PSSu E F 2DOR 8(-T)(-R)

PILZ
THE SPIRIT OF SAFETY

- Decentralised system PSSuniversal I/O

Operating Manual-21334-EN-13

1 Introduction

1.1 Validity of documentation

This documentation is valid for the product types PSSu E F 2DOR 8, PSSu E F 2DOR 8-T and PSSu E F 2DOR 8-R. It is valid until new documentation is published.

This operating manual explains the function and operation, describes the installation and provides guidelines on how to connect the product.

1.1.1 Retaining the documentation

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

1.1.2 Terminology: System environment A and B

The PSSu system can be used in two different system environments. The module's application area is described in the chapter "Intended Use" of the manual.

The distinction is made between

- PSSu in system environment A
- PSSu in system environment B

The distinction is based on the application area of the PSSu system.

PSSu in system environment A may be used in the

- Decentralised system PSSu I/O
- **Not** in the automation system PSS 4000

PSSu in system environment B may be used in the

- Automation system PSS 4000, e.g. with
  - Decentralised system PSSu I/O with SafetyNET p
  - Control system PSSu PLC
  - Control system PSSu multi

1.2 Definition of symbols

Information that is particularly important is 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 product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.

INFORMATION

This gives advice on applications and provides information on special features.

2 Overview

2.1 Module structure

A module consists of

- Electronic module and
- Base module with
  - Screw terminals or
  - Cage clamp terminals

The base modules are the carrier units for the electronic modules and are used to connect the field wiring. The electronic modules are inserted on to the base modules and determine the module's function.

Details of the base modules that can be used are available in the chapter entitled “Intended Use”.

2.2 Module features

The product has the following features:

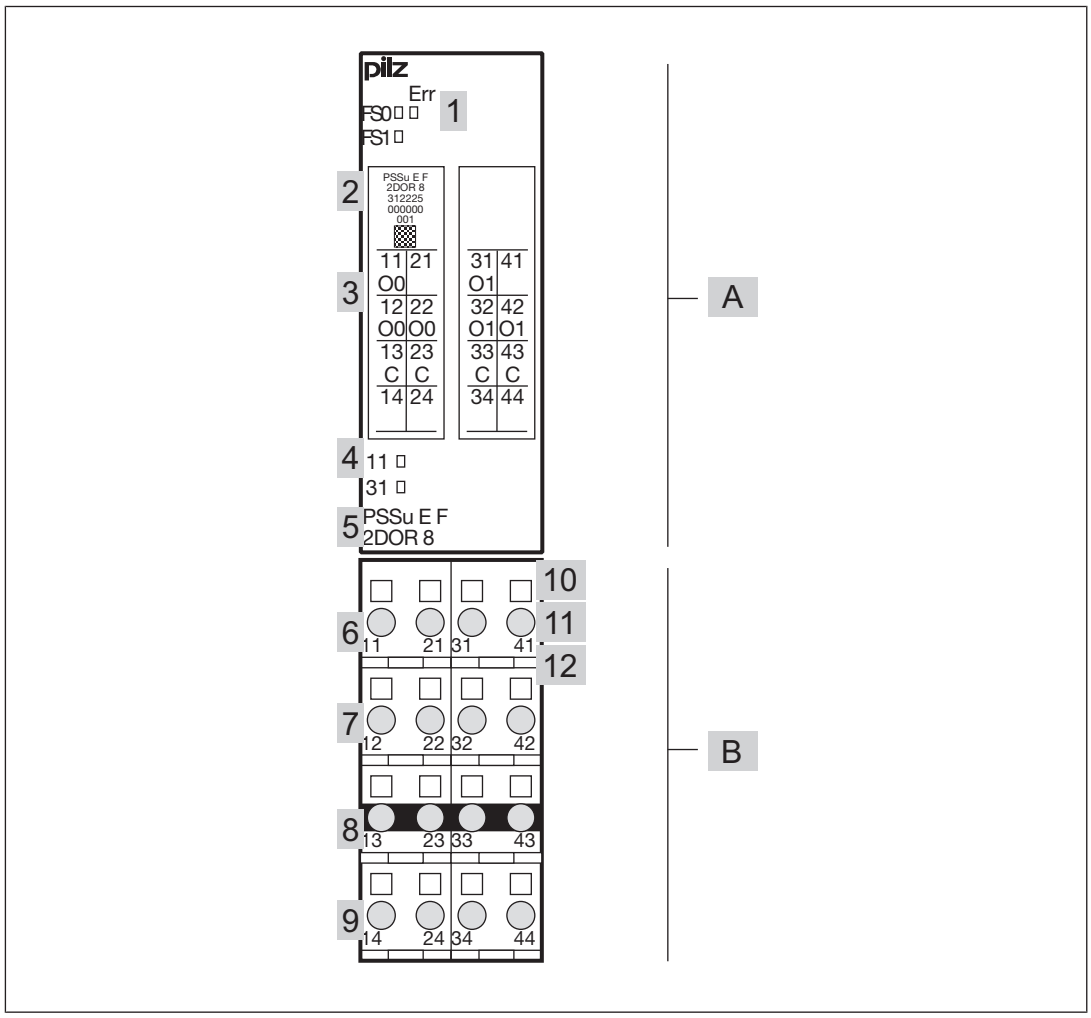
- Relay contacts
  - N/O contact
  - Volt-free
  - Current load capacity per output: 8 A
- LEDs for:
  - Switch status of each output
  - Module error

- For failsafe applications in system environment A and B
- T-type:

  PSSu E F 2DOR 8-T: for increased environmental requirements
- R-type:

  PSSu E F 2DOR 8-R: for railway applications

2.3 Front view



Legend:

- A: Electronic module
- B: Base module
- 1: LEDs for
  - Module diagnostics
  - Displaying an output's FS enable (enable principle)
- 2: Labelling strip with:
  - Name of electronic module
  - Order number
  - Serial number

  - Hardware version number
  - 2D code
- 3: Labelling strip for the terminal configuration on the base module
- 4: Status LEDs
- 5: Name of electronic module
- 6: Connection level 1
- 7: Connection level 2
- 8: Connection level 3
- 9: Connection level 4
- 10: Square mounting holes (connection levels 1, 2, 3 and 4)
  - With screw to loosen/tighten the screw terminal on base modules with screw terminals
  - With mechanism to operate the cage clamp on base modules with cage clamp terminals
- 11: Round connection holes (connection levels 1, 2, 3 and 4) for connecting the signal lines
- 12: Mounting slot for colour marker to label the connection level (connection levels 1, 2, 3 and 4)

3 Safety

3.1 Intended use

The module may be used for failsafe applications in system environment A and B (automation system PSS 4000).

The modules PSSu E F 2DOR 8 and PSSu E F 2DOR 8-T may be used as a safety components in accordance with the Lifts Directive 95/16/EC in accordance with the requirements of EN 81-1/2:1998+A3:2009, EN 81-20:2015, EN 81-50:2015, EN 81-22:2014 and EN 115-1:2008+A1:2010.

The programmable safety system should be installed in a protected environment that meets at least the requirements of pollution degree 2. Example: Protected inside space or control cabinet with protection class IP54 and corresponding air conditioning.

The module meets the requirements of EN IEC 61508 up to SIL 3.

It provides failsafe outputs in accordance with IEC 61131-2. The module may be used to switch:

- Resistive loads
- Inductive loads

The module can be used in furnaces. If the module's relay outputs shut down the entire fuel supply and the furnace is used in continuous operation, appropriate external measures must be used to establish diversity of the shutdown elements (requirement of EN 50156-1). For example, an appropriate measure may be an additional, monitored switching element (contactor or relay), which is controlled by a safe semiconductor output and is switched in series with both relay outputs.

The module PSSu E F 2DOR 8-T is suitable for use where there are increased environmental requirements (see Technical Details).

The module PSSu E F 2DOR 8-R is suitable for use where there are increased environmental requirements demanded by railway applications (see Technical details).

