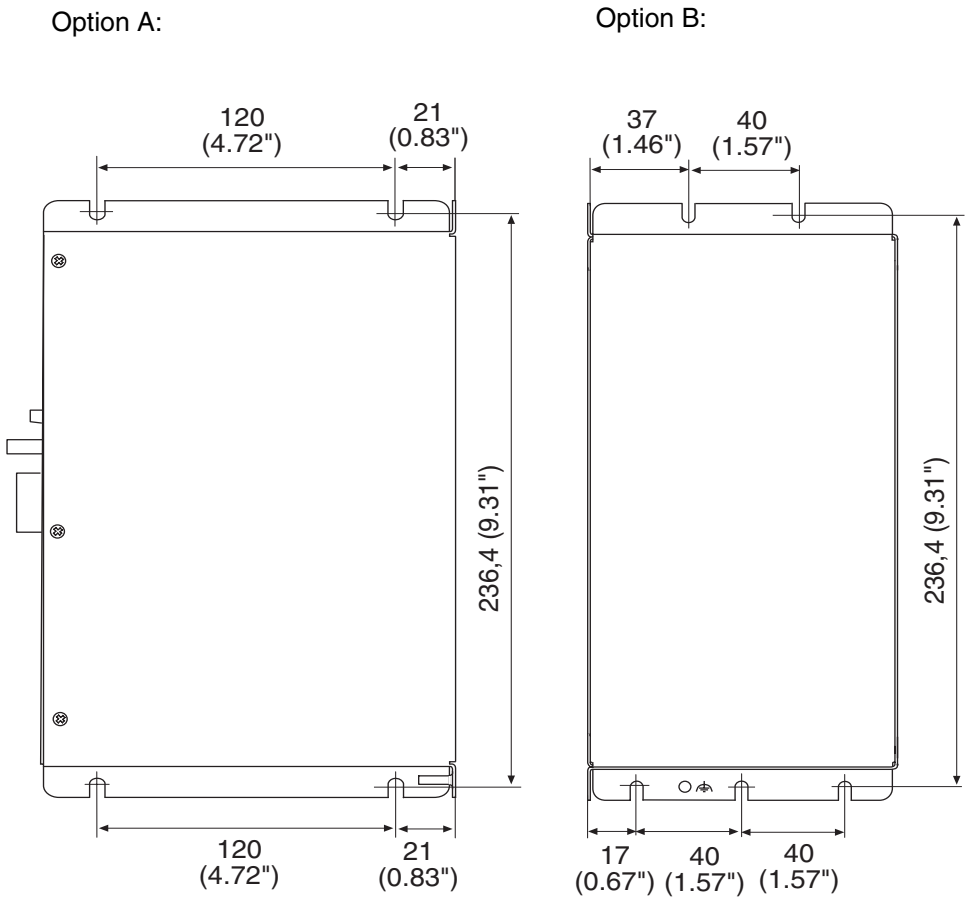


Fig. 5-1: Installation options for the programmable safety system PSS 3075-3 and PSS 3075-3 NR
Dimensions stated in mm (")

Dimensions in mm (") excluding interfaces and operating controls :
H x W x D: 246.4 x 123.6 x 162 (9.70" x 4.87" x 6.38")

Installing the safety system PSS 3075-3 DP-S, PSS SB 3075-3, PSS SB 3075-3 ETH-2 and PSS SB 3075-3 ETH-2 SE

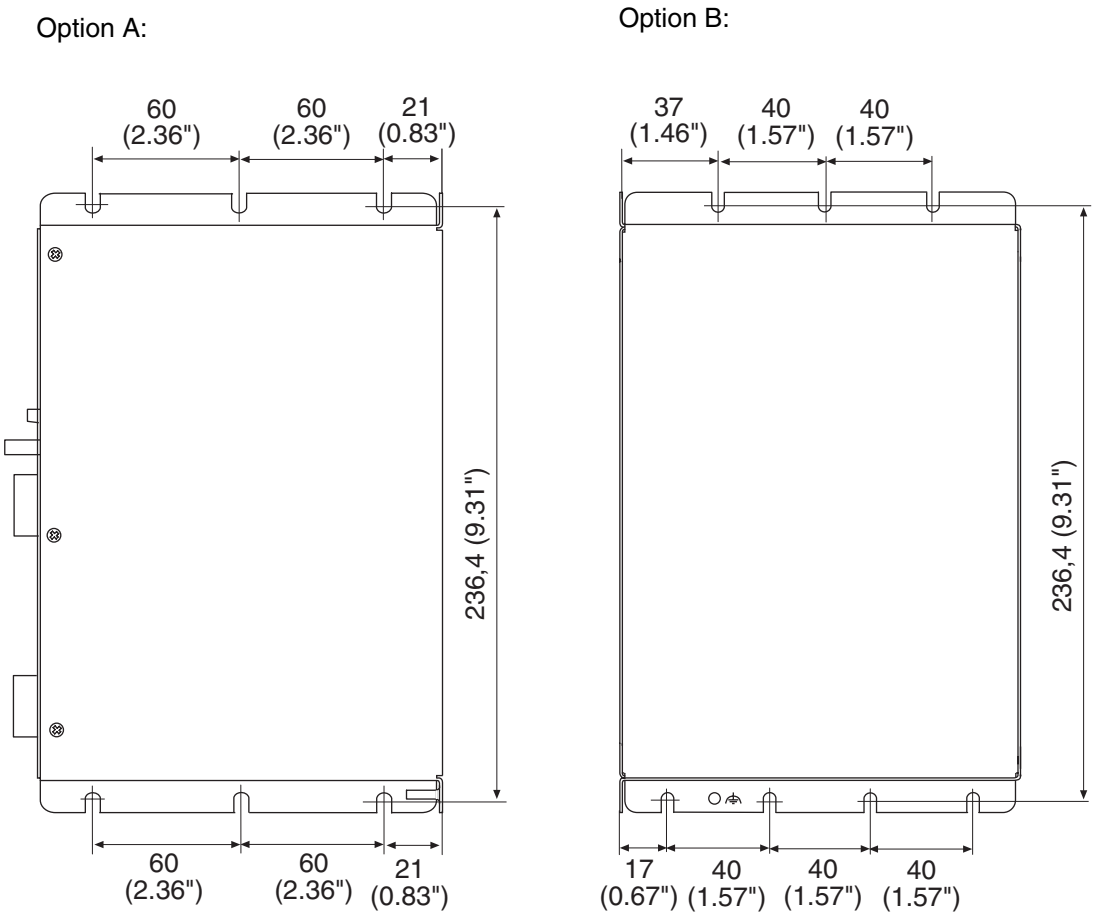


Fig. 5-2: Installation options for the programmable safety system PSS 3075-3 DP-S, PSS SB 3075-3, PSS SB 3075-3 ETH-2 and PSS SB 3075-3 ETH-2 SE
Dimensions stated in mm (")

Dimensions in mm (") excluding interfaces and operating controls :
H x W x D: 246.4 x 160.2 x 162 (9.70" x 6.31" x 6.38")

Installing the safety system PSS SB 3075-3 DP-S, PSS SB 3075-3 CANopen and PSS SB 3075-3 ETH-2 CANopen

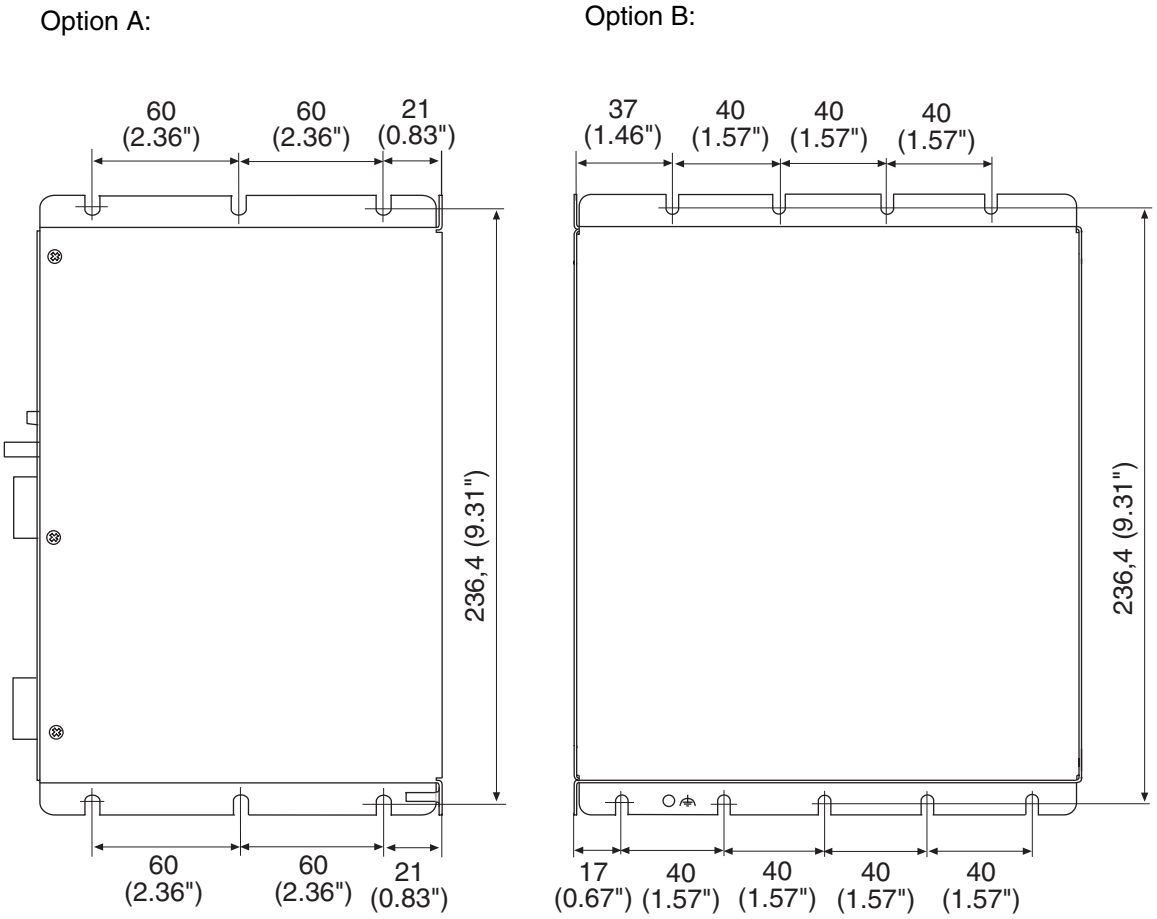


Fig. 5-3: Installation options for the programmable safety system PSS SB 3075-3 DP-S, PSS SB 3075-3 CANopen and PSS SB 3075-3 ETH-2 CANopen
Dimensions stated in mm (")

Dimensions in mm (") excluding interfaces and operating controls :
H x W x D: 246.4 x 196.8 x 162 (9.70" x 7.58" x 6.38")

