

PSSu E F PS-P(-T)(-R)



Decentralised system PSSuniversal I/O

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SD means Secure Digital.

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1.1 Validity of documentation

This documentation is valid for the products types **PSSu E F PS-P**, **PSSu E F PS-P-T** and **PSSu E F PS-P-R**. It is valid until new documentation is published.

The module **PSSu E F PS-P-T** is suitable for use where there are increased environmental requirements (see Technical Details).

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.

1.2 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 product's most important features.

3 Safety

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

4 Function Description

This chapter describes the product's individual components.

5 Installation

This chapter explains how to install the product.

6 Wiring

This chapter describes the product's wiring.

7 Operation

This chapter explains the display elements and advises on what to do if a fault occurs.

8 Technical Details

This chapter contains the product's technical details and order reference.

1.3 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 unit(s) 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.

1 Introduction

2.1 Module structure

A module consists of

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

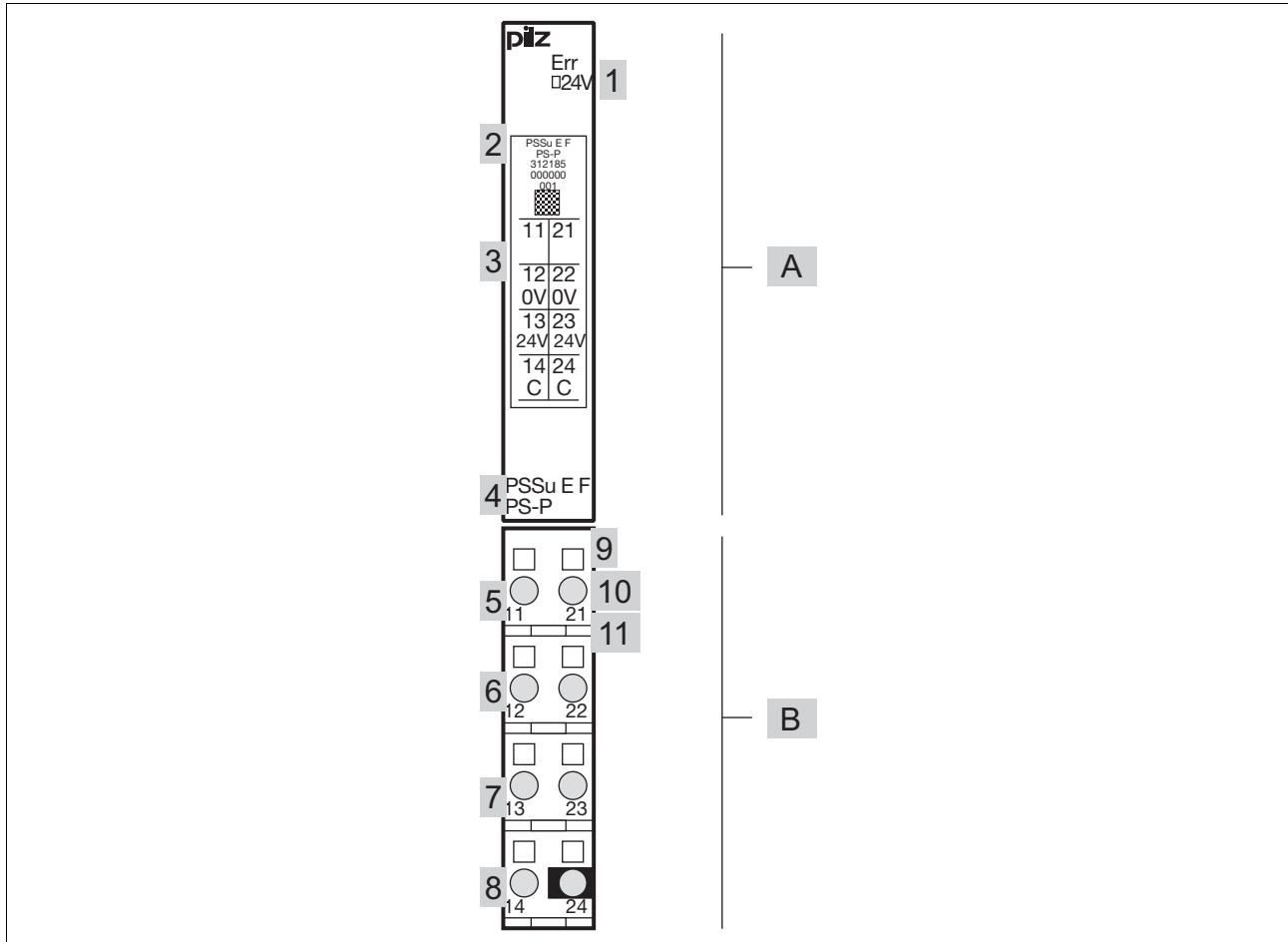
The base modules are the carrier units for the electronic modules and are used to connect the field wiring. The electronic modules are inserted on to the base modules and determine the module's function.