Intended use includes making the electrical installation EMC-compliant. Please refer to the guidelines stated in the "PSSuniversal Installation Manual". The module is designed for use in an industrial environment. It is not suitable for use in a domestic environment, as this can lead to interference.

The following is deemed improper use in particular:

- Any component, technical or electrical modification to the module
- Use of the module outside the areas described in this manual
- Any use of the module that is not in accordance with the technical details.

INFORMATION

The module is supported by

- PSSuniversal Configurator and PSSuniversal Assistant from Version 1.4.0
- PAS4000 from Version 1.0.0
  - We recommend that you always use the latest version (download from www.pilz.com).

The PSSu E F 2DOR 8 module may be used in conjunction with the following base modules:

- PSSu BP 2/16 S
- PSSu BP 2/16 C
- PSSu BP-C 2/16 S
- PSSu BP-C 2/16 C

The PSSu E F 2DOR 8-T and PSSu E F 2DOR 8-R modules may be used in conjunction with the following base modules:

- PSSu BP 2/16 S-T
- PSSu BP 2/16 C-T
- PSSu BP-C 2/16 S-T
- PSSu BP-C 2/16 C-T

3.2 Safety regulations

3.2.1 Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by competent persons.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. To be able to inspect, assess and operate devices, systems and machines, the person has to be informed of the state of the art and the applicable national, European and international laws, directives and standards.

It is the company's responsibility only to employ personnel who

- Are familiar with the basic regulations concerning health and safety / accident prevention,
- Have read and understood the information provided in the section entitled Safety
- Have a good knowledge of the generic and specialist standards applicable to the specific application.

3.2.2 Warranty and liability

All claims to warranty and liability will be rendered invalid if

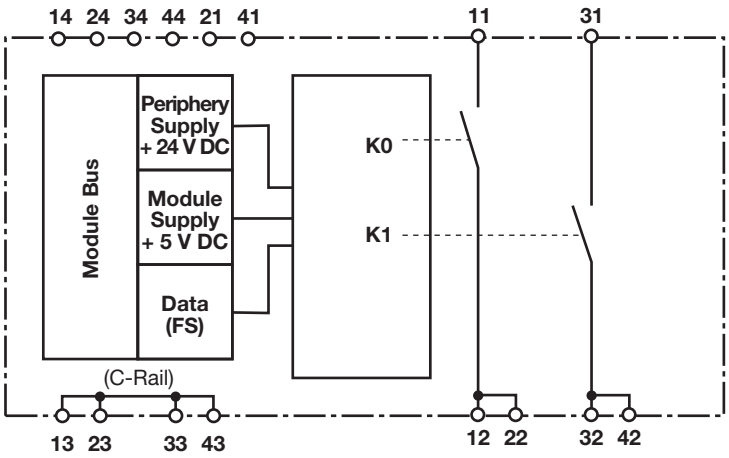
- The product was used contrary to the purpose for which it is intended,
- Damage can be attributed to not having followed the guidelines in the manual,
- Operating personnel are not suitably qualified,
- Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering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

3.2.3 Disposal

- In safety-related applications, please comply with the mission time T_M in the safety-related characteristic data.
- When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

4 Function description

4.1 Block diagram



4.2 Module features

4.2.1 Functions

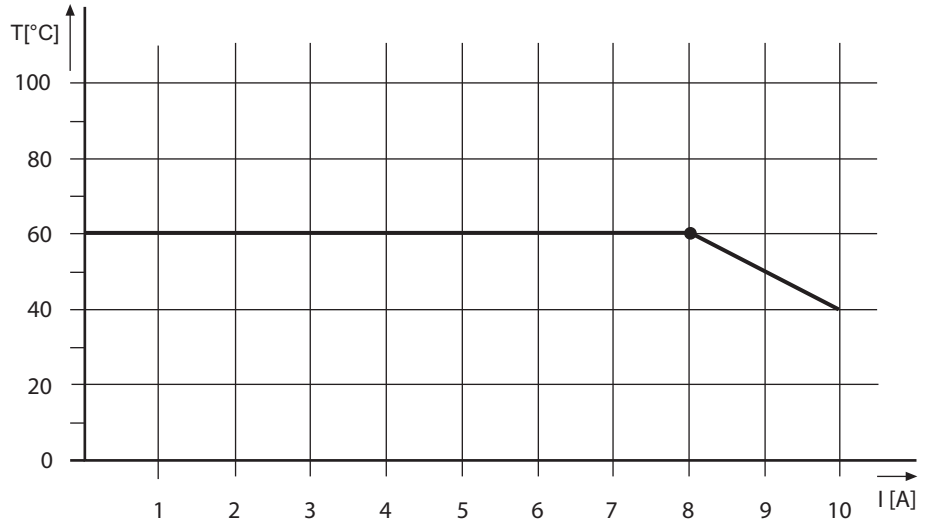
Module supply

- The module supply provides the module with voltage.

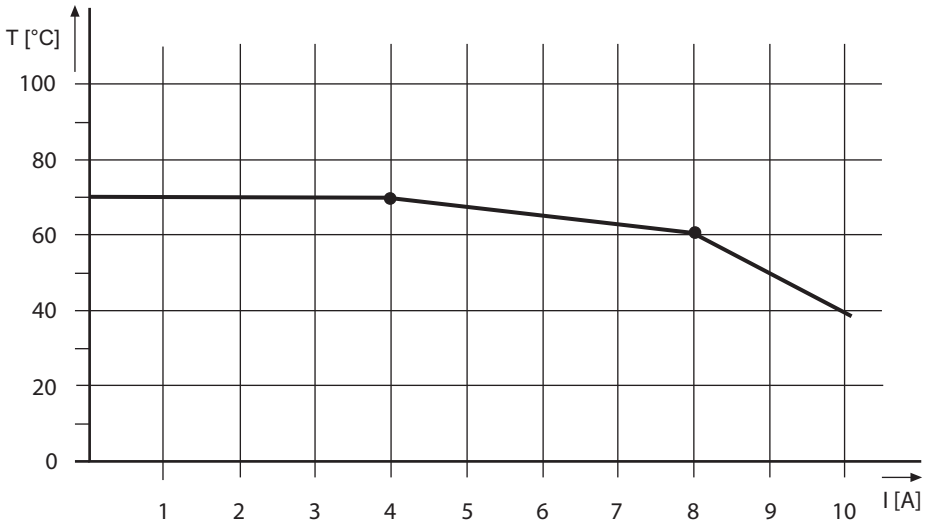
Outputs

- The head module sets the output status via the module bus.
- The relationship between the load current and the operating temperature is illustrated in the following derating diagram. The operating point should be below the characteristic curve.

PSSu E F 2DOR 8: Derating diagram for the permitted ambient temperature T dependent on load current I



PSSu E F 2DOR 8(-T)(-R): Derating diagram for the permitted ambient temperature T dependent on load current I



4.2.2 Integrated protection mechanisms

When the PSSu E F PS1(-T) or PSSu E F PS2(-T)(-R) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

The module has the following protection mechanisms:

- 1 monitored relay contact per output
- Protective separation between both relay contacts (see Technical details)
- Protective separation between both relay contacts and the periphery supply as well as the module supply, in accordance with DIN VDE 0110 overvoltage category 2 in a protected industrial network
- Temperature monitoring

The module provides the following diagnostic data:

- Start-up error
- Configuration error
- FS communication error
- Bus termination error
- Temperature error: Too warm
- Temperature error: Too hot
- Relay control error
- Relay error

4.2.3 Reaction times

Information on the reaction times of the outputs can be found in the PSSuniversal System Description.

4.3 Configuration

4.3.1 PSSu assignment in system environment A

Functions for the FS outputs of a PSSu are defined in the PSSuniversal Configurator on the PSS WIN-PRO system software:

- Read access through the standard bus system
  (configured per module):
  “R” configuration
- Read/write access through the standard bus system
  (configured per FS output):
  "&" configuration (local enable principle)
- Optimisation of ST process image by combining adjacent bits of the same type.
  “*” configuration

INFORMATION

The PSSuniversal Configurator on the PSS WIN-PRO system software must be used to define the I/O-Groups to which FS inputs and outputs belong (SafetyBUS p). The PSSu can be divided into sections A and B for this purpose. All the FS outputs on a PSSu always belong to section A.