Installing the safety system in a control cabinet

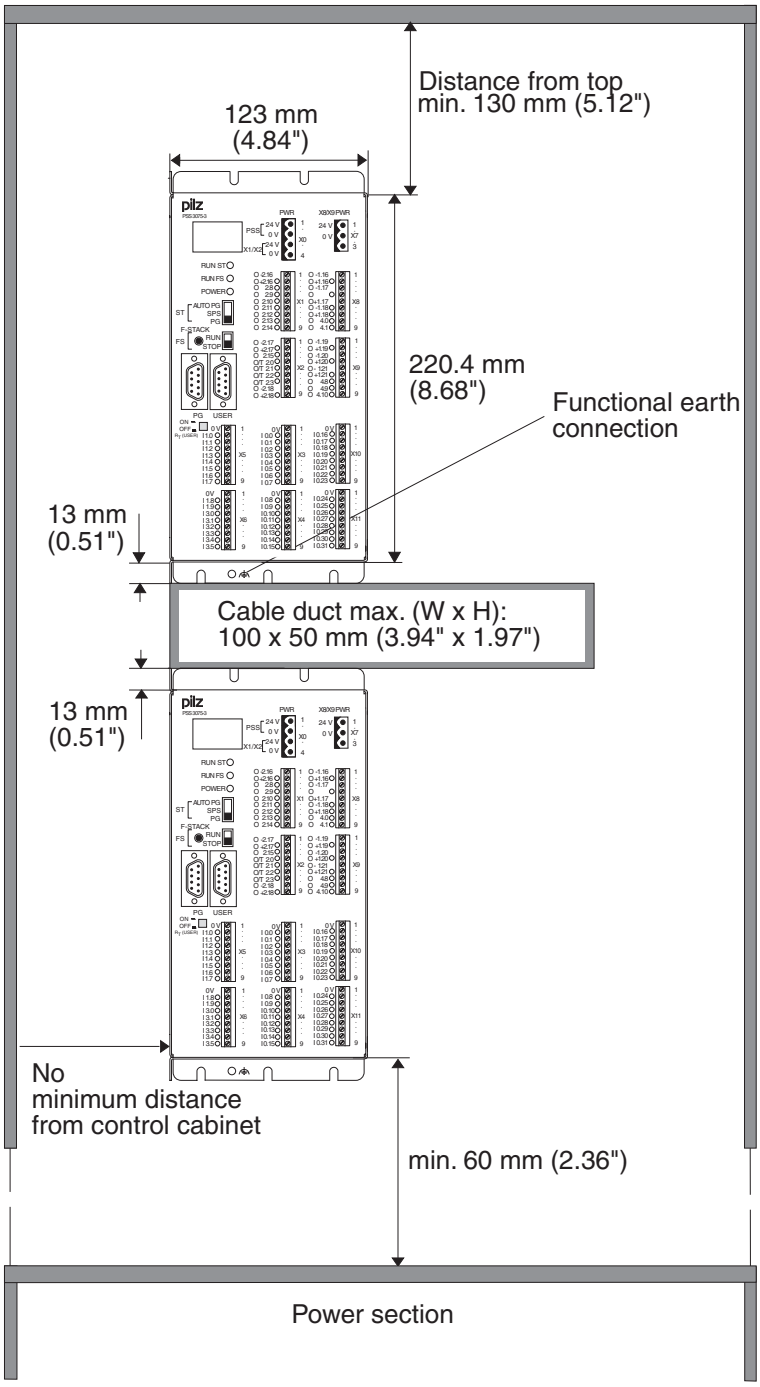
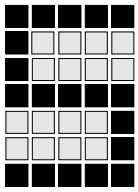


Fig. 5-4: Installing safety systems from the PSS 3075-3 series in a control cabinet (example: PSS 3075-3), dimensions stated in mm (")



Notes

Supply Voltage

General requirements

Please note the following:

- When selecting the power supply, please refer to the requirements stated under “Technical Details”.

INFORMATION
The output circuits have been designed to guarantee maximum safety. To achieve this, extensive tests are carried out internally. If the supply voltage is interrupted briefly during a test function, the relevant test pulse output will be deemed to be defective.
The normal error reaction will occur: the PSS switches to a STOP condition.
Remedy: The PSS supply voltage must be buffered.

- Overvoltage and spikes of interference outside the specifications can damage the PSS. In this case the PSS will switch to a safe condition. You should therefore ensure that appropriate EMC measures are taken.
- To achieve the lowest possible residual ripple (< ± 1.2 V), we recommend that you install a three-phase bridge rectifier or regulated supply.
- The size of the fuse will depend on the system’s technical details, the cable cross section and on local regulations.
- The external 24 V supply must be able to provide the following current: Connectors X0 and X7: the current for the internal supply to the PSS, depending on the unit type (see “Technical Details”), plus the maximum permitted load current at connectors X1 and X2 / X8 and X9. The overall load at full load may be a maximum of 10 A each.

WARNING!

Electric shock!
Safe electrical isolation must be ensured for the external 24 V supply. Failure to do so could result in electric shock. Power supplies must conform to EN 60950, 03/97, section 2.3, EN 60742, 9/95 or EN 50178, 10/97.

Supply Voltage

- The external power supply for the programmable safety system should be connected as shown in Fig. 6-1.

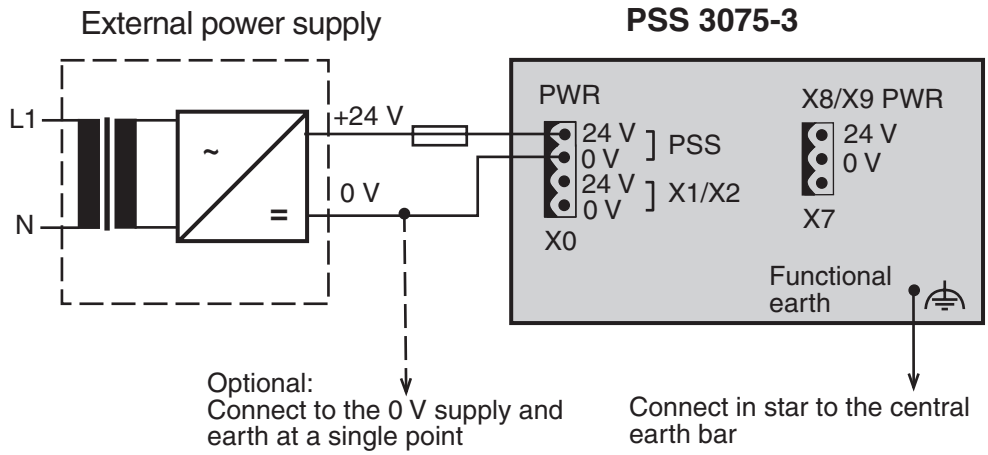


Fig. 6-1: Supplying programmable safety systems from the PSS 3075-3 series

- The external power supply for the outputs on the programmable safety system should be connected as shown in Fig. 6-2.

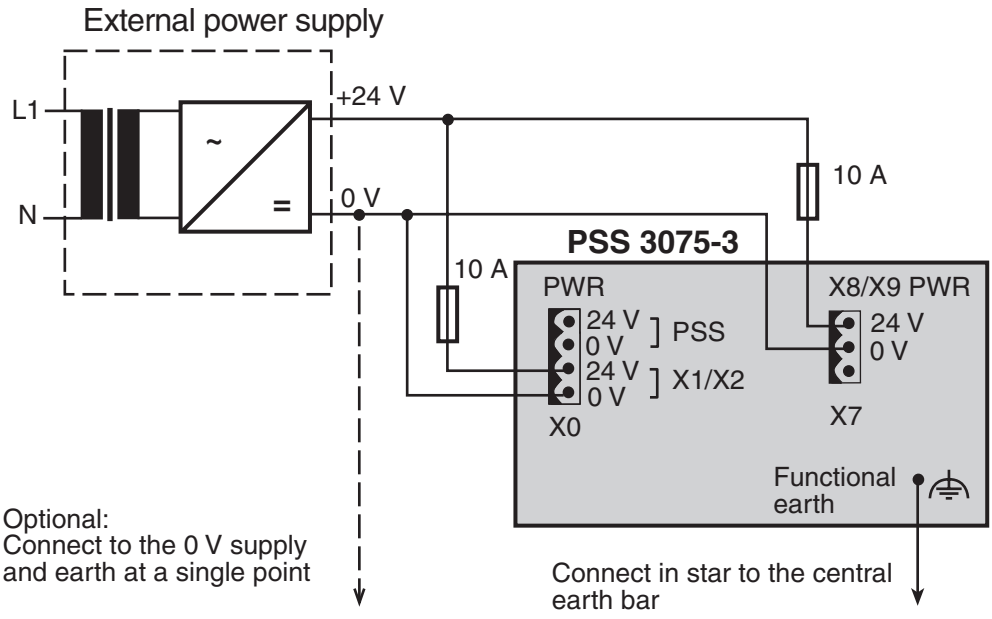


Fig. 6-2: Supplying the outputs on programmable safety systems from the PSS 3075-3 series

NOTICE
There must be no direct connection between “N” and the 0 V output on the external power supply!

- Please note:
  Always connect the supply voltage to X0 **and** X7. If not, the programmable safety system will not be able to perform various function tests.
- Depending on the relevant national regulations, it may be necessary to connect the 0 V supply to the central earth bar or to use some form of earth fault monitoring (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).

INFORMATION
We recommend that the programmable safety system (“PSS” connection) and the digital outputs (“X1/X2”, “X8/X9” connection) are fed from separate power supplies, to increase the availability of the programmable safety system.

CAUTION!

The maximum permitted load current at connectors X0 and X7 should not be exceeded. Connectors X0 and X7 should therefore be fused (see Fig. 6-1 and 6-2):
“PSS” connections: depending on the unit type (see “Technical details”)
“X1/X2” and “X8/X9” connections: 10 A each

INFORMATION
If the inputs on the PSS are being used with test pulses, connect L- on the input device supply to the 0 V terminal for the supply voltage (“PWR” connection, connectors X1/X2, X8/X9). Please refer to Chapter 7, “Wiring the Inputs and Outputs”.

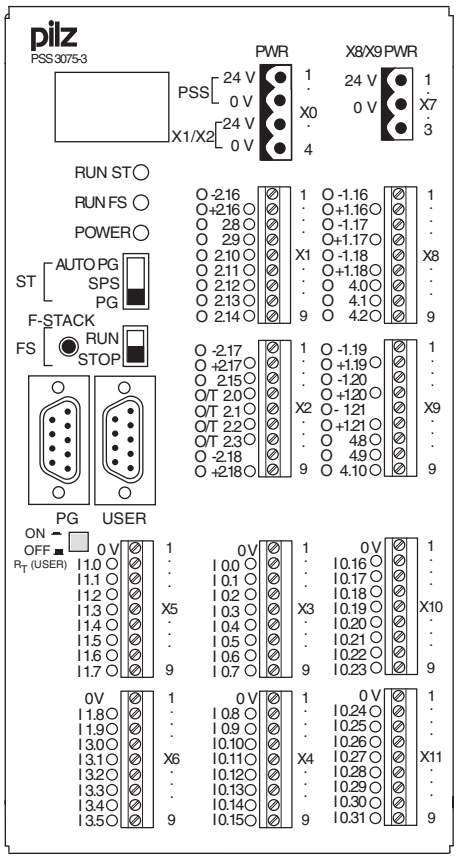
Notes on wiring

- Minimum range for cable cross sections on field connection terminals in mm^2:
  - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
  - Functional earth: 2.5 (AWG12)

Supply Voltage

- Use copper wiring.
- The torque setting on the terminals should be 0.5 … 0.6 Nm.
- Earthing:
  - Connect the housing to the central earth bar.
  - A cable cross section of at least 2.5 mm^2 should be used.
  - Connections should be kept as short as possible.

Configuration of the screw terminals and connector description



Supply voltage

	X0 PSS PWR X1/X2 PWR	**X7** X8/X9 PWR

Digital outputs:

X1 O2.16: dual-pole O2.8 ... O2.14: single-pole		**X8** O1.16 ... O1.18: dual-pole O4.0 ... O4.2: single-pole
X2 O2.17 ... O2.18: dual-pole O2.15: single-pole O/T2.0 ... O/T2.3: single-pole (test pulse outputs)		**X9** O1.19 ... 1.21: dual-pole O4.8 ... O4.10: single-pole

Digital inputs

X5 I1.0 ... I1.7	**X3** I0.0 ... I0.7	**X10** I0.16 ... I0.23
X6 I1.8, I1.9 I3.0 ... I3.5 (alarm outputs)	**X4** I0.8 ... I0.15	**X11** I0.24 ... I0.31

Fig. 7-1: Terminal configuration on programmable systems from the PSS 3075-3 series (Example: PSS 3075-3)

Wiring the Inputs and Outputs

Notes on wiring

Where safety-related applications are concerned, it is essential that short circuits and open circuits are unable to cause a hazardous condition within a plant.
The way in which this is done will depend on the degree of hazard within the plant itself, the switching frequency of the input devices and the level of safety of the input devices and actuators. You should assess these points in conjunction with the relevant standards or approvals body (e.g. BG or TÜV).
Please observe the following when wiring:

- Earthing:
  - Connect the housing to the central earth bar.
  - A cable cross section of at least 2.5 mm^2 should be used.
  - Connections should be kept as short as possible.
- Open circuits, short circuits and earth faults:
  - In principle it is possible to eliminate short circuits between signals within electrically-enclosed areas and also outside electrically-enclosed areas when the signals are conducted in different multicore cables. However, all components must meet the relevant regulations in accordance with EN, DIN and VDE.
  - Open circuits and earth faults cannot be eliminated.
  - With multi-channel input devices with frequent operation, short circuits and open circuits can be detected via feasibility checks in the control program.
  - The input test on the programmable safety system uses test pulses to enable the system's operating program to carry out a test to detect open circuits and short circuits.
- If a dual-pole output on the programmable safety system is used to drive the actuators, a test for short circuits and open circuits will automatically be carried out during each cycle. For this purpose the actuator will be switched off for approx. 100 µs.
- Where single-pole outputs or test pulse outputs are being used, a switch-off test will not be carried out in each cycle. The time for the test will depend on the test slices in the configurable self-check.
- Connecting and laying the cables
  - Screened cables are not required for digital I/Os. However, if the connection cables have screening, it should be connected at one end.

