

PSSu E S PD-D



Decentralised system PSSuniversal I/O

This document is a translation of the original document.

All rights to this documentation are reserved by Pilz GmbH & Co. KG. Copies may be made for internal purposes.

Suggestions and comments for improving this documentation will be gratefully received.

Pilz®, PIT®, PMI®, PNOZ®, Primo®, PSEN®, PSS®, PVIS®, SafetyBUS p®, SafetyEYE®, SafetyNET p®, the spirit of safety® are registered and protected trademarks of Pilz GmbH & Co. KG in some countries.



SD means Secure Digital.

Contents	Page
Chapter 1 Introduction	
1.1 Validity of documentation	1-1
1.1.1 Retaining the documentation	1-1
1.2 Overview of documentation	1-2
1.3 Definition of symbols	1-3
Chapter 2 Overview	
2.1 Module structure	2-1
2.1.1 Module features	2-1
2.2 Front view	2-2
Chapter 3 Safety	
3.1 Intended use	3-1
3.2 Safety regulations	3-2
3.2.1 Use of qualified personnel	3-2
3.2.2 Warranty and liability	3-2
3.2.3 Disposal	3-2
Chapter 4 Function description	
4.1 Module features	4-1
4.1.1 Function description	4-1
4.1.2 Integrated protection mechanisms	4-1
4.2 Configuration	4-2
4.2.1 Addresses in the process image	4-2
Chapter 5 Installation	
5.1 General installation guidelines	5-1
5.1.1 Dimensions	5-1
5.2 Installing the base module	5-3
5.3 Inserting and removing an electronic module	5-4
5.3.1 Inserting an electronic module	5-4
5.3.2 Removing an electronic module	5-5
Chapter 6 Wiring	
6.1 General wiring guidelines	6-1
6.1.1 Mechanical connection of the base modules	6-1
6.2 Terminal configuration	6-3

Chapter 7 Operation

7.1	Messages	7-1
7.2	Display elements	7-2
7.2.1	Display elements for module diagnostics	7-2
7.2.2	Display elements for output status	7-3
7.3	Status byte	7-4

Chapter 8 Technical details

8.1	Technical details	8-1
8.2	Order reference	8-3

1.1 Validity of documentation

This documentation is valid for the product **PSSu E S PD-D**. 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 .

Electronic module operates as distributor for periphery supply, with advanced diagnostics.

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.