Section A and section B on a PSSu may belong to different I/O-Groups.

Further information on configuration is available in the PSSuniversal Configurator's online help.

4.3.1.1 Addresses in the process image

The module occupies 2 consecutive bit addresses in the process image. The process image in which the outputs are shown depends on the configuration.

With write access ("&"), the Bits in the ST-PIO are used to switch the FS outputs with the local enable principle.

Configuration	SafetyBUS p	Standard bus system	
	FS-PIO	ST-PII	ST-PIO
None	2 Bit (e. g.: 32.00 … 32.01)	- - -	- - -
Read ST (“R”)		2 Bit	- - -
ST read and write (“&”)		2 Bit	2 Bit

4.3.2 PSSu assignment in system environment B

Data access is via pre-defined I/O data types:

I/O data name	I/O data type	I/O data element	Meaning
O0(11,21)	FS_O_DO	Data: SAFEBOOL	Output data O0
O1(31,32)	FS_O_DO	Data: SAFEBOOL	Output data O1

5 Installation

5.1 General installation guidelines

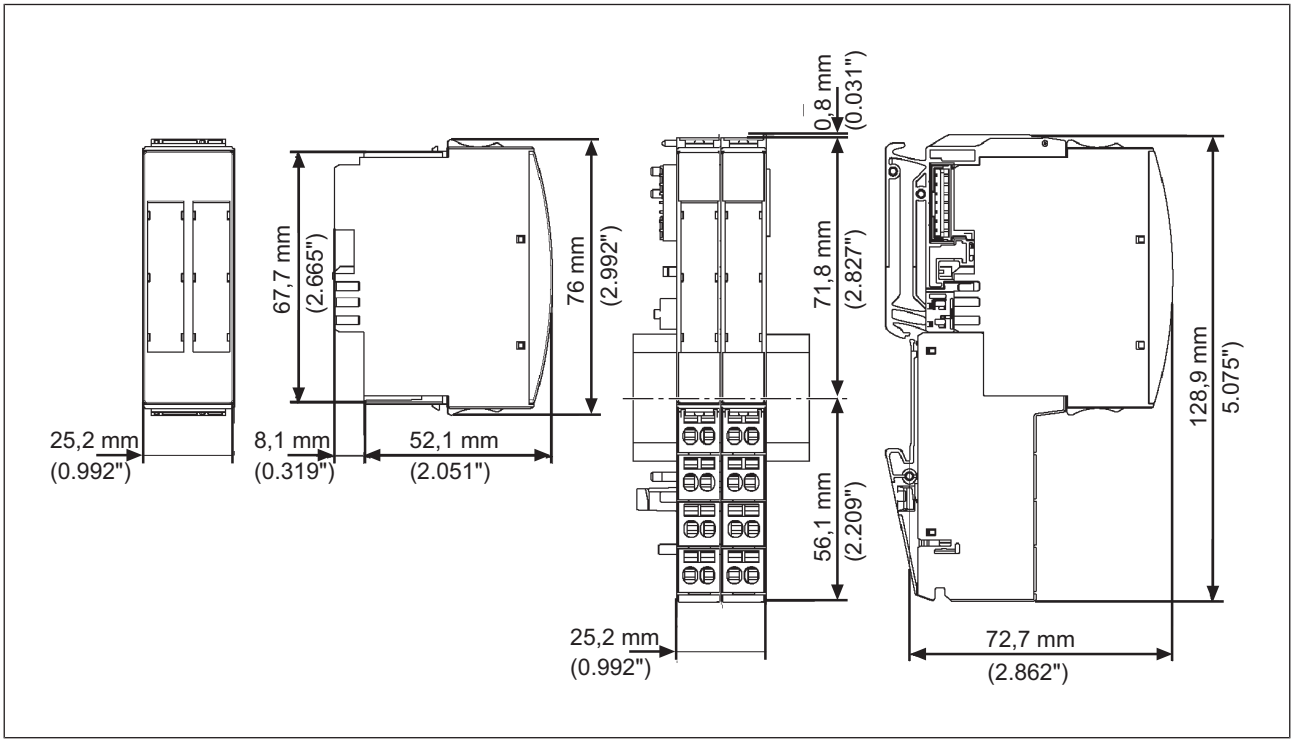
Please refer also to the PSSuniversal Installation Manual.

NOTICE

Damage due to electrostatic discharge!

Electrostatic discharge can damage components. Ensure against discharge before touching the product, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.

5.1.1 Dimensions



5.2 Installing the base module

Prerequisite:

- The head module must be installed.
- If the head module does not have an integrated power supply, a supply voltage module must be installed to the right of the head module.

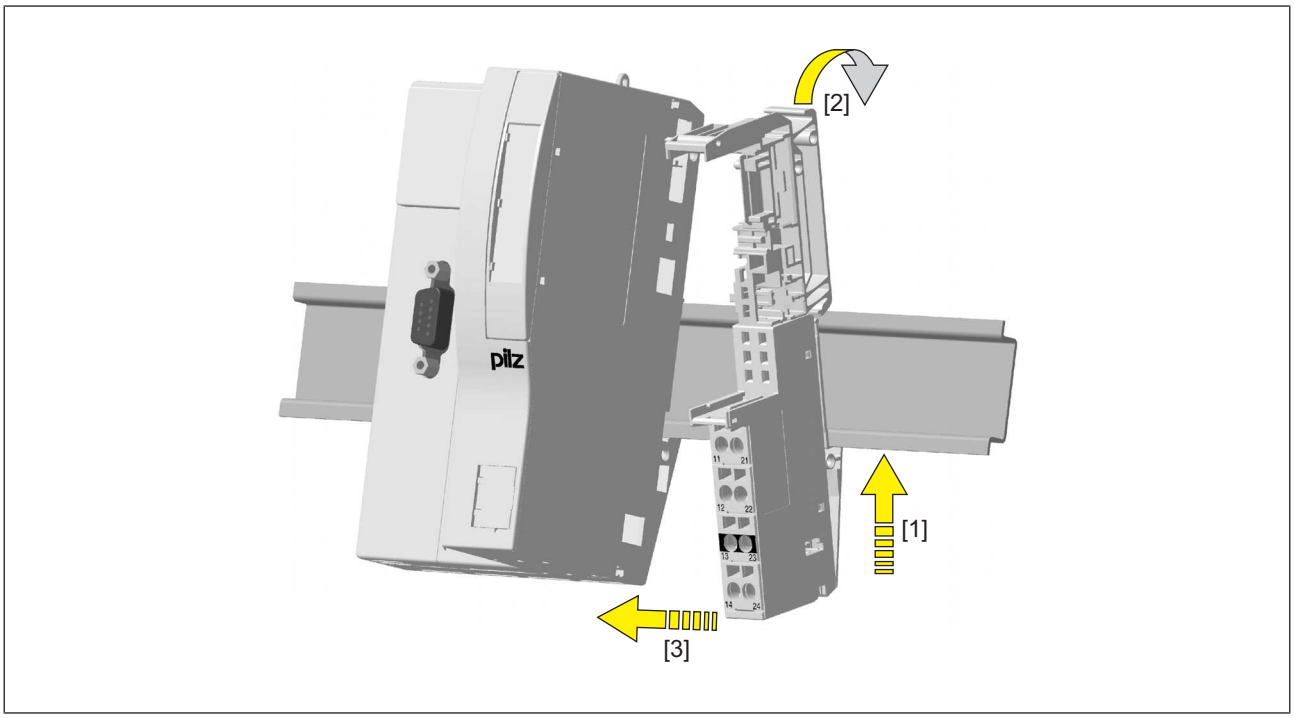
Please note:

- For mechanical reasons it is not possible to mix base modules with screw terminals and base modules with cage clamp terminals.
- All contacts should be protected from contamination.
- The mechanics of the base modules are designed for 50 plug in/out cycles.