- If there are potential sources of interference, screened cables will be required for connecting alarm signals to the alarm inputs (DIF) and, if the alarm inputs are pulsed, for supplying the test pulses. If necessary, the supply to the system can be buffered.
- When switching inductive loads, suppression should not be used to protect the semiconductor outputs. Errors may occur if suppression cannot be avoided (e.g. on contactors with integral suppression), particulary with RC elements, depending on their capacitive share. Errors will be shown on the PSS display; the PSS will switch to a safe condition.
- Minimum range for cable cross sections on field connection terminals in mm^2:
  - ¤ Digital inputs: 0.5 (AWG20) ... 1.5 (AWG16)
  - ¤ Digital outputs 0.5 (AWG20) ... 1.5 (AWG16)
  - ¤ Test pulse outputs: 0.5 (AWG20) ... 1.5 (AWG16)
  - ¤ Functional earth: 2.5 (AWG12)
- If you use a multi-strand cable with a cross section of 1.5 mm^2 to connect the I/Os, you will need to use ferrules conforming to Parts 1 and 2 of DIN 46228, 0.5 ... 1.5 mm^2, Form A or C. To crimp the ferrules you can use crimp pliers (crimp form A or C) conforming to EN 60947-1, such as the PZ 1.5 or PZ 6.5 from Weidmüller, for example.
- Use copper wiring.
- The torque setting on the terminals should be 0.5 … 0.6 Nm.

NOTICE
Please read the description that accompanies the connection examples! The connection examples can be found on the following pages.

The terms “signal inputs with frequent operation” and “single-channel safe input devices” are used in the connection examples. These terms are defined as follows:

- Signal inputs with frequent operation are signals that change status on several occasions within a period of time.
- Single-channel safe input devices are positively-driven, normally-closed contacts which open on actuation (failsafe principle).

Wiring the Inputs and Outputs

Digital inputs

Features:

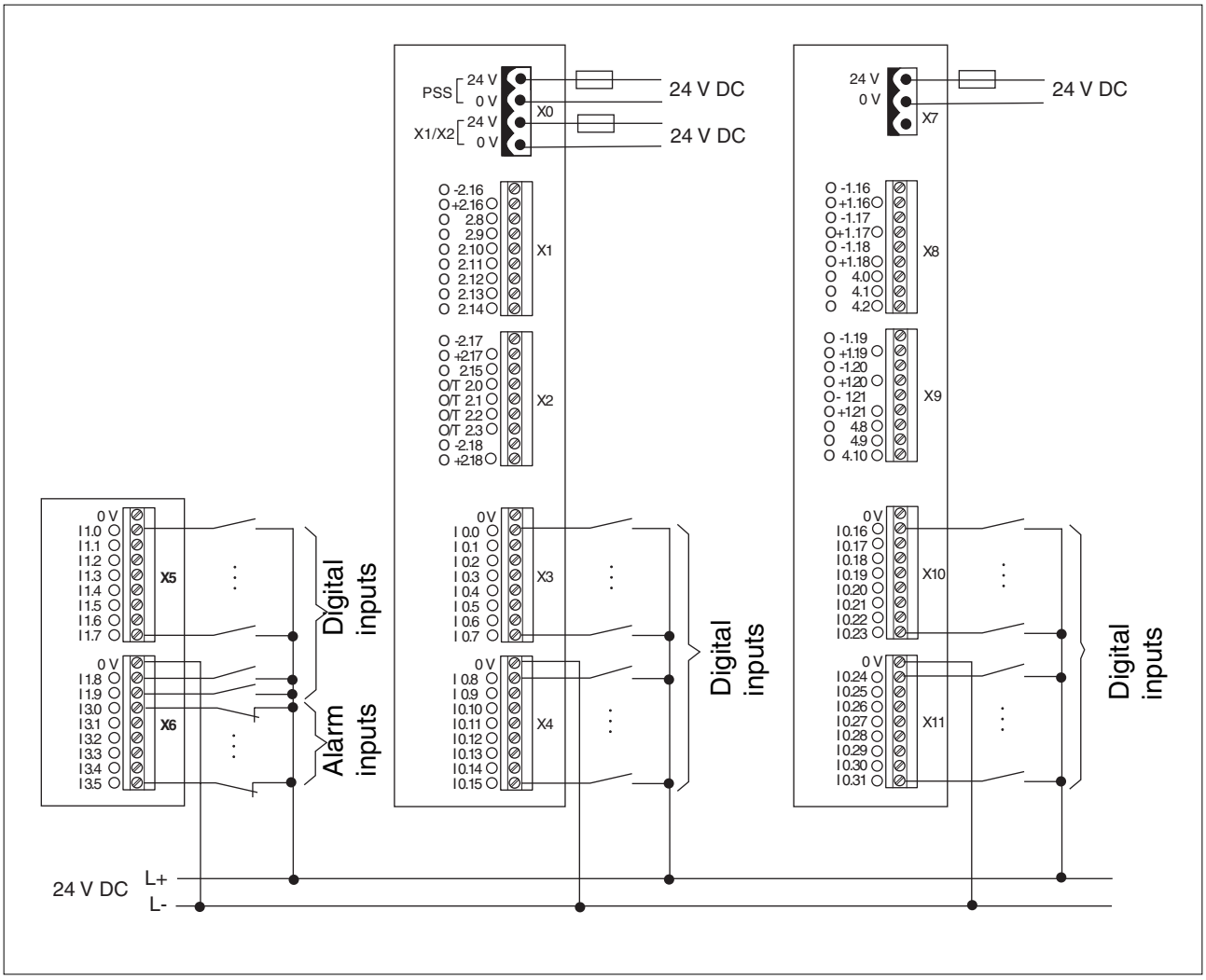
- 48 digital inputs (DI2) I0.0 ... I0.31, I1.0 ... I1.9
  Inputs I3.0 ... I 3.5 can be configured as alarm inputs (DIF)
- Response time:
  I0.00 ... I0.31: 1 ms
  I1.0 ... I1.9: 1 ms
  I3.0 ... I3.5: 0.5 ms
- Only one 0 V terminal needs to be connected to terminals:
  - X3 or X4 for digital inputs I0.0 ... I0.16
  - X5 or X6 for digital inputs I1.0 ... I1.9, I3.0 ... I3.5
  - X10 or X11 for digital inputs I0.16 ... I0.31

  However, we recommend both terminals are connected.
- Only input signals which operate in accordance with the failsafe principle (on switching off) are safety-related.
- Signals may be connected to the digital inputs (DI2) using unscreened cables. If there are potential sources of interference, screened cables will be required for connecting alarm signals to the alarm inputs (DIF) and, if the alarm inputs are pulsed, for supplying the test pulses. If necessary, the supply to the system can be buffered.



CAUTION!

The connection shown overleaf is only approved for **non**-safety applications. The connection of input devices for safety-related applications is described in the examples that follow.



Please ensure safety regulations and EMC guidelines are met!

Example: Single-channel, failsafe input device, without test pulse

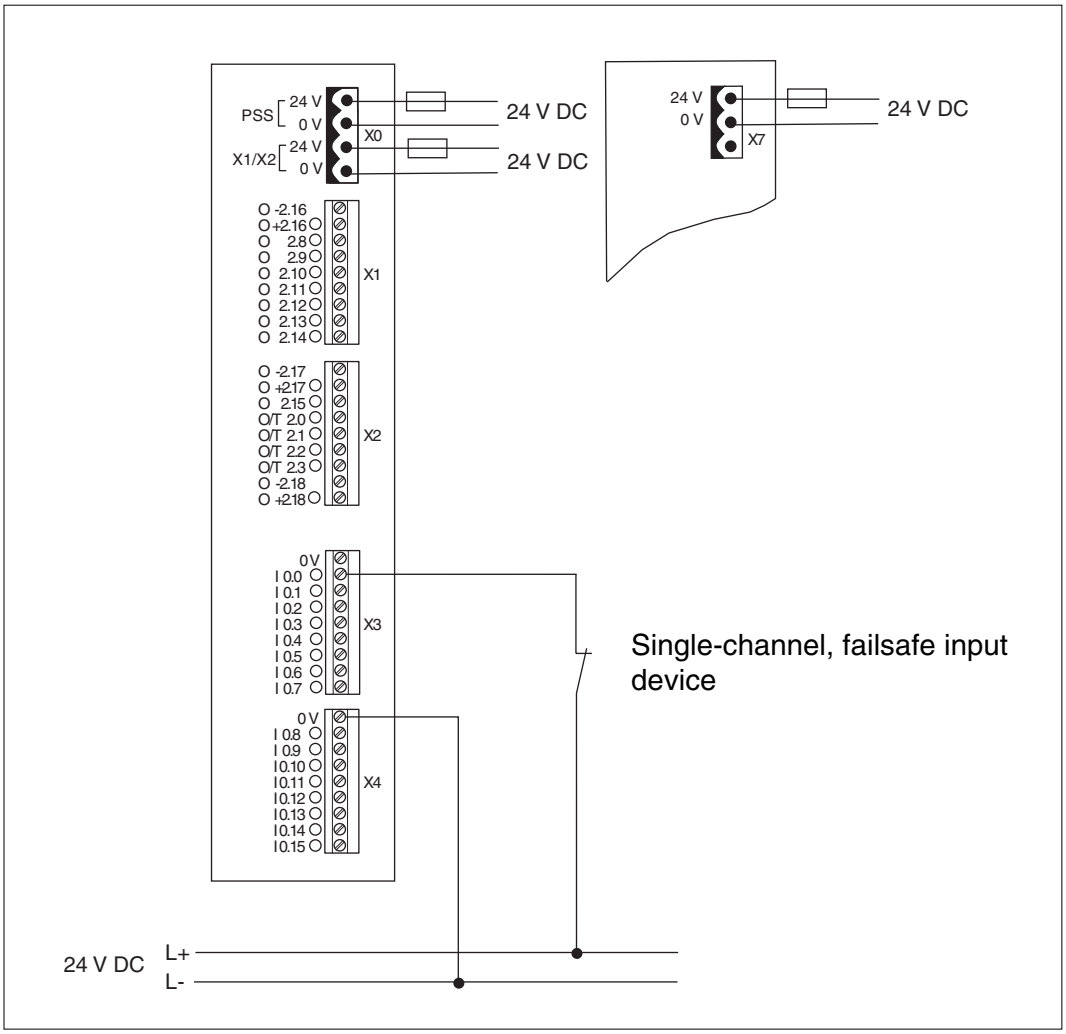
Features:

- Depending on the application area and its respective regulations, this connection diagram is suitable for **input devices with frequent and infrequent operation** in accordance with EN 954-1, **up to category 2**. The possibility of a short circuit occurring in the external wiring between different inputs or against L+ must be eliminated through appropriate wiring.
- **The input device must be approved for failsafe applications.**
- Please read the instructions provided with the input device.



CAUTION!

A short circuit in the cable between the input device and input with the L+ line or between adjacent inputs will not be detected. Neither will a short circuit between several input devices be detected. Depending on the type of input device connected, this could create a risk to both personnel and machinery (e.g. E-STOP). Always ensure that the unit is suitably wired to eliminate the risk of short circuits.



Please ensure safety regulations and EMC guidelines are met!