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

2.1.1 Module features

The product has the following features:

- ▶ Infeed for periphery supply
- ▶ Infeed for C-rail supply
- ▶ LEDs for:
 - Periphery supply
 - Module error
- ▶ Application range depends on the base module
- ▶ T-type:
PSSu E F PS-P-T: for increased environmental requirements
- ▶ R-type:
PSSu E F PS-P-R: for railway applications



- ▶ A: Electronic module
- ▶ B: Base module
- ▶ 1: LED for module diagnostics
- ▶ 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: Name of electronic module
- ▶ 5: Connection level 1
- ▶ 6: Connection level 2
- ▶ 7: Connection level 3
- ▶ 8: Connection level 4

2.2 Front view

- ▶ 9: 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
- ▶ 10: Round connection holes (connection levels 1, 2, 3 and 4) for connecting the signal lines
- ▶ 11: Mounting slot for colour marker to label the connection level (connection levels 1, 2, 3 and 4)

3.1 Intended use

The module provides the supply for the periphery supply within the system.

The module be used as:

- ▶ Supply module to refresh the periphery supply
- ▶ Supply module to form supply groups

The module **PSSu E F PS-P-T** is suitable for use where there are increased environmental requirements (see Technical Details).

The module **PSSu E F PS-P-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
- ▶ Use of the module outside the technical details (see chapter entitled "Technical Details")



INFORMATION

The module is supported by

- ▶ PSSuniversal Configurator and PSSuniversal Assistant from Version 1.4.0
- ▶ PAS4000 from version **1.0.0** base type, T-type **1.5.0** R-type
 - We recommend that you always use the latest version (download from www.pilz.de).

The **PSSu E F PS-P** module may be used in conjunction with the following base modules:

- ▶ PSSu BS 1/8S
- ▶ PSSu BS 1/8C

3.1 Intended use

The **PSSu E F PS-P-T** and **PSSu E F PS-P-R** modules may be used in conjunction with the following base modules:

- ▶ PSSu BS 1/8S-T
- ▶ PSSu BS 1/8C-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 someone who, because of their training, experience and current professional activity, has the specialist knowledge required to test, assess and operate the work equipment, devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology.

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 safety guidelines given in this description
- ▶ 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).

4.1 Module features

4.1.1 Supply voltage

Module supply

- ▶ The module supply provides the module with voltage.

The product provides the periphery supply for the modules on the module bus:

- ▶ Refreshing the periphery supply: The relevant base module interrupts the connection to the incoming (left-hand) periphery supply and C-rail on the module bus.
- ▶ Supply to the module bus:
 - Periphery supply for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
- ▶ The periphery supply does not automatically switch off if values exceed or drop below their limits. However, the "24 V" LED will light and a message will be entered in the error stack or diagnostic log.

4.1.1.1 Current load capacity

Ensure you comply with the current load capacity of the periphery supply (see "Technical Details"). If the current load is higher, an additional supply voltage module is required to refresh the periphery supply.

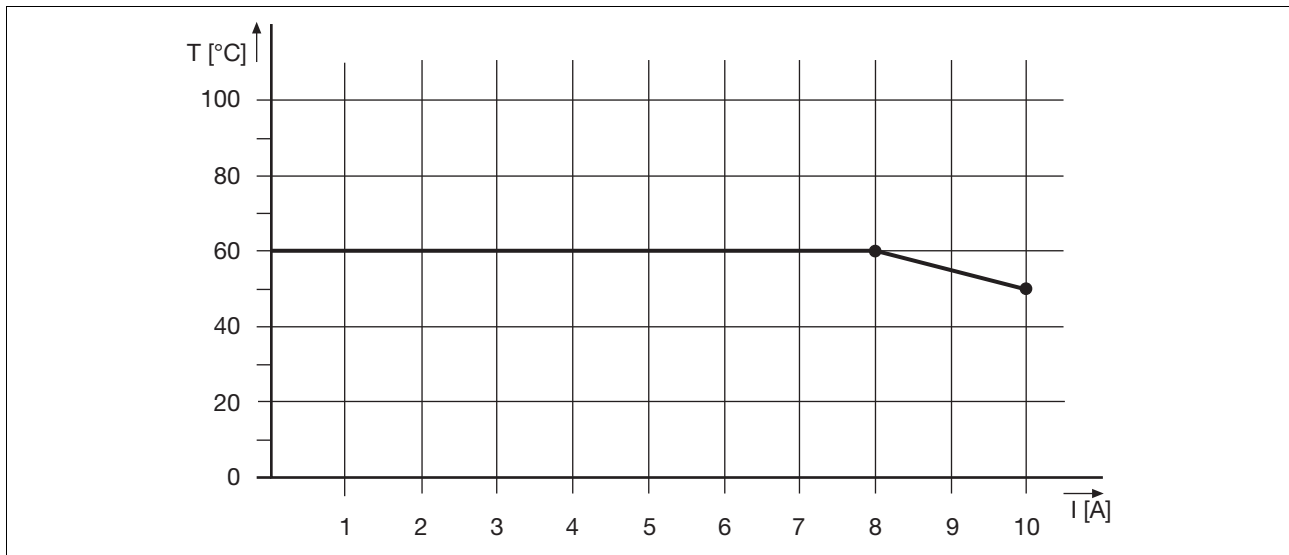
- ▶ Periphery supply

The current load is the total current consumption of the sensors, actuators and test pulses supplied via the input/output modules. The periphery supply does not automatically switch off if values exceed or drop below their limits. However, the "24 V" LED will light and a message will be entered in the error stack or diagnostic log. Please refer to the derating diagram.
- ▶ C-rail