Procedure:

- We recommend that you wire up the base modules before inserting the electronic modules.
- Slot the groove on the base module on to the mounting rail from below [1].
- Push the base module back [2] until you hear it lock into position.
- On the mounting rail, slide the base module to the left until you hear the two lateral mounting hooks on the adjacent module lock into position [3].

Schematic representation:



5.3 Inserting and removing an electronic module

Please note:

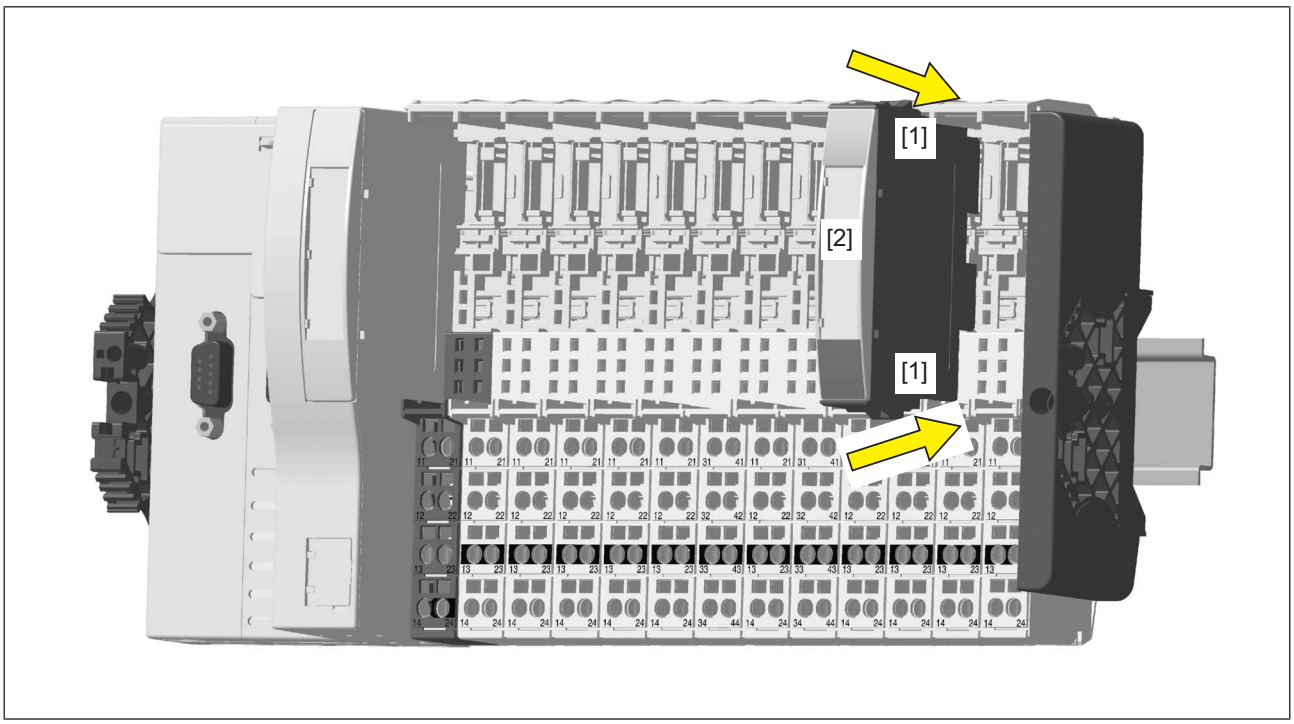
- Only insert on to base modules that are already installed.
- Preferably these base modules should be ready wired.
- Electronic modules with outputs may only be inserted and removed when the load is switched off. Unforeseeable error reactions may be triggered if modules are inserted and removed under load.
- When an electronic module is plugged into a base module for the first time, one part of the coding element remains on the electronic module, while its counterpart is fixed on to the base module. This is how the base module is coded.
- The mechanics of the electronic modules are designed for 50 plug in/out cycles.

5.3.1 Inserting an electronic module

Procedure:

- The electronic module must audibly lock into position [1].
- Mark the electronic module using the labelling strips [2].

Schematic representation:

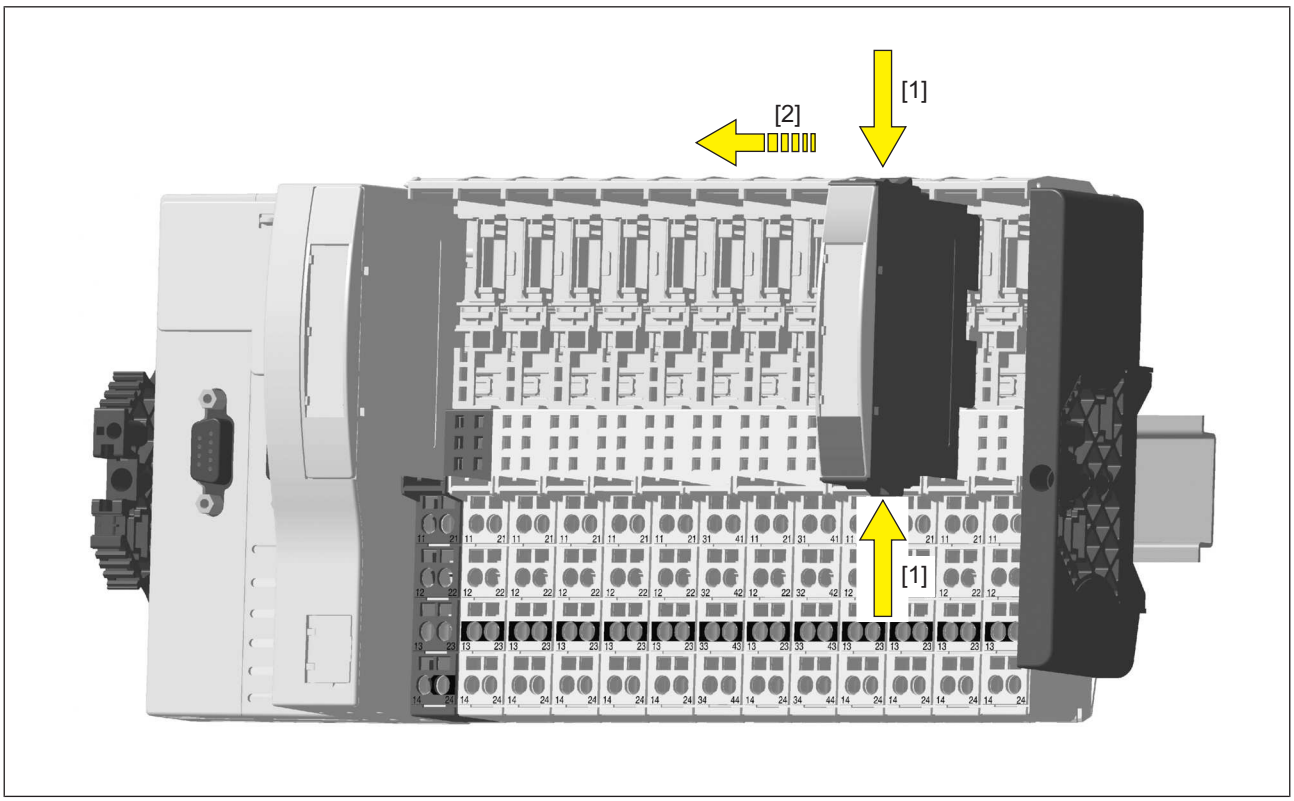


5.3.2 Removing an electronic module

Procedure:

- Press the locking mechanisms [1] together simultaneously.
- Pull out the electronic module [2].

Schematic representation:



5.3.3 Changing an electronic module during operation

It is possible to change an electronic module during operation. The configuration data is retained when a module is changed.