Example: Dual-channel, failsafe input devices, without test pulses

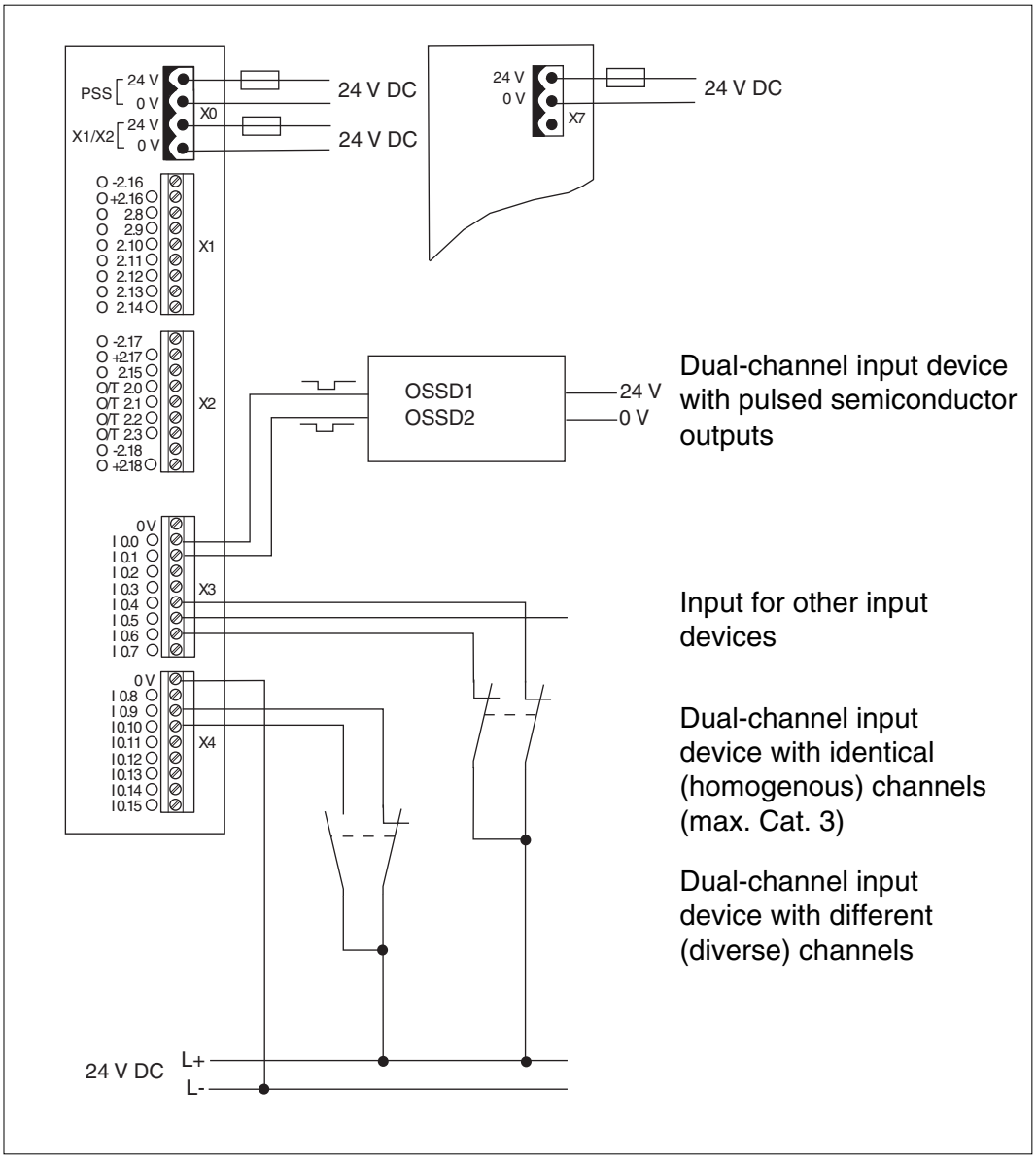
Features:

- Depending on the application area and its respective regulations, this connection diagram is suitable for input devices with **frequent operation** and diverse channels, up to **category 4** in accordance with EN 954-1, provided the functionality of both input device channels is monitored in the user program via a **feasibility check.**
- Depending on the application area and its respective regulations, this connection diagram is suitable for input devices with **infrequent operation up to category 3** in accordance with EN 954-1, provided the functionality of both input device channels is monitored in the user program via a **feasibility check**.
- The possibility of a short circuit occurring between adjacent terminals cannot be eliminated. For this reason, the two identical (homogenous) channels on an input device must **not** be connected to adjacent inputs.
- If you are using input devices with different (diverse) channels, adjacent inputs may be used. Short circuits will be detected in the user program via the feasibility check.



CAUTION!

A short circuit in the cable between the input device and input with the L+ line or between adjacent inputs will not be detected. Depending on the type of input device connected, this could create a risk to both personnel and machinery (e.g. E-STOP). Always ensure that the unit is suitably wired to eliminate the risk of short circuits.



Please ensure safety regulations and EMC guidelines are met!

Example: Single-channel, failsafe input device, with test pulse

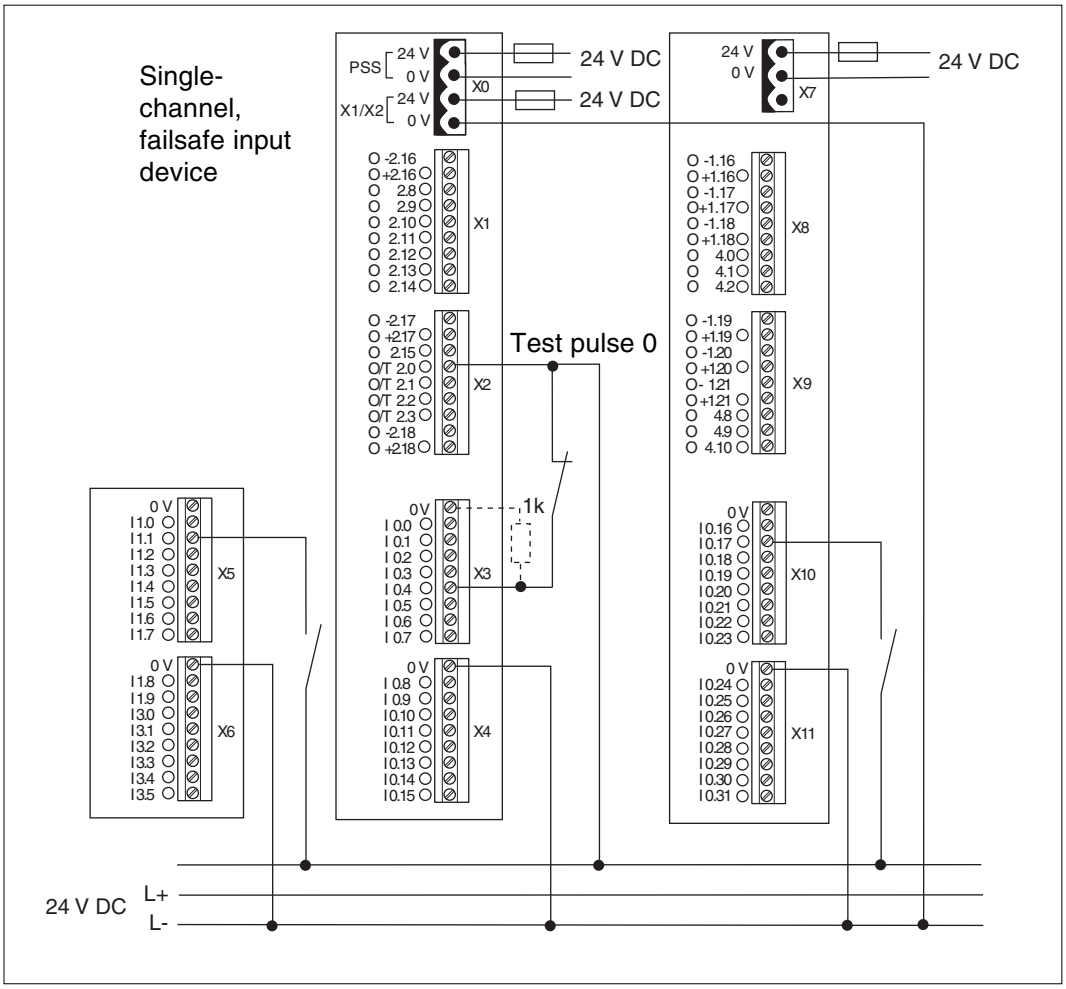
Features:

- Depending on the application area and its respective regulations, this connection diagram is suitable for applications **up to category 2** in accordance with EN 954-1.
- **The input device must be approved for failsafe applications.**
- Please read the instructions provided with the input device.
- The test pulse must be allocated to the input in the system software's PSS Configurator (e.g. PSS WIN-PRO).
- Testing will detect short circuits on the input device cable to L+ and to other test pulses.
- Only input devices with N/C contacts can be tested.
- Cable runs: 1 ms inputs: 200 m
  With 1 kOhm resistance parallel to input: max. 800 m



CAUTION!

Short circuits between the cable from the signal to the input device and the cable from the input device to the input will **not** be detected.

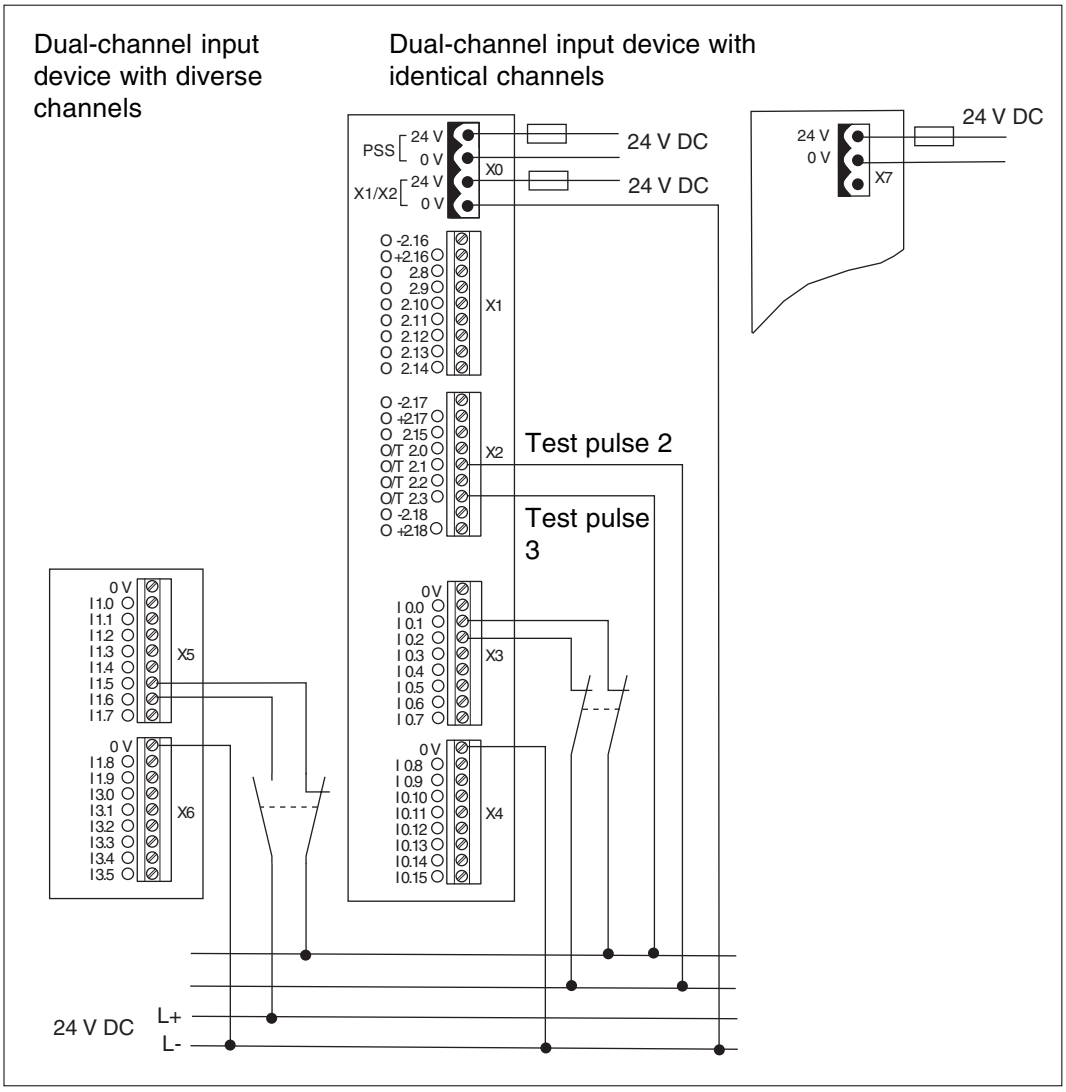


Please ensure safety regulations and EMC guidelines are met!