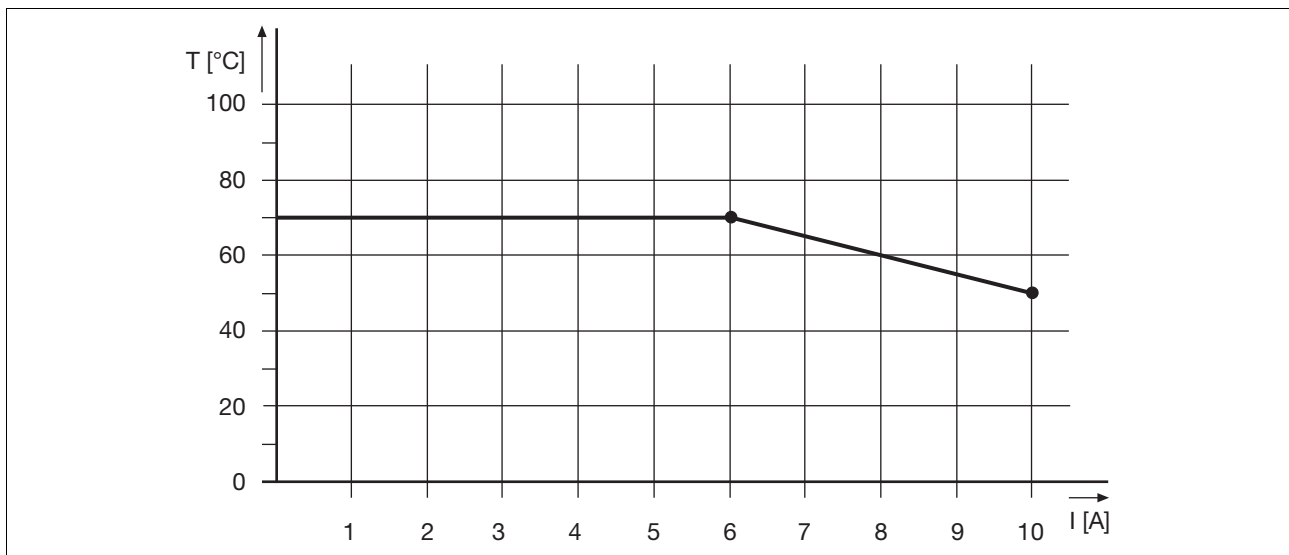
If the current load is higher, the C-rail must use a different supply to prevent overload. Please refer to the derating diagram.

4.1 Module features

PSSu E F PS-P: Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



PSSu E F PS-P(-T)(-R): Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



4.1 Module features

4.1.2 Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

The module registers the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error
- ▶ Temperature error: too warm
- ▶ Overvoltage error
- ▶ Undervoltage error
- ▶ Error in the overvoltage protection diodes

4.2 Configuration

The module does not have to be configured.

4.2.1 Addresses in the process image

The module does not occupy any addresses in the process image.

4.2.2 FS error behaviour

In the case of a safety-related error on an FS output, all FS outputs in the affected I/O-Group (SafetyBUS p) are shut down.

In the case of a safety-related error on an FS input, the process image of all FS inputs in the affected I/O-Group (SafetyBUS p) is set to zero.

The I/O-Group switches to a STOP condition. An error telegram is then triggered on SafetyBUS p and the error is entered in the PSSuniversal error stack.

5.1 General installation guidelines

Please also refer to the PSSuniversal Installation Manual.



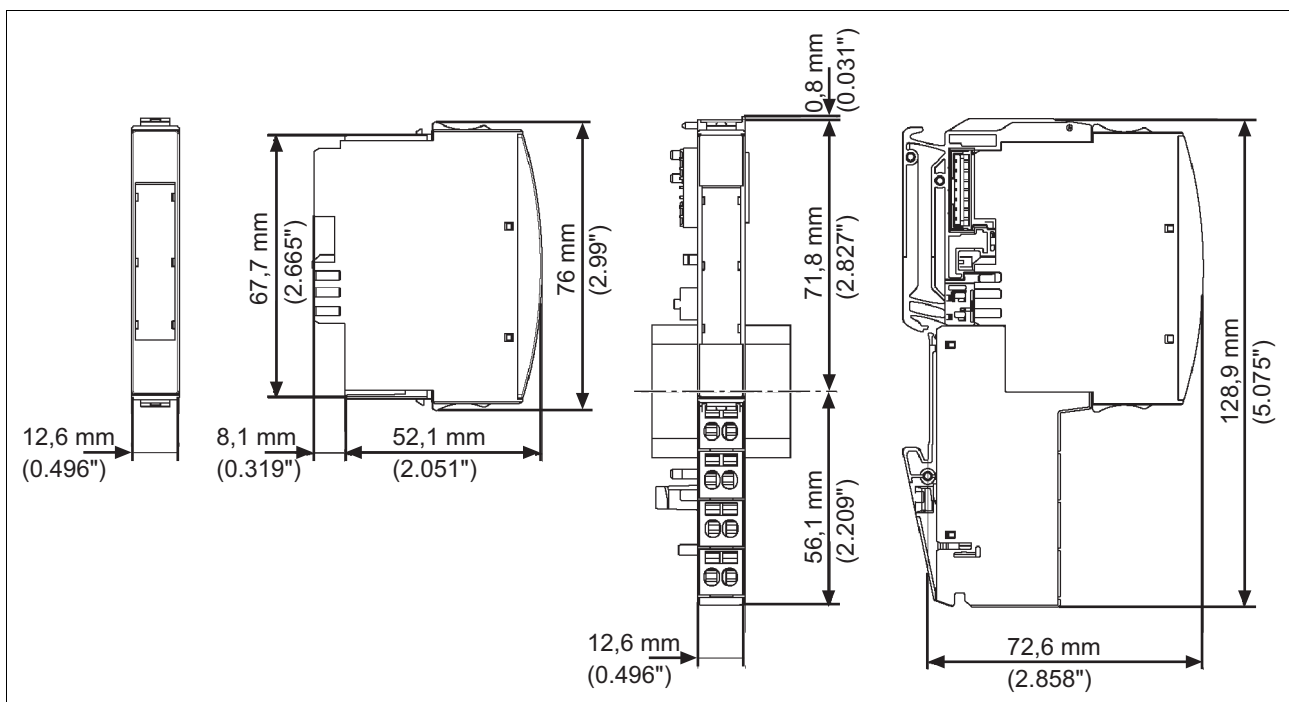
CAUTION!