Effects:

- System environment A:
  - In the event of a potential FS communication error, the FS section of the PSSu system and all relevant I/O-Groups (SafetyBUS p) switch to a STOP condition.
- System environment B:
  - All FS hardware outputs on the PSSu system switch to a safe condition.
  - The substitute values are used for the modules' FS outputs, with Valid Bits = FALSE.

CAUTION!

Sparking can cause interference and errors!

Only change the module when the load is switched off!

6 Wiring

6.1 General wiring guidelines

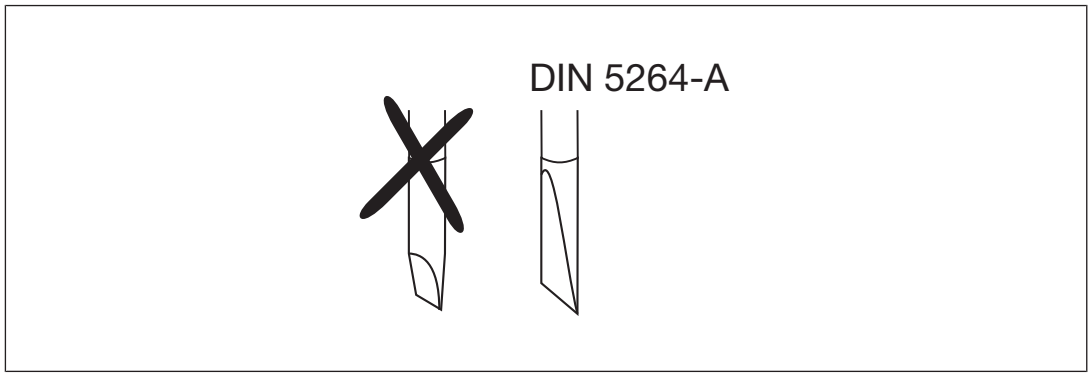
Please note:

- If short circuits occur between the cable from the output to the load and a supply line, it will no longer be possible to switch off the load. Possible remedies:
  - Use separate multicore cable for supply voltages
  - Use dual actuators, e.g. two contactors in series.
  - Use an additional shutdown device such as a main contactor
- Use appropriate wiring to exclude short circuits between the outputs!
- The actuators may be connected using unshielded cables.
- To prevent contact welding, a fuse should be connected before the output contacts (see Technical details).
- With inductive loads, sufficient fuse protection must be provided on all output contacts.
- When installed at a height of over 2000 m above sea level, only protective extra low voltage may be connected to the relay contacts.
- If voltages higher than 50 VAC or 120 VDC are connected to the relay contacts, please note the following:
  - Specific accident prevention regulations apply.
  - For safety reasons, only the protective earth (PE) may be connected to the C-rail of the supply group.
- Use copper wiring.

6.1.1 Mechanical connection of the base modules

Procedure:

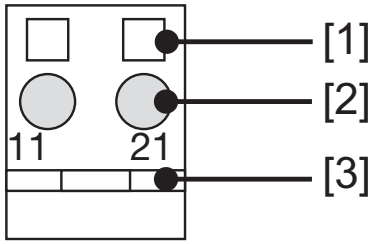
- Use a flat blade screwdriver (DIN 5264-A)!

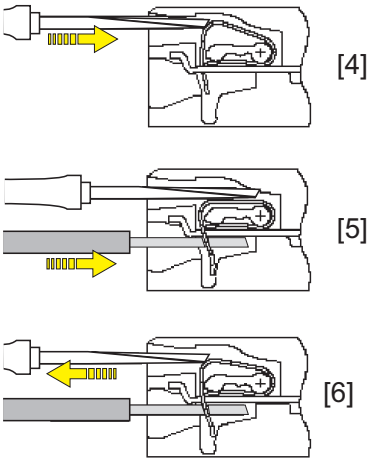


- Strip the wire back 8 mm.
- If necessary, label the connection level with a colour marker [3].
- Base module with screw terminals:
  - Use a screwdriver to loosen the screw on the screw terminal [1]
  - Insert the stripped cable into the round fixing hole [2], as far as it will go.
  - Tighten up the screw on the screw terminal.

– Check that the cable is firmly seated.

- Base module with cage clamp terminals:
  – Insert the screwdriver [4] into the square hole [1].
  – Insert the stripped cable into the round fixing hole [2], as far as it will go [5].
  – Pull out the screwdriver [6].
  – Check that the cable is firmly seated.



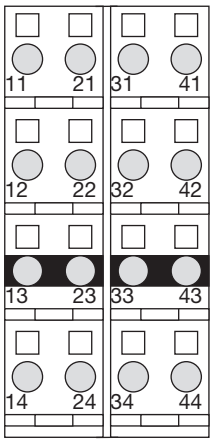


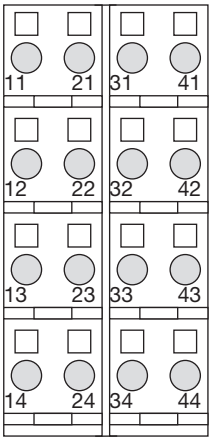
Please note:

- The minimum cable cross section for field connection terminals on the base modules is 0.14 mm^2 (AWG26).
- The maximum cable cross section for field connection terminals is:
  – Digital inputs: 1.5 mm^2 (AWG16)
  – Digital outputs: 2.0 mm^2 (AWG14)
  – Inputs/outputs on the counter modules: 1.5 mm^2 (AWG16)
  – Analogue inputs/outputs: 1.5 mm^2 (AWG16)
  – Communication cables: 1.5 mm^2 (AWG16)
  – Test pulse outputs: 1.5 mm^2 (AWG16)
  – Power supply: 2.5 mm^2 (AWG12)
  – Functional earth: 2.5 mm^2 (AWG12)

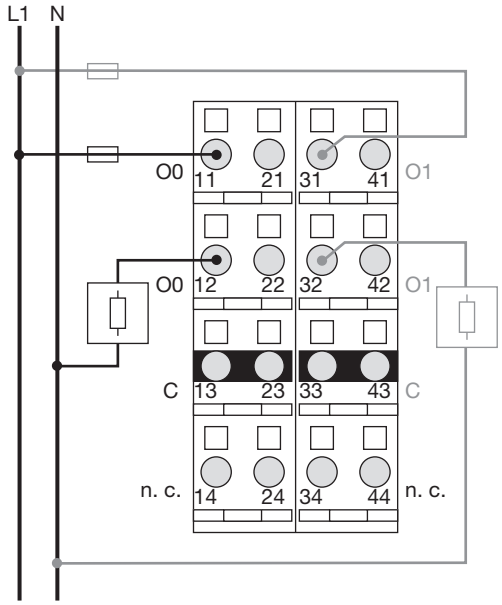
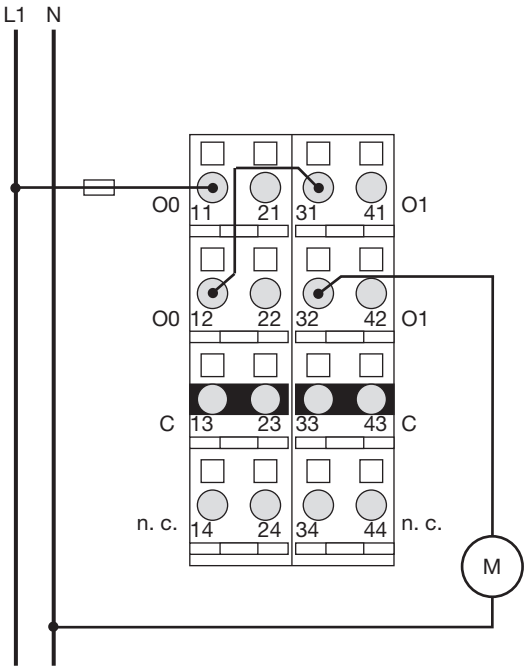
- On base modules with screw terminals:
  - If you use a multi-strand cable to connect the I/Os, it is recommended that you use ferrules conforming to Parts 1 and 2 of DIN 46228, 0.14 ... 1.5 mm², Form A or C, although this is not essential. To crimp the ferrules you can use crimp pliers (crimp form A or C) conforming to EN 60947-1, such as the PZ 1.5 or PZ 6.5 from Weidmüller, for example.
  - Maximum torque setting: 0.8 Nm
- Use copper wiring.