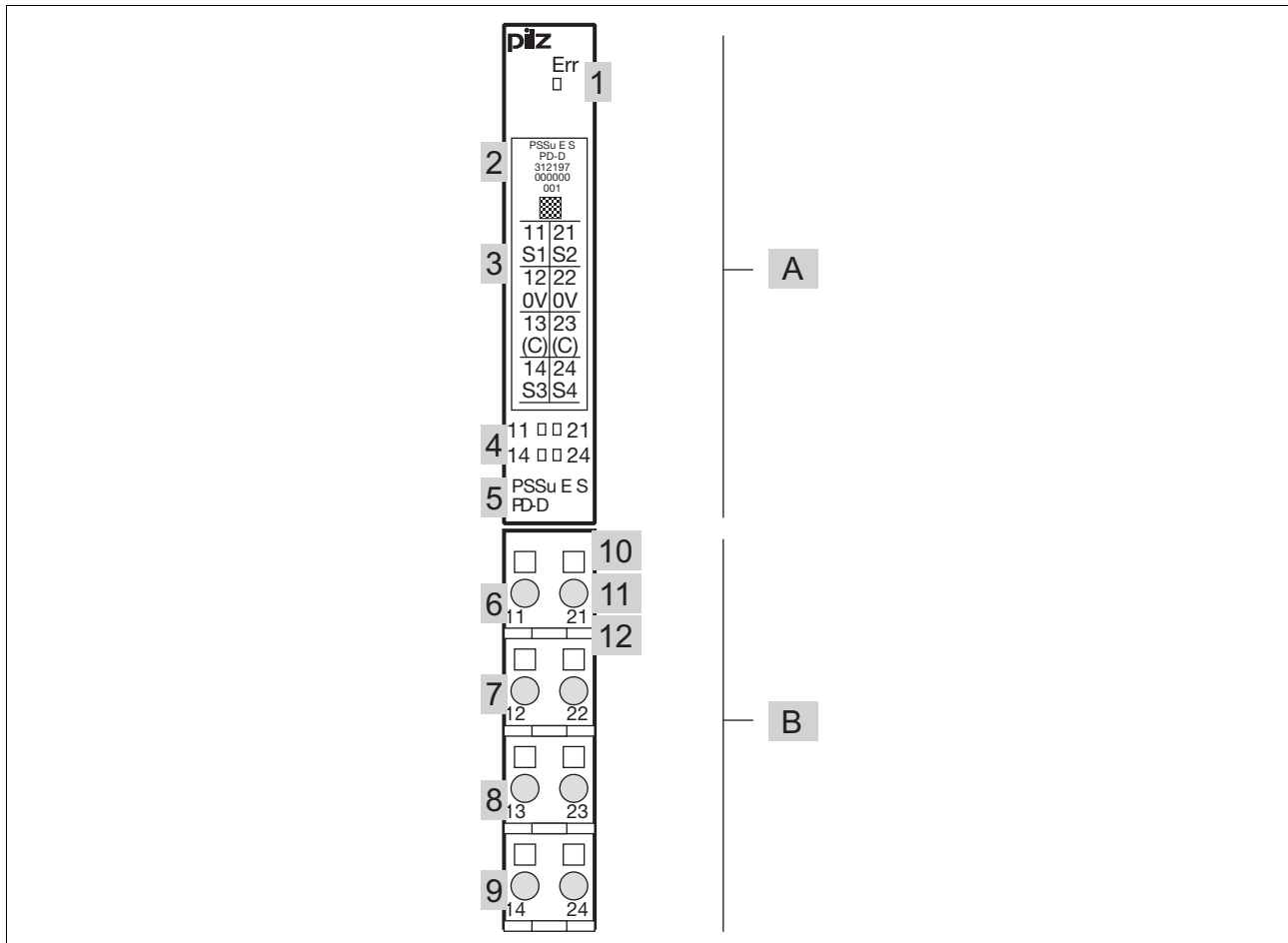
Details of the base modules that can be used are available in the chapter entitled "Intended Use".

2.1.1 Module features

The module has the following features:

- ▶ **4** Outputs for periphery supply:
 - Current load capacity per output: **1.50 A**
 - Short circuit-proof
 - Overload-proof
- ▶ LEDs for:
 - Switch status of each output
 - Module error
- ▶ The module provides advanced diagnostic data.

2.2 Front view



Key:

- ▶ A: Electronic module **PSSu E S PD-D**
- ▶ B: Base module
- ▶ 1: LED for module diagnostics
- ▶ 2: Labelling strip with:
 - Description 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: Description of electronic module
- ▶ 6: Connection level 1
- ▶ 7: Connection level 2
- ▶ 8: Connection level 3
- ▶ 9: Connection level 4

2.2 Front view

- ▶ 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)

3.1 Intended use

The module may be used for additional connections to the periphery supply. The periphery supply can be drawn from the connections, but may not be fed through that route.

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 the PSSuniversal Configurator and PSSuniversal Assistant from Version 1.6.0. We recommend that you always use the latest version (download from www.pilz.de).

The **PSSu E S PD-D** module may be used in conjunction with the following base modules:

- ▶ PSSu BP 1/8S
- ▶ PSSu BP 1/8C
- ▶ PSSu BP-C 1/8S
- ▶ PSSu BP-C 1/8C
- ▶ PSSu BP 1/12S
- ▶ PSSu BP 1/12C
- ▶ PSSu BP-C1 1/12S
- ▶ PSSu BP-C1 1/12C

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 Function description

- ▶ The module routes the periphery supply from the module bus to the base module terminals.
- ▶ The periphery supply is available at the outputs.