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 arm-band.

5.1.1 Dimensions

Base modules with four connection levels:



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.

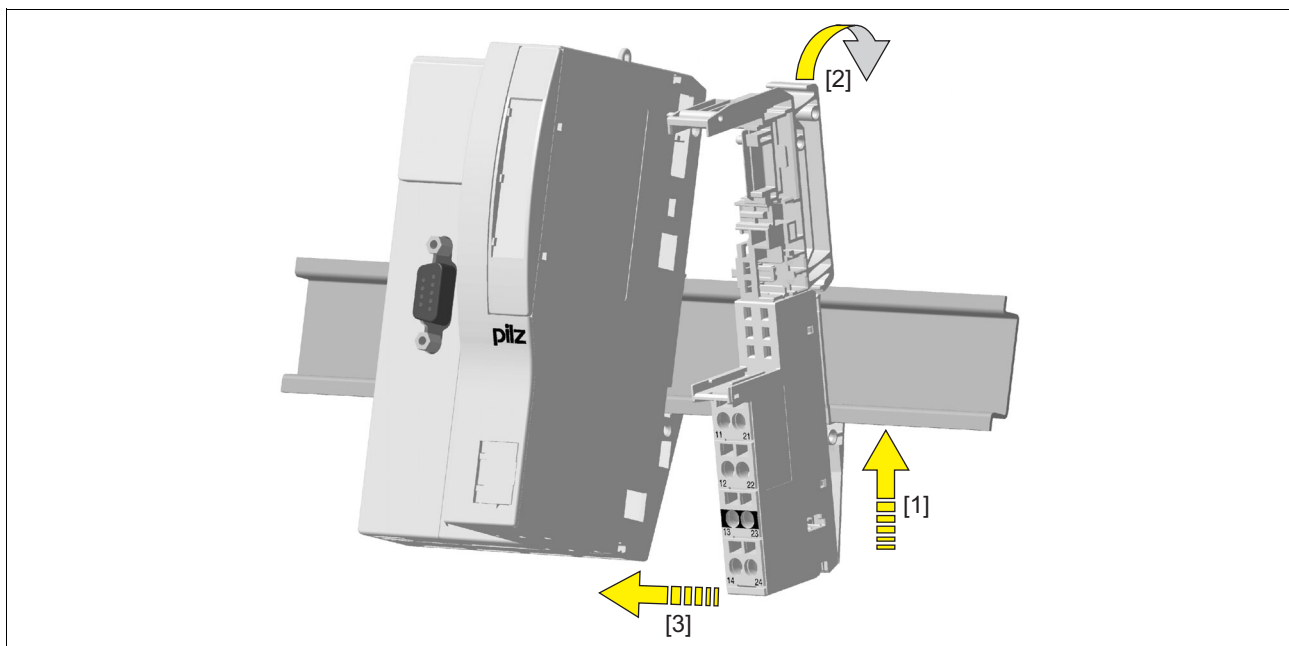
Please note:

- ▶ 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:

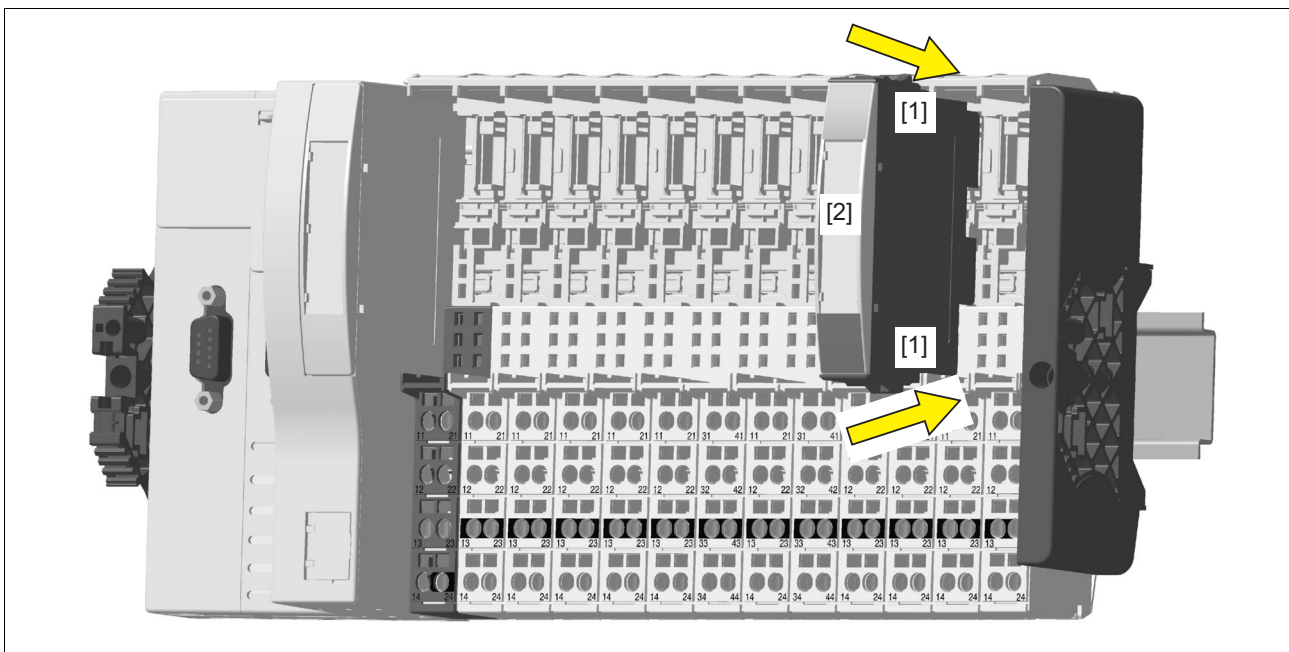
- ▶ Only insert on to base modules that are already installed.
- ▶ Preferably these base modules should be ready wired.
- ▶ Electronic modules with outputs may only be inserted and removed when the load is switched off. Unforeseeable error reactions may be triggered if modules are inserted and removed 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:



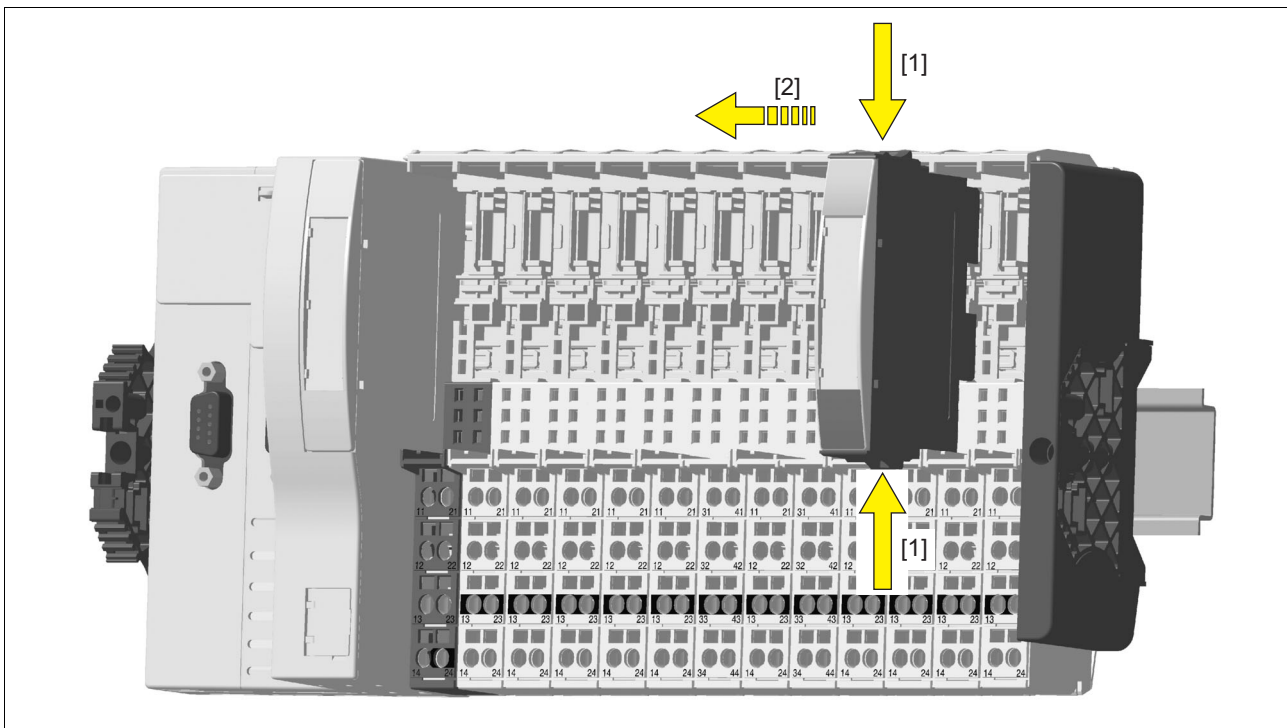
5.3 Inserting and removing an electronic module

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



NOTICE

Supply voltage modules may only be inserted and removed when the supply voltage is switched off.

6.1 General wiring guidelines

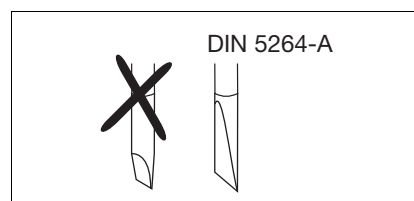
Please note:

- ▶ The requirements of the supply voltages can be found in the chapter entitled "Technical Details".
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the periphery supply on the module bus is 10 A. Please refer to the derating diagram in the chapter entitled "Function Description".
- ▶ The maximum current load for the C-rail is 10 A. Please refer to the derating diagram in the chapter entitled "Function Description".
- ▶ Permitted infeed at the C-rail:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... +30 VDC
 - - 48 VAC ... + 48 VAC
- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Details of the minimum range for cable cross sections on connection terminals can be found in the section entitled "Technical Details".
- ▶ Use copper wiring.