Example: Dual-channel, failsafe input device, with test pulse

Features:

- Depending on the application area and its respective regulations, this connection diagram is suitable for applications **up to category 4** in accordance with EN 954-1.
- This type of connection is mainly used for signal inputs with infrequent operation.
- The operating system will detect all shorts between contacts and short circuits to L+ and L-.
- Short circuits across the contact can be detected via the feasibility check in the user program.
- The test pulse must be allocated to the input in the system software's PSS Configurator (e.g. PSS WIN-PRO).
- On input devices with identical channels, each channel should be given a separate test pulse. This will ensure that all short circuits are detected, with the exception of short circuits which short out the input device (cable from the signal to the input device and cable from the input device to the input).
- Cable runs: 200 m;
  With 1 kOhm resistance parallel to input: max. 800 m



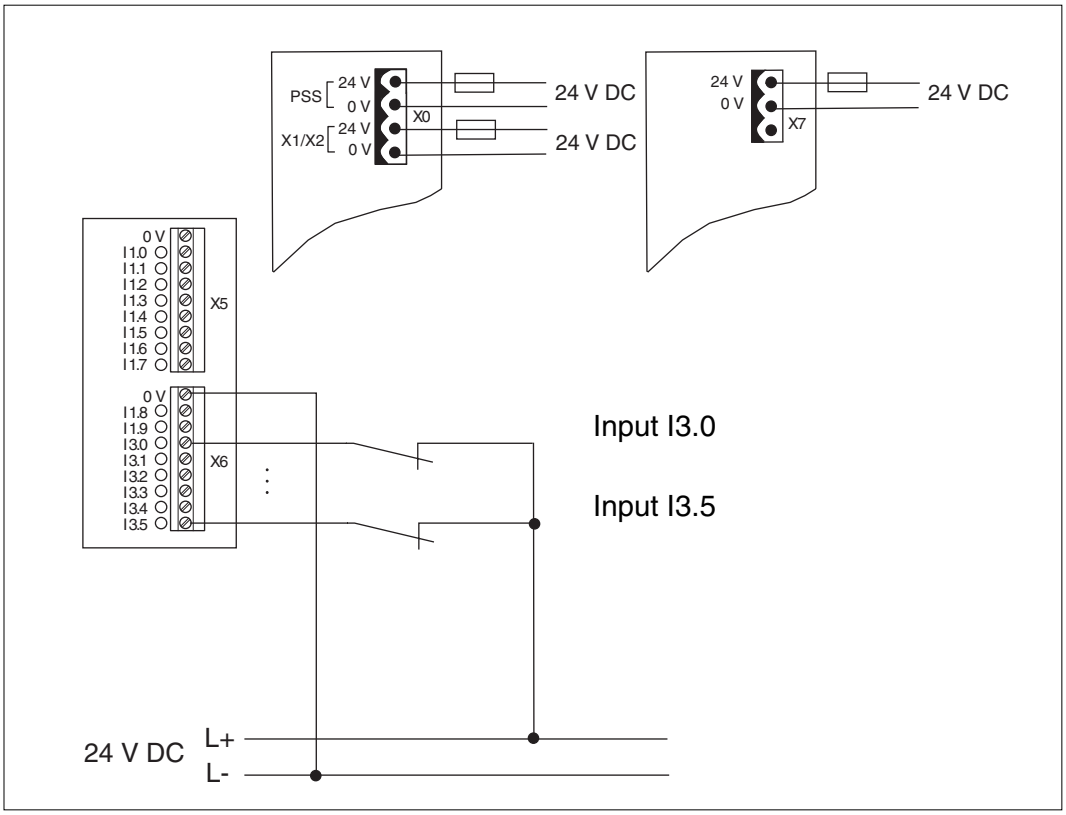
Please ensure safety regulations and EMC guidelines are met!

Wiring the Inputs and Outputs

Alarm inputs (DIF)

Features:

- Alarm inputs for max. 6 process interrupts
- Alarm processing is triggered by a pulse edge change at an input.
- The inputs that trigger an alarm and the pulse edge that causes the alarm to be triggered are defined via the configurator in the programming device (see Programming Manual).
- Only those alarms triggered by a signal change from “1” to “0” are safety-related.
- The input signals may require screened cables, depending on the signal frequency and the ambient conditions.
- Alarms which are safety-related must undergo a functionality test. The inputs may be tested using test pulses or via the feasibility check (see example, “Alarm test”).
- If cable runs exceed 50 m, a resistance of 1 kOhm must be connected in parallel with the input. Maximum cable runs will then be 400 m.



Please ensure safety regulations and EMC guidelines are met!

Alarm inputs (DIF)
Example: Alarm test

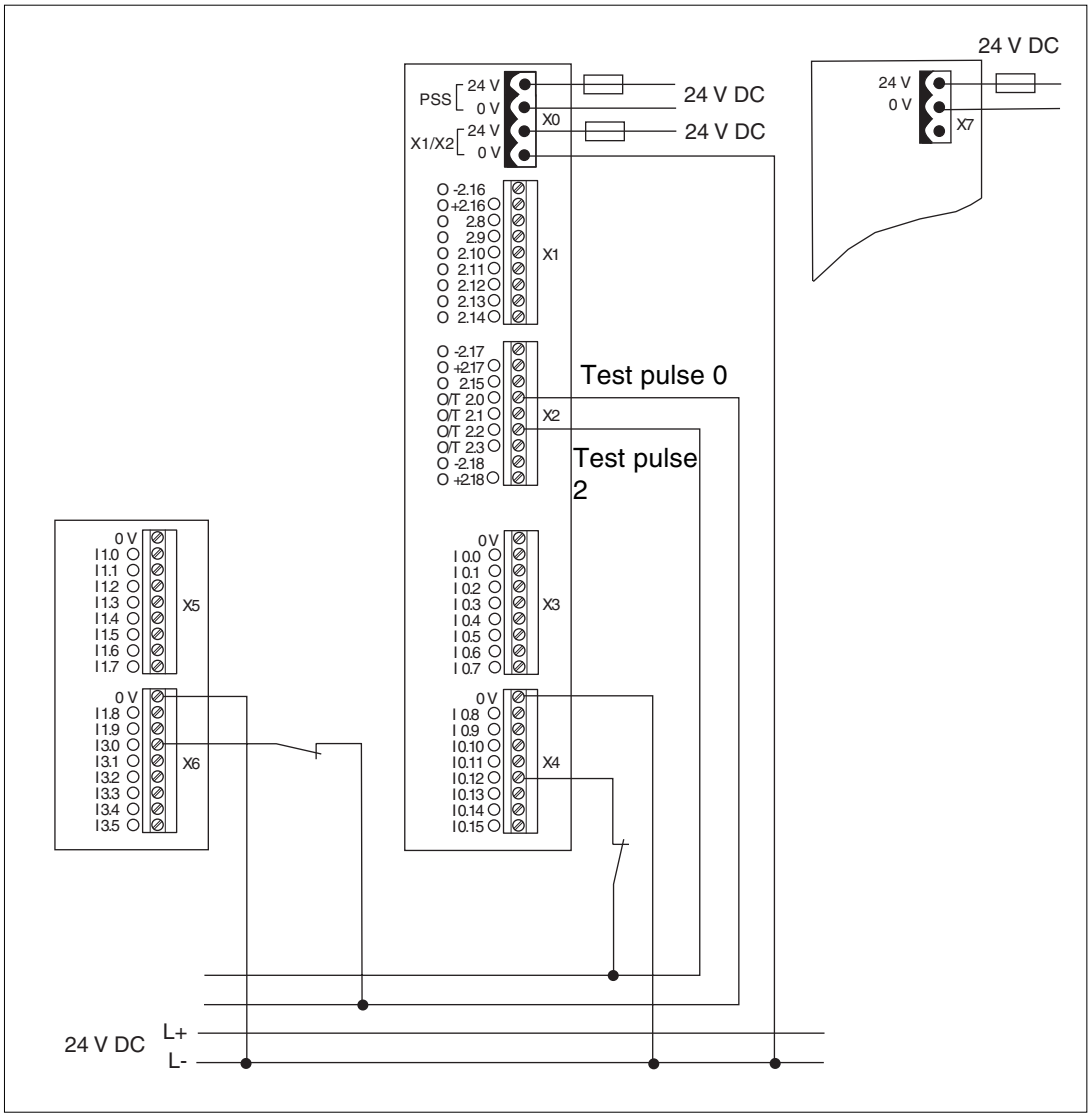
Features:

- The test pulse must be allocated to the input in the system software's PSS Configurator (e.g. PSS WIN-PRO).
- The alarm inputs on the programmable safety system have a shorter filter time than the other inputs on the safety system. The test period will automatically adjust to the alarm inputs.
- DIF and DI2 inputs must **not** be connected to the same test pulse output.



CAUTION!

A short circuit in the cable between the input device and input with the L+ line or between adjacent inputs will not be detected. Neither will a short circuit between several input devices be detected. Depending on the type of input device connected, this could create a risk to both personnel and machinery (e.g. E-STOP). Always ensure that the unit is suitably wired to eliminate the risk of short circuits.



Please ensure safety regulations and EMC guidelines are met!

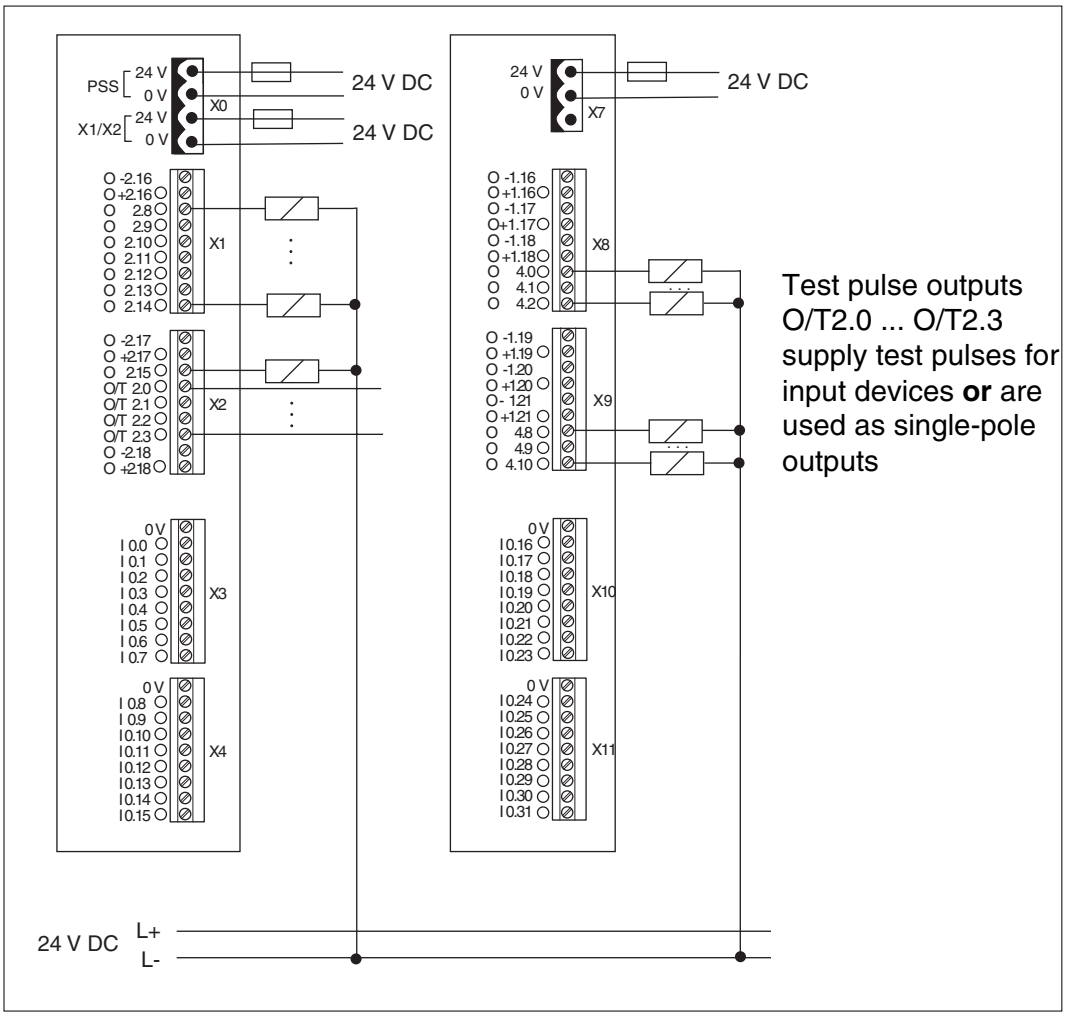
Wiring the Inputs and Outputs

Single-pole outputs

Features:

- 18 single-pole outputs O/T2.0 ... O/T2.3, O2.8 ... O2.15, O4.0 ... O4.2 and O4.8 ... O4.10.
  The 4 outputs O/T2.0 ... OT2.3 can be configured together as test pulse outputs.
- Output current: 1.5 A
- The continuous current over all the outputs must not exceed the following values:
  - max. total of 10 A at terminals X1 and X2
  - max. total of 10 A at terminals X8 and X9
- The test pulse outputs are push-pull outputs. Do **not** use the push-pull level to drive a load to L+, otherwise the switch-off test will detect a connection to L+ and will register an error.
- Do not connect two adjacent inputs to the same test pulse.
- The four test pulse outputs can only be configured together as test pulse outputs or as single-pole outputs that do not use test pulses (see Programming Manual). Configuration will be automatic, depending on the number of test pulse outputs used:
  Number $\leq$ 4: O/T2.0 ... O/T2.3 are test pulse outputs
  Number = 0: O/T2.0 ... O/T2.3 are single-pole outputs
- If only one test pulse is used, the remaining test pulse outputs must remain unconnected.
- Each output is protected against short-circuit, overload and excess temperature. Outputs are designed for resistive and inductive loads.
- All outputs have a common second shutdown route. This means that the programmable safety system can be used in single-channel operation for applications up to **category 3** in accordance with EN 954-1 (11/94). Please note that the second shutdown route is only tested when the safety system switches from STOP to RUN and that a feedback loop must be used with single-channel operation.
  To achieve **category 4**, two actuators must be connected in series to two different outputs.