6.2 Terminal configuration

Base module	Terminal configuration	
With C-rail	11: Output O0 Relay contact 1 21: Not assigned 12-22: Output O0 Relay contact 2 (12-22 linked within the base module) 13-23: C-rail supply (13-23-33-43 linked within the base module) 14-24: Not assigned 31: Output O1 Relay contact 1 41: Not assigned 32-42: Output O1 Relay contact 2 (32-42 linked within the base module) 34-44: Not assigned	

Base module	Terminal configuration	
Without C-rail	11: Output O0 Relay contact 1 21: Not assigned 12-22: Output O0 Relay contact 2 (12-22 linked within the base module) 14-24: Not assigned 31: Output O1 Relay contact 1 41: Not assigned 32-42: Output O1 Relay contact 2 (32-42 linked within the base module) 34-44: Not assigned	

6.3 Connecting the module

Output circuit	With C-rail
Single-channel actuator Switches 230 VAC	
Dual-channel actuator Switches 230 VAC	

6.4 Function test during commissioning

An error must be simulated for each safety-related output during commissioning: The anticipated error reaction must occur when an output has a short circuit to a supply voltage.

INFORMATION

The short circuit test must be performed on the load and not on the output terminal.

7 Operation

NOTICE

The safety function should be checked after initial commissioning and each time the plant/machine is changed. The safety functions may only be checked by qualified personnel.

When the relay outputs are switched on, the mechanical contact on the relay cannot be tested automatically. Depending on the operational environment, measures to detect the non-opening of switching elements may be required under some circumstances.

When the product is used in accordance with the European Machinery Directive, a check must be carried out to ensure that the safety contacts on the relay outputs open correctly. Start the device again or open the safety contacts (switch off output), so that the internal diagnostics can check the correct opening of the safety contacts

- for SIL CL 3/PL e at least 1x per month
- for SIL CL 2/PL d at least 1x per year

7.1 Messages

A module error is displayed via the "Err" LED (see section entitled "Display elements"). It is signalled to the head module and then entered in the

- Error stack, with PSSu in system environment A
- Diagnostic log, with PSSu in system environment B.

of the head module.

The module can detect the following errors:

Module error	Explanation	Remedy
Start-up error	Error as the PSSu system starts up	Change faulty module.
Configuration error	Incorrect module type configured.	The configured hardware registry does not match the actual hardware registry.
FS communication error	Error during FS communication	Change faulty module.
Bus termination error	There is no terminating plate or there is a bad contact with the module bus.	Install a terminating plate with integrated end bracket or insert the base modules together correctly.
Temperature error: too warm ([1])	Ambient temperature too high: Error stack entry/diagnostic log entry	Ensure there is sufficient ventilation in the control cabinet or prevent overload.
Temperature error: too hot ([1])	Ambient temperature too high: Reset the module and stop the affected I/O-Groups (SafetyBUS p)	Ensure there is sufficient ventilation in the control cabinet or prevent overload.
Relay control error	Error during cyclical monitoring test of the relay coils	Change faulty relay module.

Module error	Explanation	Remedy
Relay error	A relay position is faulty. Possible cause: Defective relay contact	Change faulty relay module.
Error in the local enable principle	FS output has reacted incorrectly or unexpectedly	Check the configuration of the FS output, or check the fieldbus signals in the FS and ST section.

([1]) There are two levels of overtemperature.

- Too warm:
  If a module's temperature exceeds a threshold value, the module sends a warning to the head module. If the temperature drops back below the threshold value, the module sends an all-clear.
- Too hot:
  If a module's temperature exceeds a further threshold value, the module sends an error message to the head module and triggers an I/O-Group stop.

7.2 Display elements

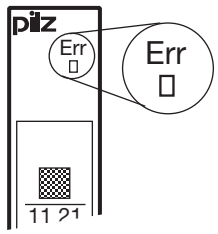
Legend

☼ LED on

● LED off

7.2.1 Display elements for module diagnostics

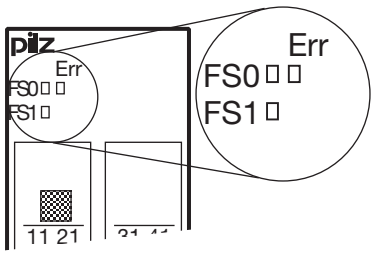
The module has an LED for displaying module errors ("Err" LED).



LED			Meaning
Name	Colour	Status	
Err	- - -	●	No error
	Red	☼	Module error

7.2.2 Display elements for an output's FS enable

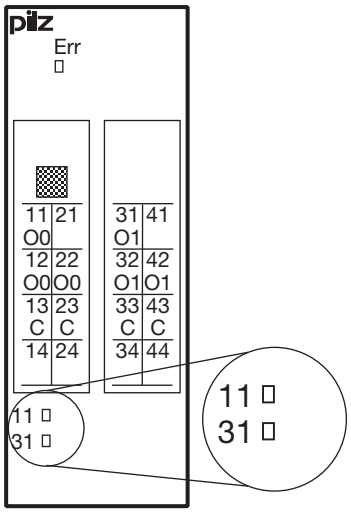
FS outputs are driven via a standard bus system using the local enable principle. An FS enable is assigned to each of these FS outputs. The status of that enable is displayed via the enable LEDs (“FS0” and “FS1”).



LED			Key
Description	Colour	Status	
FS0	- - -	●	No FS enable for output O0
	Yellow	☼	FS enable for output O0
FS1	- - -	●	No FS enable for output O1
	Yellow	☼	FS enable for output O1

7.2.3 Display elements for output status

Each output is assigned an LED for displaying the output status (LEDs “11” and “31”).



LED			Meaning		
Designation	Colour	Status	Signal	Output	Terminal
11	- - -	●	0 signal	O0 (Output 1)	11, 12-22
	Green	☼	1 signal		
31	- - -	●	0 signal	O1 (Output 2)	31, 32-42
	Green	☼	1 signal		

8 Technical details

General	312225	314225	315225
Certifications	CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed	CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed	CE, TÜV
Application range	Failsafe	Failsafe	Failsafe
Module's device code	0C03h	0C03h	0C03h
Number of FS output bits	2	2	2
Application in system environment A			
From FS firmware version, other head modules	4	4	–
From FS firmware version PSSu H F PN	1	1	–
Application in system environment B			
From FS firmware version, head modules	1.0.0	1.0.0	1.5.0
Electrical data	**312225**	**314225**	**315225**
Internal supply voltage (module supply)			
Module's power consumption	0,2 W	0,2 W	0,2 W
Periphery's supply voltage (periphery supply)			
Voltage range	16,8 - 30 V	16,8 - 30 V	16,8 - 30 V
Module's current consumption with no load	60 mA	60 mA	60 mA
Module's power consumption with no load	1,5 W	1,5 W	1,5 W
Max. power dissipation of module	2,5 W	2,5 W	2,5 W
Max. inrush current at UB	1 A	1 A	1 A
Permitted loads	inductive, resistive	inductive, resistive	inductive, resistive
Relay outputs	**312225**	**314225**	**315225**
Number of relay outputs	2	2	2
Utilisation category			
In accordance with the standard	EN 60947-4-1	EN 60947-4-1	EN 60947-4-1