6.1.1 Mechanical connection of the base modules

Procedure:

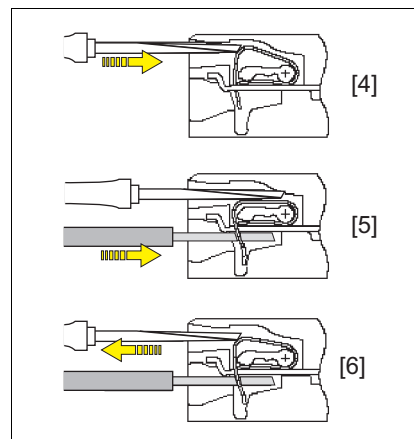
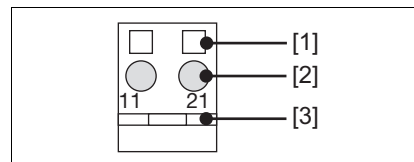
- ▶ Use a flat blade screwdriver (DIN 5264-A)!



- ▶ Strip the wire back 8 mm.
- ▶ If necessary, label the connection level with a colour marker [3].

6.1 General wiring guidelines

- ▶ 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:

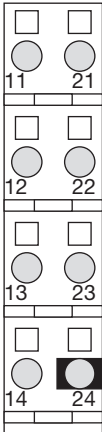
- ▶ The minimum cable cross section for field connection terminals on the base modules is 0.14 mm² (AWG26)
- ▶ The maximum cable cross section for field connection terminals is:
 - Digital inputs: 1.5 mm² (AWG16)
 - Digital outputs: 2.0 mm² (AWG14)
 - Inputs/outputs on the counter modules: 1.5 mm² (AWG16)
 - Analogue inputs/outputs: 1.5 mm² (AWG16)
 - Communication cables: 1.5 mm² (AWG16)
 - Test pulse outputs: 1.5 mm² (AWG16)
 - Power supply: 2.5 mm² (AWG12)
 - Functional earth: 2.5 mm² (AWG12)

6.1 General wiring guidelines

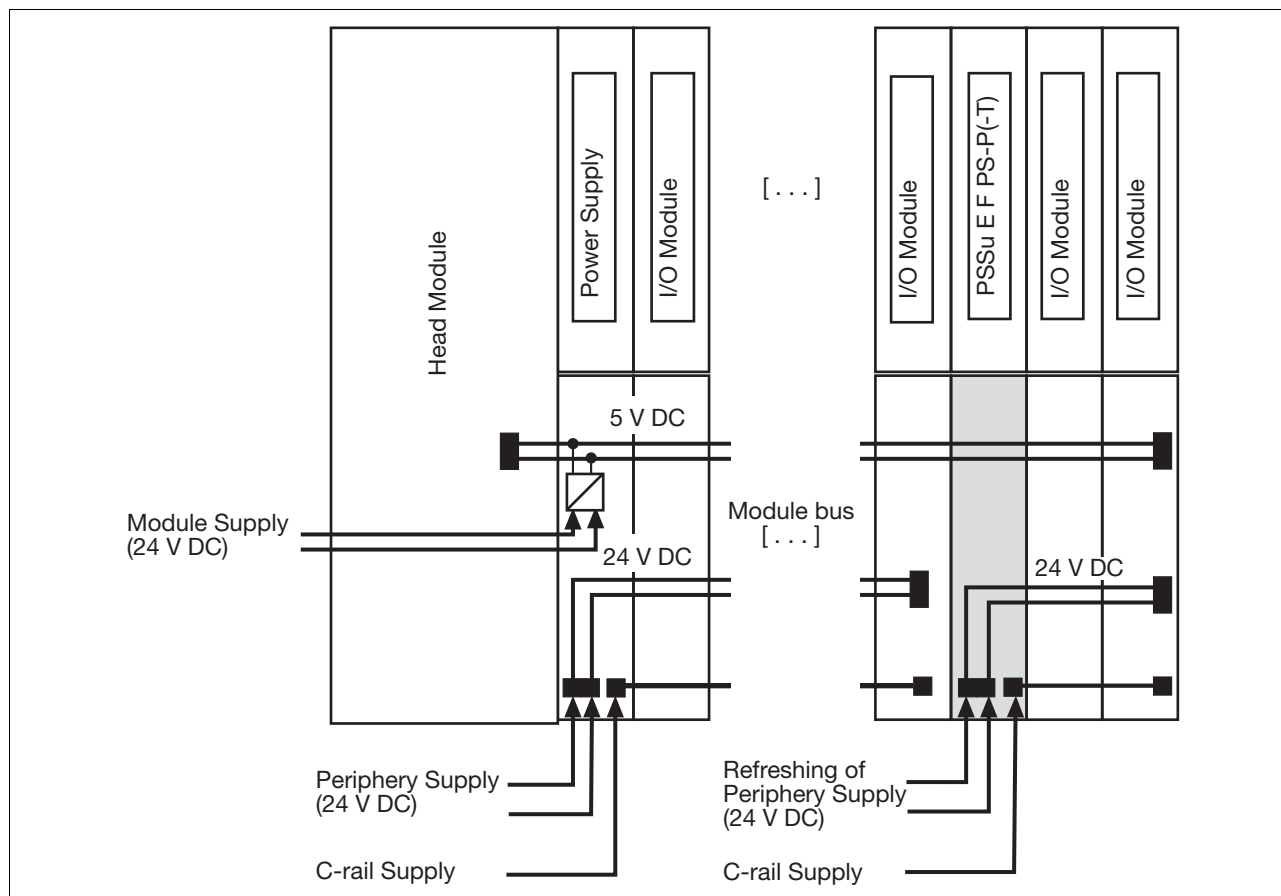
- ▶ On base modules with screw terminals:
 - If you use a multi-strand cable to connect the I/Os, it is recommended that you use ferrules conforming to Parts 1 and 2 of DIN 46228, 0.14 ... 1.5 mm², Form A or C, although this is not essential. To crimp the ferrules you can use crimp pliers (crimp form 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