- If short circuits occur between the cable from the output to the load and the 24 VDC supply line, it will no longer be possible to switch off the load. Possible remedies:
  - Use separate multicore cable for the 24 VDC
  - Use dual actuators
  - Use an additional shutdown device such as a main contactor



Please ensure safety regulations and EMC guidelines are met!

Wiring the Inputs and Outputs

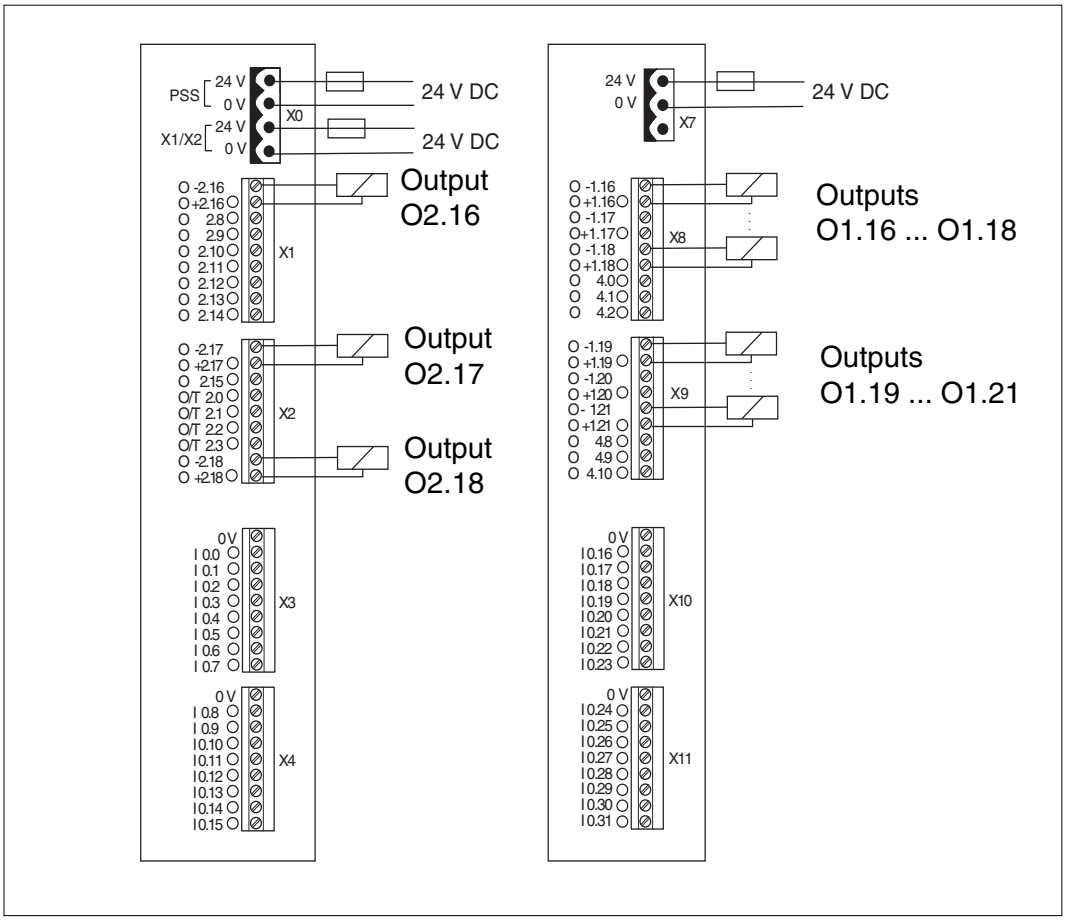
Dual-pole outputs

Features:

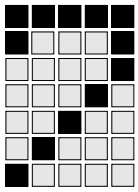
- 9 dual-pole outputs O1.16 ... O1.21, O2.16 ... O2.18
- Output current: 2 A
- The continuous current over all the outputs must not exceed the following values:

- max. total of 10 A at terminals X1 and X2
- max. total of 10 A at terminals X8 and X9

- The operating system on the programmable safety system tests the outputs during each cycle. Any short circuits and open circuits to the load will be detected (short circuits are detected only when the outputs are switched on).
- During testing, the load is isolated from the supply for 100 ... 200 µs in each cycle (depending on the load and cable runs). The load must not switch off during this time.
  Outputs that are switched off are switched on for approximately 100 µs in order to test the monitoring inputs. The load must not switch on during this time.
- Error messages can occur when testing outputs on which the contactors are smaller than the recommended load. The error messages are triggered by too high an inductance on the contactors. In this case it helps to have a 1 kOhm resistor connected in parallel to the contactor coil.
- Each output is protected against short-circuit, overload and excess temperature. Outputs are designed for resistive and inductive loads.



Please ensure safety regulations and EMC guidelines are met!



Notes

Interfaces

General requirements

We recommend you use screened cable for the RS 232/RS 485 interfaces. If unscreened cables are used, the interfaces may malfunction.

- Earth the cable screening on both sides (e.g. on a bus bar).
- If you are using longer cables and there is the possibility of transient currents, you can prevent these by using equipotential bonding cables. If you are unable to use equipotential bonding cables, connect the screening at one end.

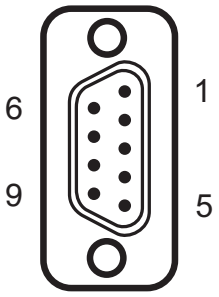
Interfaces

Programming device interface (“PG”)

The programming device interface is a combined RS 232/RS 485 interface. Both interfaces are available on a male 9-pin D-Sub connector. The interface enables communication between the programming device and the PSS.
The termination can be activated via links within the connector (see Fig. 8-3 in the section entitled “RS 485 programming device interface”).

NOTICE
Never operate the combined RS 232 and RS 485 interface simultaneously or in parallel. The programmable safety system is not designed for this.

Male D-Sub connector
9-pin



RS 232	RS 485
1: RxD	2: R1
5: GND	3: B
6: TxD	4: R2
	5: GND
	7: A
	8: R3

n.c. = not connected

Fig. 8-1: Configuration of the programming device interface

Programming device interface RS 232

The RS 232 interface for connecting the programming device is provided in a minimum configuration. The connections TxD, RxD and GND are available.

INFORMATION
To connect the PSS to the programming device via the RS 232 interface you will need a cable with a layout as shown in Fig. 8-2. This cable is available under order number 301 960.
A null modem cable can also be used (order no. 93 123); this is connected to the programming device interface using a special adapter. This adapter is available under order number 311 080.

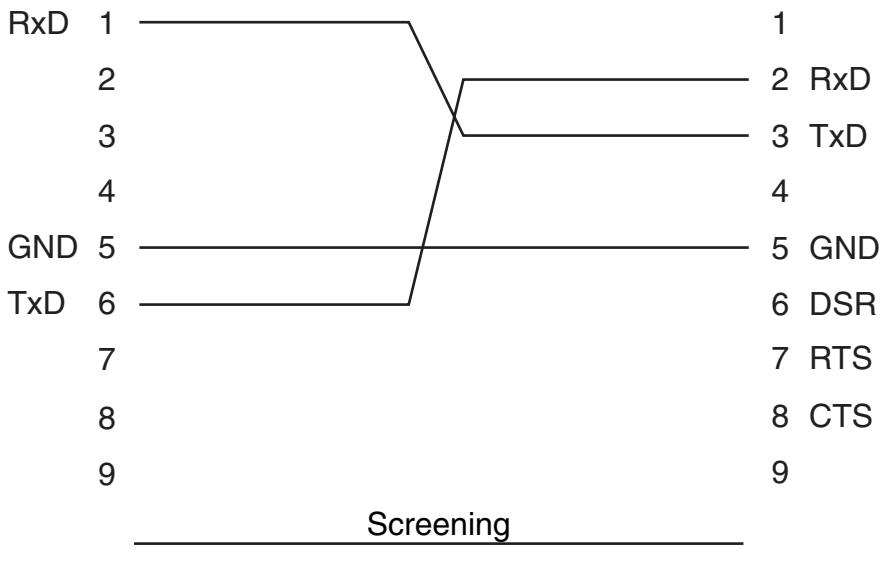


Fig. 8-2: Connection cable between programming device and PSS

Interfaces

Programming device interface RS 485

If you need to cover longer distances between the programming device and PSS (from approx. 15 m), use the RS 485 interface on the PSS.
If the programming device has **no** RS 485 interface, connect the RS 485 interface on the PSS to the RS 232 interface on the programming device via the C-PC-PAP-2 interface adapter (order no. 305 155).
To connect the PSS to the programming device or to the interface adapter, you will need a cable with a layout as shown in Fig. 8-3. This cable is available under order number 374 205. It contains all the necessary links.

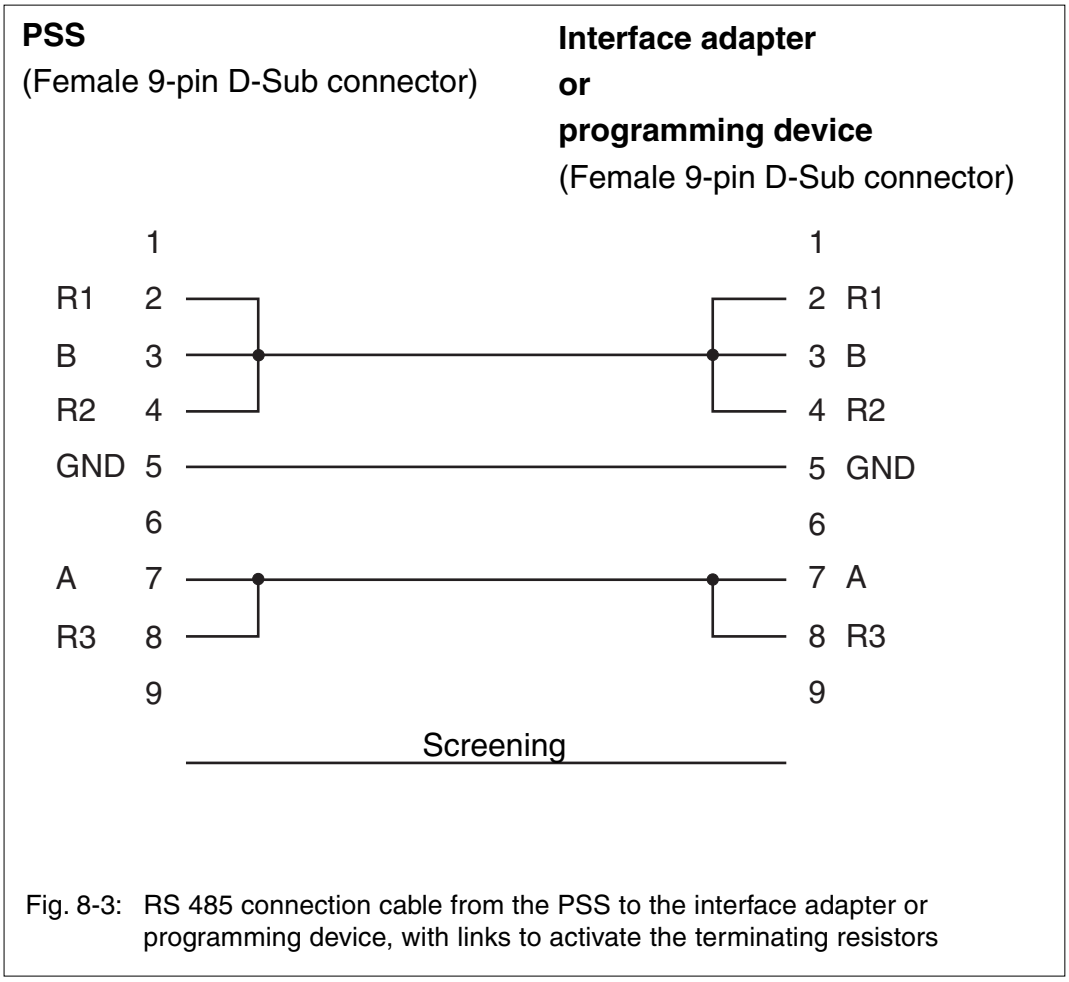


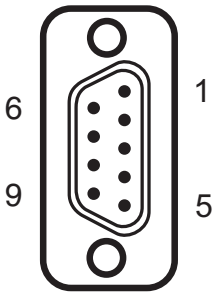
Fig. 8-3: RS 485 connection cable from the PSS to the interface adapter or programming device, with links to activate the terminating resistors