Relay outputs	312225	314225	315225
Utilisation category of safety contacts			
AC1 at	**250 V**	**250 V**	**250 V**
Min. current	**10 mA**	**10 mA**	**10 mA**
Max. current	**8 A**	**8 A**	**8 A**
Max. power	**2000 VA**	**2000 VA**	**2000 VA**
AC1 with condensation at	–	**30 V**	**30 V**
Min. current	–	**10 mA**	**10 mA**
Max. current	–	**8 A**	**8 A**
Max. power	–	**240 VA**	**240 VA**
DC1 at	**24 V**	**24 V**	**24 V**
Min. current	**10 mA**	**10 mA**	**10 mA**
Max. current	**8 A**	**8 A**	**8 A**
Max. power	**192 W**	**192 W**	**192 W**
DC1 at	–	–	**60 V**
Min. current	–	–	**10 mA**
Max. current	–	–	**1,66 A**
Max. power	–	–	**100 W**
Utilisation category			
In accordance with the standard	**EN 60947-5-1**	**EN 60947-5-1**	**EN 60947-5-1**
Utilisation category of safety contacts			
AC15 at	**230 V**	**230 V**	**230 V**
Max. current	**3 A**	**3 A**	**3 A**
AC15 with condensation at	–	**30 V**	**30 V**
Max. current	–	**3 A**	**3 A**
DC13 (6 cycles/min) at	**24 V**	**24 V**	**24 V**
Max. current	**5 A**	**5 A**	**5 A**
DC13 at	–	–	**60 V**
Max. current	–	–	**0,7 A**
Utilisation category in accordance with UL			
Voltage	**250 V AC G.U. (same polarity)**	**250 V AC G.U. (same polarity)**	–
With current	**3 A**	**3 A**	–
Voltage	**24 V DC G. P.**	**24 V DC G. P.**	–
With current	**3 A**	**3 A**	–
Pilot Duty	**B300, R300**	**B300, R300**	–
External contact fuse protection, safety contacts			
In accordance with the standard	**VDE 0660**	**VDE 0660**	**VDE 0660**
Blow-out fuse, quick	**10 A**	**10 A**	**10 A**
Blow-out fuse, slow	**6 A**	**6 A**	**6 A**

Relay outputs	312225	314225	315225
Max. processing time for relay output tProcOM when signal changes from "1" to "0"	**120 ms**	**120 ms**	**120 ms**
Typ. processing time of relay output tProcOM when signal changes from "0" to "1"	**20 - 60 ms**	**20 - 60 ms**	**20 - 60 ms**
Contact material	**AgCuNi + 0,2 µm Au**	**AgCuNi + 0,2 µm Au**	**AgCuNi + 0,2 µm Au**
Potential isolation between relay contact and module supply	**4900 V (prot. separation)**	**4900 V (prot. separation)**	**4900 V (prot. separation)**
Potential isolation between relay contact and periphery supply	**4900 V (prot. separation)**	**4900 V (prot. separation)**	**4900 V (prot. separation)**
Potential isolation between relay contact and C-rail	**3050 V (basic insulation)**	**3050 V (basic insulation)**	**3050 V (basic insulation)**
Potential isolation between relay contact 1 and relay contact 2	**4900 V (prot. separation)**	**4900 V (prot. separation)**	**4900 V (prot. separation)**
Environmental data	**312225**	**314225**	**315225**
Application site			
In accordance with the standard	–	–	**EN 50125-3**
Application site	–	–	**Track area (1 m - 3 m)**
In accordance with the standard	–	–	**EN 61373**
Application site	–	–	**Category 1, Class A + B**
Climatic suitability	**EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78**	**EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78**	**EN 50125-1, EN 50125-3, EN 50155, EN 60068-2-1, EN 60068-2-14, EN 60068-2-2**
Ambient temperature			
In accordance with the standard	**EN 60068-2-14**	**EN 60068-2-14**	**EN 50155**
Temperature range	**0 - 60 °C**	**-40 - 70 °C**	**-40 - 70 °C**
Max. temperature in accordance with UL	**60 °C**	**60 °C**	–
In accordance with the standard	–	–	**EN 50125-1**
Temperature range	–	–	**-40 ... +70 °C**
In accordance with the standard	–	–	**EN 50125-3**
Temperature range	–	–	**-40 ... +70 °C**
Storage temperature			
In accordance with the standard	**EN 60068-2-1/-2**	**EN 60068-2-1/-2**	**EN 60068-2-1/-2**
Temperature range	**-25 - 70 °C**	**-40 - 70 °C**	–

Environmental data	312225	314225	315225
Climatic suitability			
In accordance with the standard	**EN 60068-2-78**	**EN 60068-2-78**	–
Humidity	**93 % r. h. at 40 °C**	**93 % r. h. at 40 °C**	–
Condensation during operation	**Not permitted**	**Short-term (only with separated extra low voltage)**	**Short-term (only with separated extra low voltage)**
Max. operating height above sea level	**2000 m**	**2000 m**	**2000 m**
Max. operating height above sea level in accordance with EN 81-1, EN 81-2 and EN 115-1	**2000 m**	**2000 m**	–
EMC	**EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4**	**EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4**	**EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4**
Vibration			
In accordance with the standard	**EN 60068-2-6**	**EN 60068-2-6**	**EN 50125-3**
Frequency	**10 - 150 Hz**	**10 - 150 Hz**	**5 - 2000 Hz**
Acceleration	**1g**	**1g**	**0,23g**
Broadband noise			
In accordance with the standard	–	**EN 60068-2-64**	**EN 61373**
Frequency	–	**5 - 500 Hz**	**5 - 150 Hz**
Acceleration	–	**1,9grms**	**0,79 g RMS**
Shock stress			
In accordance with the standard	**EN 60068-2-27**	**EN 60068-2-27**	**EN 50125-3**
Number of shocks	**6**	**6**	**20**
Acceleration	**15g**	**15g**	**2g**
Duration	**11 ms**	**11 ms**	**11 ms**
In accordance with the standard	**EN 60068-2-27**	**EN 60068-2-27**	**EN 61373**
Number of shocks	**1000**	**1000**	**20**
Acceleration	**10g**	**10g**	**5g**
Duration	**16 ms**	**16 ms**	**30 ms**
Supply interruptions			
In accordance with the standard	–	–	**EN 50155**
Class	–	–	**S2, C1, C2**
Airgap creepage			
In accordance with the standard	**EN 60664-1**	**EN 60664-1**	**EN 50124-1**
Overvoltage category	**III**	**III**	**OV2**
Pollution degree	**2**	**2**	**PD2**

Environmental data	312225	314225	315225
Protection type			
In accordance with the standard	**EN 60529**	**EN 60529**	**EN 60529**
Housing	**IP20**	**IP20**	**IP20**
Terminals	**IP20**	**IP20**	–
Mounting area (e.g. control cabinet)	**IP54**	**IP54**	**IP51**
Mechanical data	**312225**	**314225**	**315225**
Mechanical life	**10,000,000 cycles**	**10,000,000 cycles**	**10,000,000 cycles**
Material			
Bottom	**PC**	**PC**	**PC**
Front	**PC**	**PC**	**PC**
Coding	**PA**	**PA**	**PA**
Mounting type	**plug-in**	**plug-in**	**plug-in**
Dimensions			
Height	**76 mm**	**76 mm**	**76 mm**
Width	**25,2 mm**	**25,2 mm**	**25,2 mm**
Depth	**60,2 mm**	**60,2 mm**	**60,2 mm**
Weight	**90 g**	**91 g**	**93 g**
Mechanical coding			
Type	**H**	**H**	**H**
Colour	**Yellow**	**Yellow**	**Yellow**

Where standards are undated, the 2009-10 latest editions shall apply.

Further information about the switching capability is available in the service life graphs.

8.1 Safety characteristic data

NOTICE

You must comply with the safety characteristic data in order to achieve the required safety level for your plant/machine.

Operating mode	EN ISO 13849-1: 2015 PL	EN ISO 13849-1: 2015 Category	EN 62061 SIL CL	EN 62061 PFH_D [1/h]	IEC 61511 SIL	IEC 61511 PFD	EN ISO 13849-1: 2015 T_M [year]
1-channel	**PL c**	**Cat. 1**	**-**	**7,60E-08**	**-**	**6,66E-03**	**20**
2-channel	**PL e**	**Cat. 4**	**SIL CL 3**	**7,78E-10**	**SIL 3**	**1,34E-06**	**20**

All the units used within a safety function must be considered when calculating the safety characteristic data.