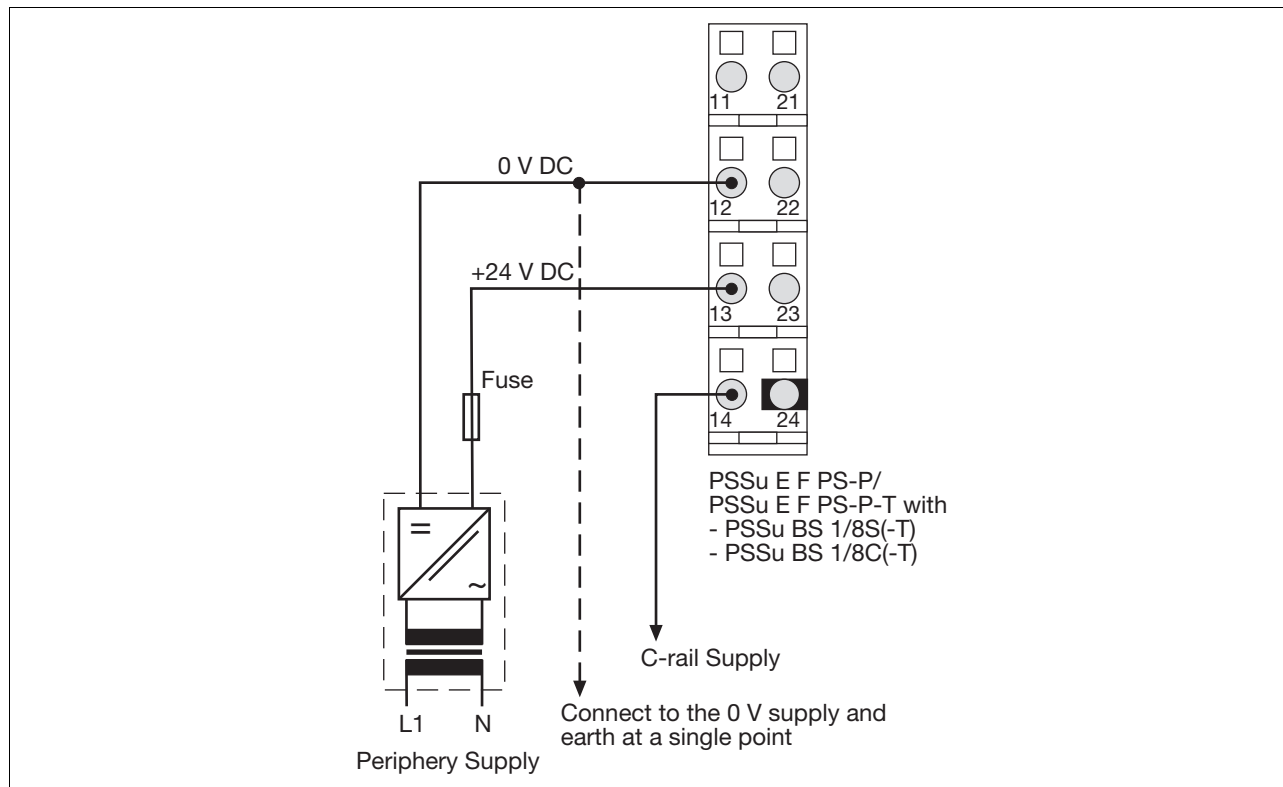
- ▶ Supply module
 - To refresh the periphery supply
 - To interrupt the incoming periphery supply and C-rail
 - To provide subsequent modules with the periphery supply and C-rail supply
 - To form supply groups

Base module	Terminal configuration	
Screw terminals: PSSu BS 1/8S PSSu BS 1/8S-T	11: Not connected 21: Not connected	
Cage clamp terminals: PSSu BS 1/8C PSSu BS 1/8C-T	12-22: 0 V periphery supply, interrupted to the left (12-22 linked within the base module) 13-23: +24 V periphery supply, interrupted to the left (13-23 linked within the base module) 14-24 C-rail supply, interrupted to the left (14-24 linked within the base module)	

6.2 Terminal configuration



6.3 Connecting the module



7.1 Messages

A module error is displayed via the “Err” LED (see section entitled “Display elements”), signalled to the head module and then entered in the head module's error stack or diagnostic log.

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.
Temperature error: too warm	Ambient temperature too high: Entry in the error stack or diagnostic log	Ensure there is sufficient ventilation in the control cabinet or prevent overload.
Overvoltage error	A system voltage or infeed is too high.	Stabilise the supply or change the faulty supply voltage module.
Undervoltage error	A system voltage or infeed is too low.	Stabilise the supply or change the faulty supply voltage module.
Error in the overvoltage protection diodes	Overvoltage protection diodes are defective.	Change faulty supply voltage module.