User interface (“USER”)

The user interface is a combined RS 232/RS 485 interface. Both interfaces are available on a male 9-pin D-Sub connector.

NOTICE
Never operate the combined RS 232 and RS 485 interface simultaneously or in parallel. The programmable safety system is not designed for this.

Male D-Sub connector
9-pin



RS 232	RS 485
2: RxD	1: A
3: TxD	5: GND
4: DTR	9: B
5: GND	
6: DSR	
7: RTS	
8: CTS	

Fig. 8-4: Configuration of the user interface

Interfaces

User interface RS 232

A detailed description of the interface can be found in the “FS System Description” and “ST System Description” in the PSS-range manual package.

INFORMATION
To connect PX(T) display systems, PMI graphics systems and the Pilz MPI adapter to the RS 232 user interface on the PSS you will need a cable with a layout as shown in Fig. 8-5. This cable is available under order number 301 965. The cable is not suitable for connecting a PX 20 (see operating manual PX 20).

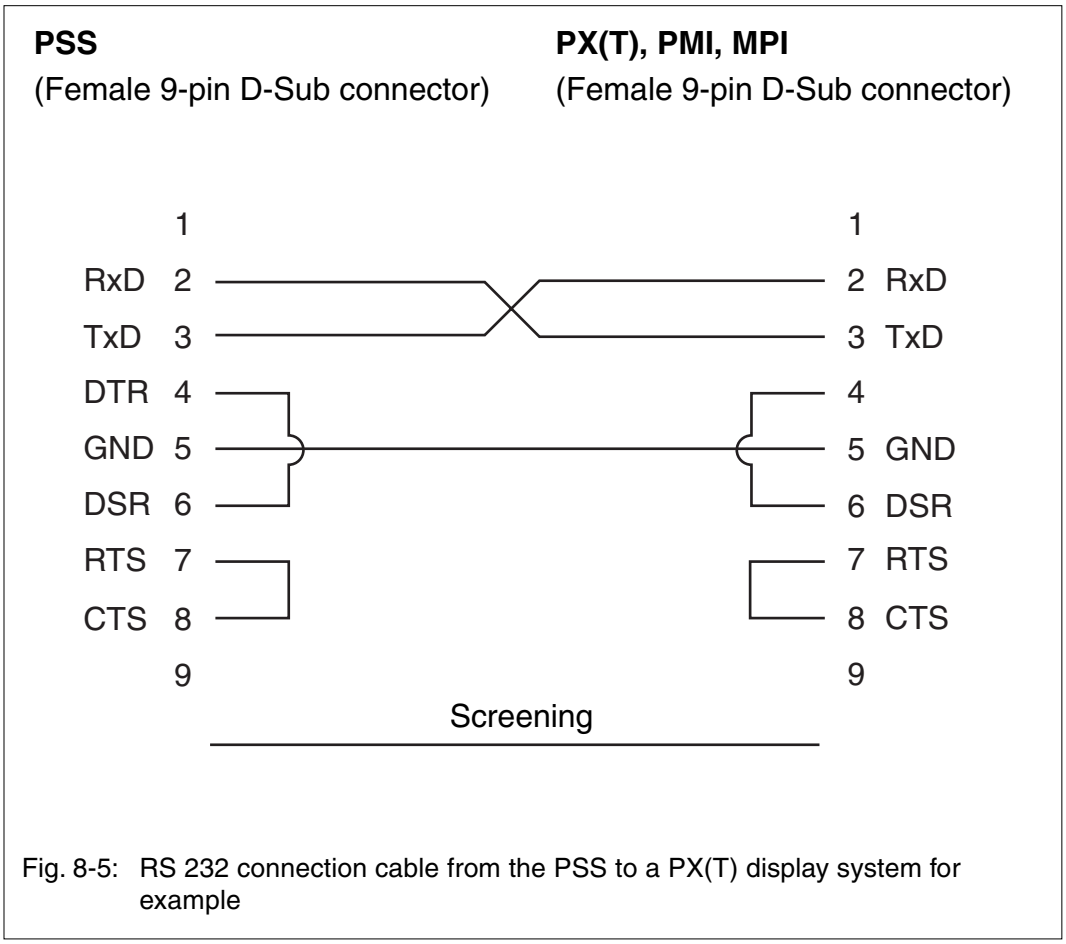


Fig. 8-5: RS 232 connection cable from the PSS to a PX(T) display system for example

User interface RS 485

A detailed description of the interface can be found in the “FS System Description” and “ST System Description” in the PSS-range manual package.

The RS 485 interface has internal termination: 120 Ohm between A and B, 270 Ohm between A and 5 V and between B and GND.

The termination on the RS 485 user interface can be switched off. To do this, press the **R_T (USER)** button on the front of the module to the OFF position. This will enable you to build up an RS 485 network.

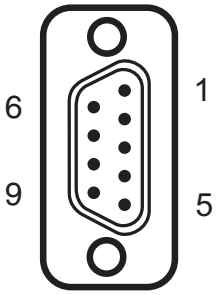
Button R_T (USER)	**Status**	**Key**
	Button operated, ON position	Terminating resistors are connected
	Button not operated, OFF position	Terminating resistors are disconnected

SafetyBUS p interface (“SafetyBUS p”)

Some unit types have a SafetyBUS p interface. Connection to SafetyBUS p is via a male 9-pin D-Sub connector. Detailed information on SafetyBUS p can be found in the SafetyBUS p manual.

Male D-Sub connector

9-pin



1: n.c.
2: CAN_L (brown)
3: CAN_GND (white)
4: n.c.
5: CAN_SHLD
6: n.c.
7: CAN_H (green)
8: Supply voltage for fibre-optic couplers from Pilz
9: n.c.

n.c. = not connected

Fig. 8-6: Configuration of the SafetyBUS p interface

Interfaces for standard bus connections

The standard bus interfaces are described in separate operating manuals. The necessary operating manuals are supplied with each programmable safety system in the PSS 3075-3 series, depending on the unit type.

Operation and Maintenance

Commissioning

- Install the programmable safety system as described in Chapter 5, “Installation”.
- Connect the inputs and outputs as described in Chapter 7, “Wiring the Inputs and Outputs”.
- Supply voltage for the PSS - as described in Chapter 6 “Supply Voltage” - connect and switch on.

Faults

PSS and SafetyBUS p functionality
If a fault occurs on the safety system or there is a wiring error, the PSS will switch to a STOP condition and output a message to the display. All the decentralised outputs in the I/O-Groups that are assigned to the LD on the PSS will also be switched off.
The error stack display in the system software (e.g. PSS-WIN-PRO) can be used to locate the error. The description for error evaluation can be found in the “FS System Description” in the PSS-range manual package.

Standard bus functionality
Various options are available, should a standard bus interface not achieve the correct operating status:

- Evaluation of the relevant LEDs for operating status (see operating manual for the relevant standard bus system)
- The drivers (standard function blocks) of the standard bus systems will provide some diagnostic options (see operating manual for the relevant software package).
- Bus diagnostics via a corresponding network analyzer
  Network analyzers from various companies are available for the different bus systems. Further information can be found in the operating manual for the relevant analyzer.

Operation and Maintenance

Display elements

PSS functionality

LED	Signal	Key
RUN ST	Off	Standard section of PSS in “STOP”
	Lights green	Standard section of PSS in “RUN”
RUN FS	Off	Failsafe section of PSS in “STOP”
	Lights green	Failsafe section of PSS in “RUN”
	Flashes green	Major error Remedy: Read the error stack, switch off the PSS, rectify the error, switch on the PSS
POWER	Lights green	The internally-generated 5 V supply is within the permitted range.
Digital inputs/outputs	Off	Signal level at “0”
	Lights green	Signal level at “1”

SafetyBUS p functionality

LED “STATUS SB”
The LED lights as soon as the connection to SafetyBUS p is made.

Standard bus functionality

Various operating and fault statuses are displayed via the LEDs on the various standard bus interfaces (see operating manual for the relevant standard bus system).

Changing the battery

If the battery voltage drops below 2.5 V, the CPU will issue the error message “S-04”. You should then change the battery, Only use a battery type that has been approved by Pilz (see chapter entitled “Technical Details”). Battery types that are approved by Pilz are “UL-Recognized”.



CAUTION!

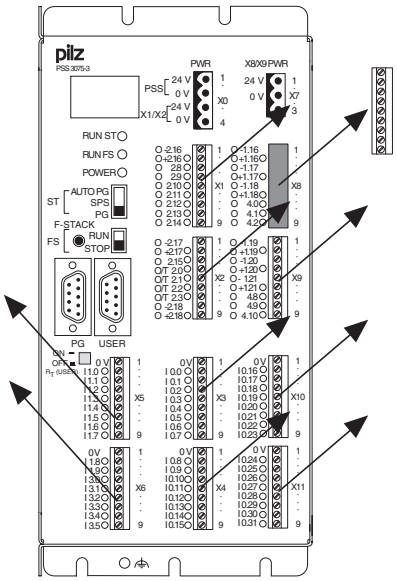
- Damage due to electrostatic discharge!
  Electrostatic discharge can damage components on the safety system. Ensure against discharge before touching the PSS, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.
- Data loss!
  The battery should be changed when the supply voltage is switched off. The CPU will retain data for approx. 2 minutes. If it takes longer to change the battery, data will be lost.



WARNING!

Risk of injury due to improper handling or due to damaged lithium batteries!
Lithium batteries may only be exchanged by specialist staff who have been trained to deal with lithium batteries.

Dead batteries must be disposed of properly!



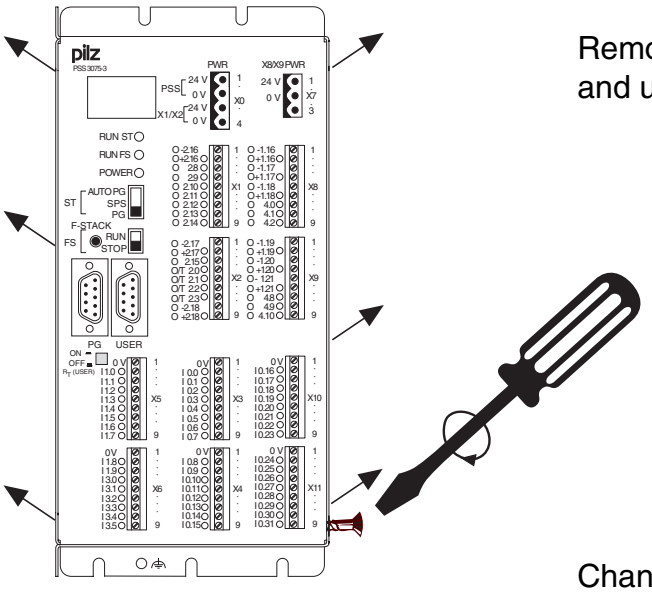
Switch off the supply voltage, remove connector and terminal blocks.