INFORMATION

A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may be different. We recommend that you use the PAScal software tool to calculate the safety function's SIL/PL values.

CAUTION!

It is essential to consider the relay's service life graphs. The relay outputs' safety-related characteristic data is only valid if the values in the service life graphs are met.

The PFH value depends on the switch frequency and the load of the relay output.
If the service life graphs are not accessible, the stated PFH value can be used irrespective of the switch frequency and the load, as the PFH value already considers the relay's B10d value as well as the failure rates of the other components.

8.2 Service life graphs

The service life graphs indicate the number of cycles from which failures due to wear must be expected. The wear is mainly caused by the electrical load; the mechanical load is negligible.

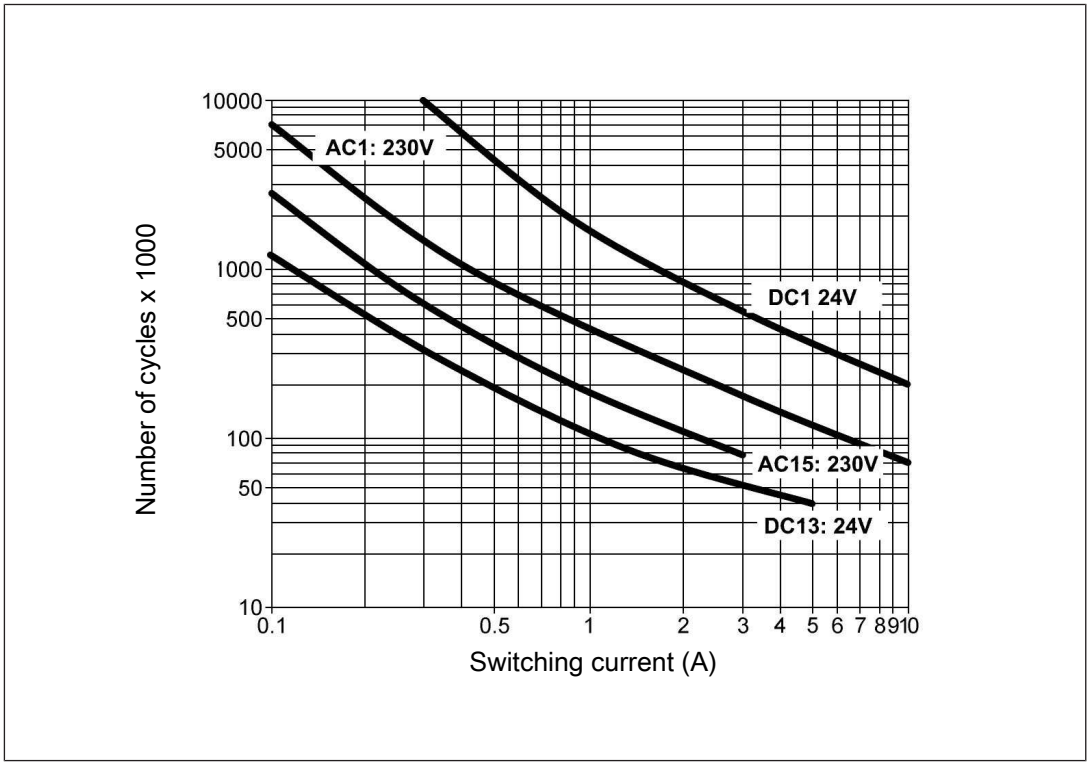


Fig.: Service life graph / Switching capability 24 VDC / 250 VAC

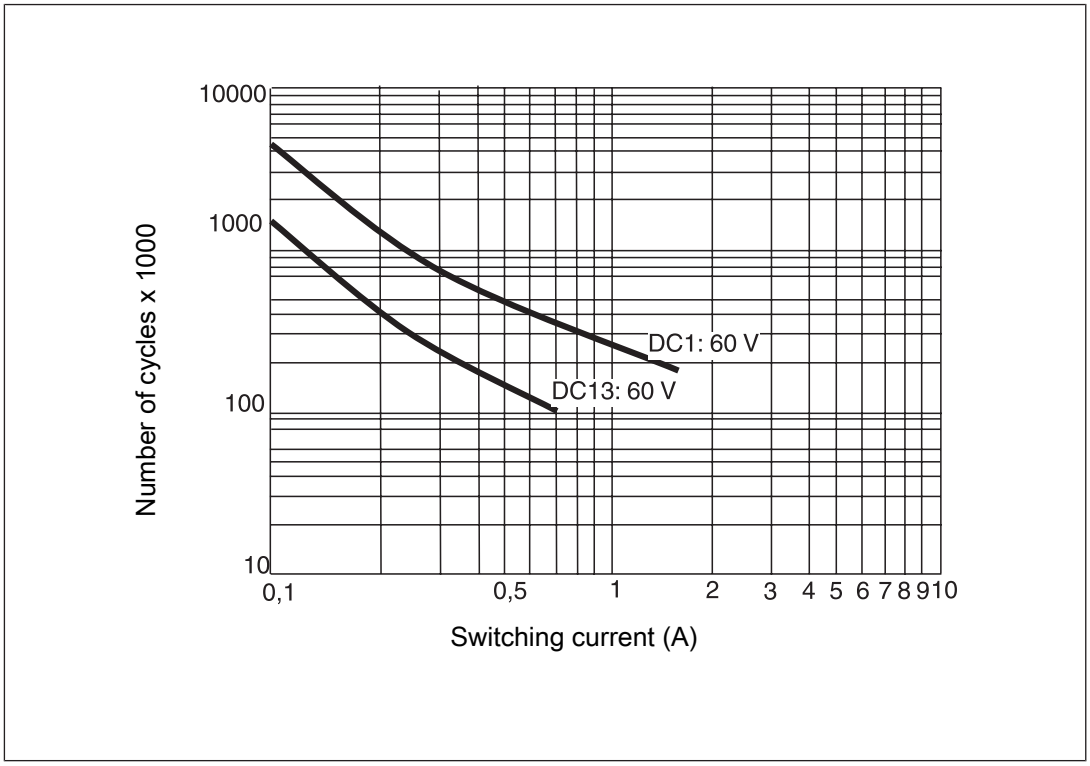


Fig.: Service life graph / Switching capability 60 VDC

Example

- Inductive load: 0.2 A
- Utilisation category: AC15
- Contact service life: 1 000 000 cycles

Provided the application to be implemented requires fewer than 1 000 000 cycles, the PFH value (see Technical details [📖 31]) can be used in the calculation.

To increase the service life, sufficient spark suppression must be provided on all relay contacts. With capacitive loads, any power surges that occur must be noted. With DC contactors, use flywheel diodes for spark suppression.

We recommend you use semiconductor outputs to switch 24 VDC loads.

9 Order reference

9.1 Product

Product type	Features	Order no.
PSSu E F 2DOR 8	Electronic module, base type	312 225
PSSu E F 2DOR 8-T	Electronic module, T-type	314 225
PSSu E F 2DOR 8-R	Electronic module, R-type	315 225

9.2 Accessories

Base modules

Product type	Features	Order no.
PSSu BP 2/16 S	Base module without C-rail with screw terminals	312 628
PSSu BP 2/16 S-T	Base module without C-rail with screw terminals, T-type	314 628
PSSu BP 2/16 C	Base module without C-rail with cage clamp terminals	312 629
PSSu BP 2/16 C-T	Base module without C-rail with cage clamp terminals, T-type	314 629
PSSu BP-C 2/16 S	Base module with C-rail and screw terminals	312 630
PSSu BP-C 2/16 S-T	Base module with C-rail and screw terminals, T-type	314 630
PSSu BP-C 2/16 C	Base module with C-rail and cage clamp terminals	312 631
PSSu BP-C 2/16 C-T	Base module with C-rail and cage clamp terminals, T-type	314 631