Further information on PSSu error messages is available in the online help for PSS WIN-PRO or PAS4000.

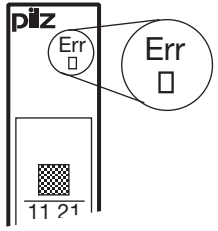
7.2 Display elements

Key:

	LED on
	LED off

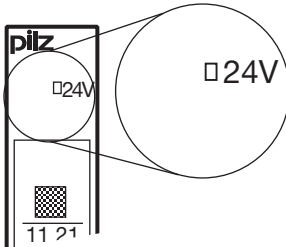
7.2.1 Anzeigeelemente zur Moduldiagnose

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

	LED			Key
	Name	Colour	Status	
	Err	---		No error
		red		Module error

7.2.2 Display elements for the status of the periphery supply

A status LED is assigned to the periphery supply ("24 V" LED).

	LED			Key
	Description	Colour	Status	
	24 V	---		No supply voltage or error in the supply voltage for periphery supply
		green		Supply voltage for periphery supply is error-free

8.1 Technical details

Technical details	
Application range	Standard/Failsafe
Module's device code	0802h
Support in system environment A	yes base type, T-type no R-type
from FS firmware version for other head modules	4 base type, T-type
from ST firmware version for other head modules	5 base type, T-type
from FS firmware version PSSu H F PN	1 base type, T-type
from ST firmware version PSSu H S PN	1 base type, T-type
from ST firmware version PSSu WR S IDN	6 base type, T-type
Support in system environment B	yes
from head module FS firmware version	1.0.0 base type, T-type 1.5.0 R-type
from head module ST firmware version	1.0.0
Electrical data	
Voltage	24 V DC
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	23 mA
Module's power consumption	0.12 W
Infeed for	Periphery Supply
Voltage	24 V DC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Max. power dissipation of the module	0.50 W
Environmental data	
Climatic suitability	EN 50125-1, EN 50125-3, EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	-40 - 70 °C T-type 0 - 60 °C base type
Max. ambient temperature in accordance with UL 508 base type, T-type	0 ... 60 °C T-type
Storage temperature	-25 - 70 °C base type -40 - 70 °C T-type
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C base type, T-type
Condensation	yes T-type no base type
Max. operating height above sea level	2000 m base type 5000 m T-type
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
Vibration to EN 60068-2-6 base type, T-type	
Frequency	10 - 1,000 Hz T-type 10 - 150 Hz base type
Max. acceleration	1g base type 5g T-type
Broadband noise in accordance with EN 60068-2-64 T-type	
Frequency	5 - 500 Hz T-type
Max. acceleration	1.9grms T-type

8.1 Technical details

Environmental data	
Shock stress	
EN 60068-2-27 base type, T-type	15g base type, T-type 11 ms base type, T-type
EN 60068-2-29 base type, T-type	10g base type 25g T-type 16 ms base type 6 ms T-type
Protection type in accordance with EN 60529 base type, T-type	
Mounting (e.g. cabinet)	IP54 base type, T-type
Housing	IP20 base type, T-type
Terminals	IP20 base type, T-type
Airgap creepage in accordance with EN 60664-1 base type, T-type	
Overvoltage category	II base type, T-type
Pollution degree	2 base type, T-type
Environmental data for railway applications	
Application site in accordance with EN 50125-3 R-type	Track area (1m – 3m) R-type
Application site in accordance with EN 61373 R-type	Category 1, Class A + B R-type
Climatic suitability	50125-1, 50125-3, 50155
Max. operating height above sea level	2,000 m R-type
Ambient temperature in accordance with EN 50155 R-type	-40 ... +70 °C R-type
Ambient temperature in accordance with EN 50125-1 R-type, EN 50125-3 R-type	-40 ... +70 °C R-type
Shock stress EN 50125-3 R-type	2 g R-type 11 ms R-type
Vibration to 50125-3 R-type	0.23 g R-type 5 ... 2,000 Hz R-type
Shock stress EN 61373 R-type	5 g R-type 30 ms R-type
Broadband noise in accordance with EN 61373 R-type	
Max. acceleration	0.79 g RMS R-type
Frequency	5 ... 150 Hz R-type
Protection type in accordance with EN 60529 R-type	
Mounting (e.g. cabinet)	IP51 R-type
Housing	IP20 R-type
Terminals	IP20 R-type
Airgap creepage in accordance with EN 50124-1 R-type	
Overvoltage category	OV2 R-type
Pollution degree	PD1 R-type
Supply interruptions in accordance with EN 50155 R-type	S2, C1, C2 R-type
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA

8.1 Technical details

Mechanical data	
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	34 g base type
	35 g R-type, T-type
Mechanical coding	
Type	A
Colour	yellow

8.2 Order reference

Order reference	
Description	Order no.
PSSu E F PS-P (Electronic module)	312 185
PSSu E F PS-P-T (Electronic module, T-type)	314 185
PSSu E F PS-P-R (Electronic module, R-type)	315 185
Base modules	Order no.
PSSu BS 1/8S (Base module with screw terminals, for use only as the first module after the head module)	312 650
PSSu BS 1/8S-T (Base module with screw terminals, for use only as the first module after the head module, T-type)	314 650
PSSu BS 1/8C (Base module with cage clamp terminals, for use only as the first module after the head module)	312 651
PSSu BS 1/8C-T (Base module with cage clamp terminals, for use only as the first module after the head module, T-type)	314 651



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