Remove the cap from the “F-STACK” button.

Fig. 9-1: Changing the battery, part 1 (example: PSS 3075-3)

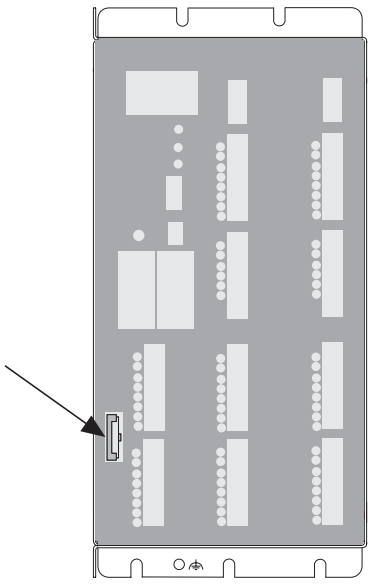
CAUTION!

Adverse effect on the safety functions!
Please ensure that no metal parts get into the open PSS system, as this could adversely affect the system’s safety functions. Please proceed with care!



Remove the blanking plate and undo the screws.

Change the battery and close up the housing.



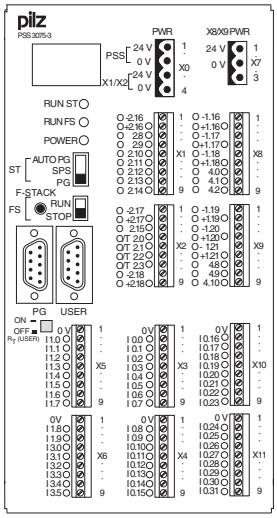
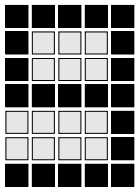


Fig. 9-2: Changing the battery, part 2 (example: PSS 3075-3)

NOTICE
Make sure all the screws are tightened up securely, to ensure the housing is properly connected to the functional earth.



Notes

Technical Details

Electrical data	
Supply voltage	24 VDC
Tolerance	20 ... 30 VDC including residual ripple of max. ± 1.2 V
Current consumption “PSS PWR”	
PSS 3075-3, PSS 3075-3 NR	Max. 570 mA
PSS 3075-3 DP-S	Max. 680 mA
PSS SB 3075-3	Max. 740 mA
PSS SB 3075-3 DP-S, PSS SB 3075-3 CANopen	Max. 860 mA
PSS SB 3075-3 ETH-2 (SE)	Max. 970 mA
PSS SB 3075-3 ETH-2 CANopen	Max. 1200 mA
Total load capacity on the outputs	
“X1/X2 PWR”	10 A
“X8/X9 PWR”	10 A
Max. power dissipation at U_B = 30 V and max. permitted total current	
PSS 3075-3, PSS 3075-3 NR	59 W
PSS 3075-3 DP-S	62 W
PSS SB 3075-3	64 W
PSS SB 3075-3 DP-S, PSS SB 3075-3 CANopen	67 W
PSS SB 3075-3 ETH-2 (SE)	69 W
PSS SB 3075-3 ETH-2 CANopen	72 W
Typ. power dissipation at U_B = 24 V and 50 % of the max. permitted total current	
PSS 3075-3, PSS 3075-3 NR	29 W
PSS 3075-3 DP-S	32 W
PSS SB 3075-3	33 W
PSS SB 3075-3 DP-S, PSS SB 3075-3 CANopen	36 W
PSS SB 3075-3 ETH-2 (SE)	39 W
PSS SB 3075-3 ETH-2 CANopen	42 W

Connection type	Plug-in screw connectors or spring-loaded terminals (accessories)
CPU	
Processing time	Typ. 0.5 ms for 1000 instructions
Real-time clock	Quartz-driven clock in standard section
Alarm processing	Max. 6 alarms in failsafe section
Flags Failsafe section Standard section	 5184 2048
Times	64 in both FS and ST section
Time base	50, 100 ms; 1, 10, 60 s
Counters	64 in both FS and ST section
Data memory Failsafe section Standard section	 64 kByte, **non**-retentive 170 KByte, non-volatile (battery)
Program memory Failsafe section Standard section	 Integral 512 kByte Flash memory Integral 512 kByte Flash memory
Display	4-digit
Interfaces	Galvanically isolated: Combined RS 232 (with minimum configuration)/RS 485 interface for programming device, Combined RS 232/RS 485 as user interface (termination is selectable)
Battery (not on PSS 3075-3 NR) Service life	Lithium, Type CR2477N (see accessories) ca. 2 years
SafetyBUS p	
Status display	LED
Transmission rate	Max. 500 kBit/s
Cable runs	Max. 3500 m
Transmission type	Differential two-wire cable, Fibre-optic cable via fibre-optic coupler
Connection	Male 9-pin D-Sub connector

Inputs and outputs	
Polarity protection	Yes
Galvanic isolation	Yes (optocoupler)
Status display	LED
Inputs	
Number	48, 6 of which are alarm inputs
Signal level at “0”	-3 ... +5 VDC
Signal level at “1”	+15 ... +30 VDC
Input current	Typ. 6 mA
Input delay	< 1 ms, alarm inputs: 0.5 ms
Pulse suppression	≤ 300 µs (requirement: in the PSS Configurator, ≥ 3 ms must be configured under “Max. delay of digital inputs” and “DI test time”.)
Alarm detection time	Alarm inputs that do not use test pulses: 2 ms Alarm inputs that use test pulses: 3 ms
Outputs - single-pole	
Number	18, 4 of which are test pulse outputs
Output current at “1” without UL approval with UL approval	 Max. 3,5 A (see Derating diagrams) Max. 1,5 A
Short circuit protection	Electronic
Limitation of inductive switch-off	Test pulses: ca. UB -42 VDC Single-pole outputs: ca. UB -70 VDC
Residual current at “0” Signal	0 mA
Signal level at “0”	0 VDC
Signal level at “1”	U_B -1 VDC at 3.5 A
Switch-off delay	Test pulses: ca. 50 µs Single-pole outputs: < 200 µs
On time during self test	ca. 200 µs
Off time during self test	400 µs ... 500 µs

Technical Details

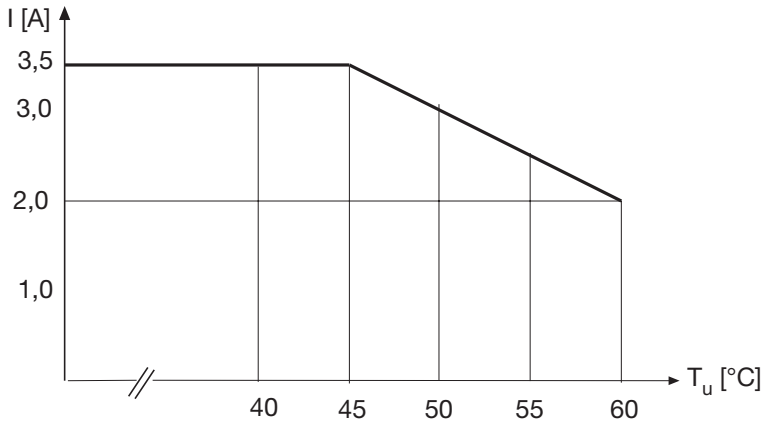
Outputs - dual-pole	
Number of outputs	9
Output current at “1”	2 A ... 3,5 A see Derating diagrams
Short circuit protection	Electronic
Limitation of inductive switch-off	$-U_B$
Residual current at “0” Signal	Test pulses: 5 mA for max. 700 µs
Signal level at “0”	12 VDC at both output terminals
Signal level at “1”	U_B -2 VDC at 3.5 A
Output switch delay	50 µs
Test pulse	< 700 µs
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Mounting position	Vertical
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temp. (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock EN 60068-2-27, 03/93 EN 60068-2-29, 04/93	 15g, 11 ms 10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Mechanical data	
Weight	
PSS 3075-3, PSS 3075-3 NR	2300 g
PSS 3075-3 DP-S	2700 g
PSS SB 3075-3	2750 g
PSS SB 3075-3 ETH-2 (SE)	2850 g
PSS SB 3075-3 DP-S	3050 g
PSS SB 3075-3 CANopen	3065 g
PSS SB 3075-3 ETH-2 CANopen	3150 g
Dimensions (H x W x D)	
PSS 3075-3, PSS 3075-3 NR	246.4 x 123.6 x 162 mm
PSS 3075-3 DP-S, PSS SB 3075-3, PSS SB 3075-3 ETH-2 (SE)	246.4 x 160.2 x 162 mm
PSS SB 3075-3 DP-S, PSS SB 3075-3 CANopen, PSS SB 3075-3 ETH-2 CANopen	246.4 x 196.8 x 162 mm

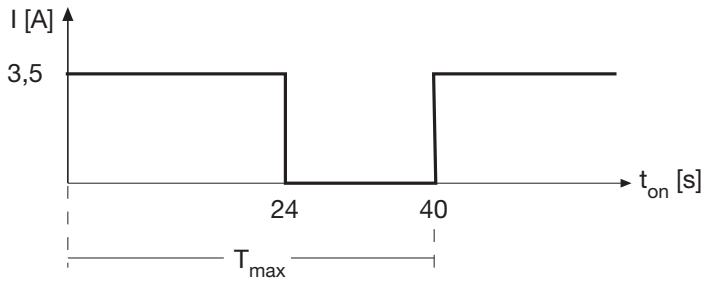
Technical Details

Derating diagrams

Current load capacity of the outputs, depending on the ambient temperature T_u



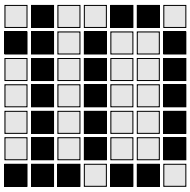
Max. current load capacity of 3.5 A when T_u >45 °C
Continuous duty: 60% based on T_{max}: 40 s



Accessories

Battery	Order No.
PSS ZKL 3075-3 (Set of plug-in screw connectors)	300 910
PSS ZKF 3075-3 (Set of sprint-loaded terminals)	300 912
PSS ZCM Cable Mounting Plate (Mounting plate for cable strain relief)	300 920
PSS ZCC Cable Clip (Cable feed retainer)	300 922
PSS ZKL Upgrade Kit 3046/3074 (Plug-in screw connector to upgrade the supply voltage terminal on a PSS 3046/PSS 3074 to one for a PSS from the PSS 3047-3/PSS 3075-3 series)	300 924
Lithium Type CR2477N 3.0 V 950 mAh	300 930

The names of products, goods and technologies used in this manual are trademarks of the respective companies.



Notes

Appendix

Address of Safety Network International e.V.

Safety Network International e.V.
Robert-Bosch-Straße 30
D-73760 Ostfildern
Germany
Tel. No.: +49 7 11 34 09-1 18
Fax No.: +49 7 11 34 09-4 49
E-Mail: info@safety-network.com

Changes in the documentation

Changes in Version 21 071-02

Old page	New page	Change
-	-	Additional PROFIBUS interface (PSS 3075-3 DP-S), expanded in various places

Changes in Version 21 071-03

Old page	New page	Change
-	-	Additional PSS SB 3075-3 and PSS SB 3075-3 DP-S, expanded in various places

Changes in Version 21 071-04

Old page	New page	Change
-	-	Additional PSS SB 3075-3 ETH-2, expanded in various places

Appendix

Changes in Version 21 071-05

Old page	New page	Change
-	3-2	New: section "Product modifications"
10-3	10-3	Technical details was amended
-	10-5	New: section "Derating diagrams"

Changes in Version 21 071-06

Old page	New page	Change
-	-	Additional PSS SB 3075-3 CANopen, expanded in various places

Changes in Version 21 071-07

Old page	New page	Change
-	-	Additional PSS SB 3075-3 ETH-2 SE, expanded in various places

Changes in Version 21 071-08

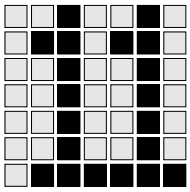
Old page	New page	Change
10-3	10-3	Technical details was amended

Changes in Version 21 071-09

Old page	New page	Change
-	-	Additional PSS SB 3075-3 ETH-2 CANopen, expanded in various places

Changes in Version 21 071-10

Old page	New page	Change
-	-	Additional PSS 3075-3 NR, expanded in various places



Notes

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