The module provides advanced diagnostic data, which is also available in a status byte in the ST-PIL:

- ▶ Output overload/short circuit
- ▶ Excess module temperature

4.1.2 Integrated protection mechanisms

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

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error
- ▶ Output overload
- ▶ Temperature error: too warm
- ▶ Temperature error: too hot

4.2 Configuration

It is not necessary to configure ST outputs in the PSSUniversal Configurator on the PSS WIN-PRO system software. Overload detection and temperature monitoring can be configured: The entries in the status byte can be deactivated.

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

4.2.1 Addresses in the process image

The module occupies 8 consecutive bit addresses for the status byte in the ST-PII, if the status byte is configured.

Configuration	SafetyBUS p	Standard bus system	
	FS-PIO	ST-PII	ST-PIO
Without status byte	- - -	- - -	- - -
With status byte ("S")	- - -	8 Bit	- - -



INFORMATION

Further information on the structure and contents of the status byte can be found under "Operation".

5.1 General installation guidelines

Please also refer to the PSSuniversal Installation Manual.



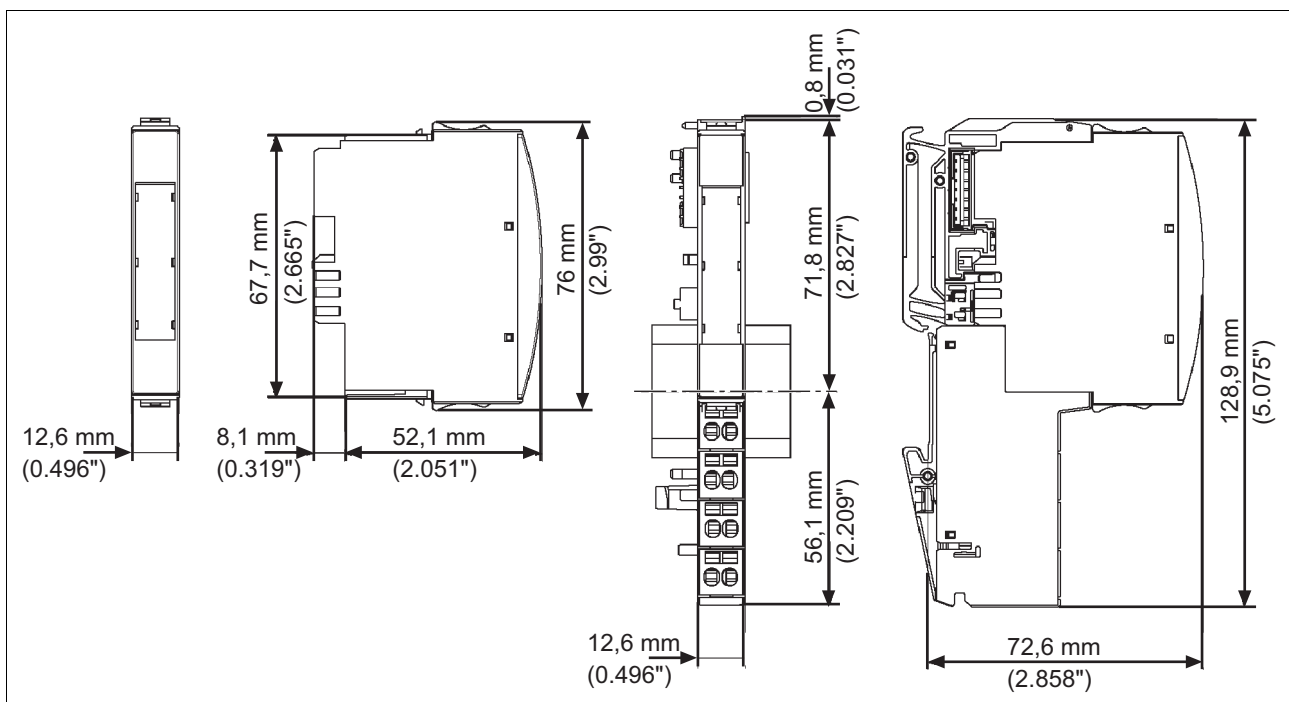
CAUTION!

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.

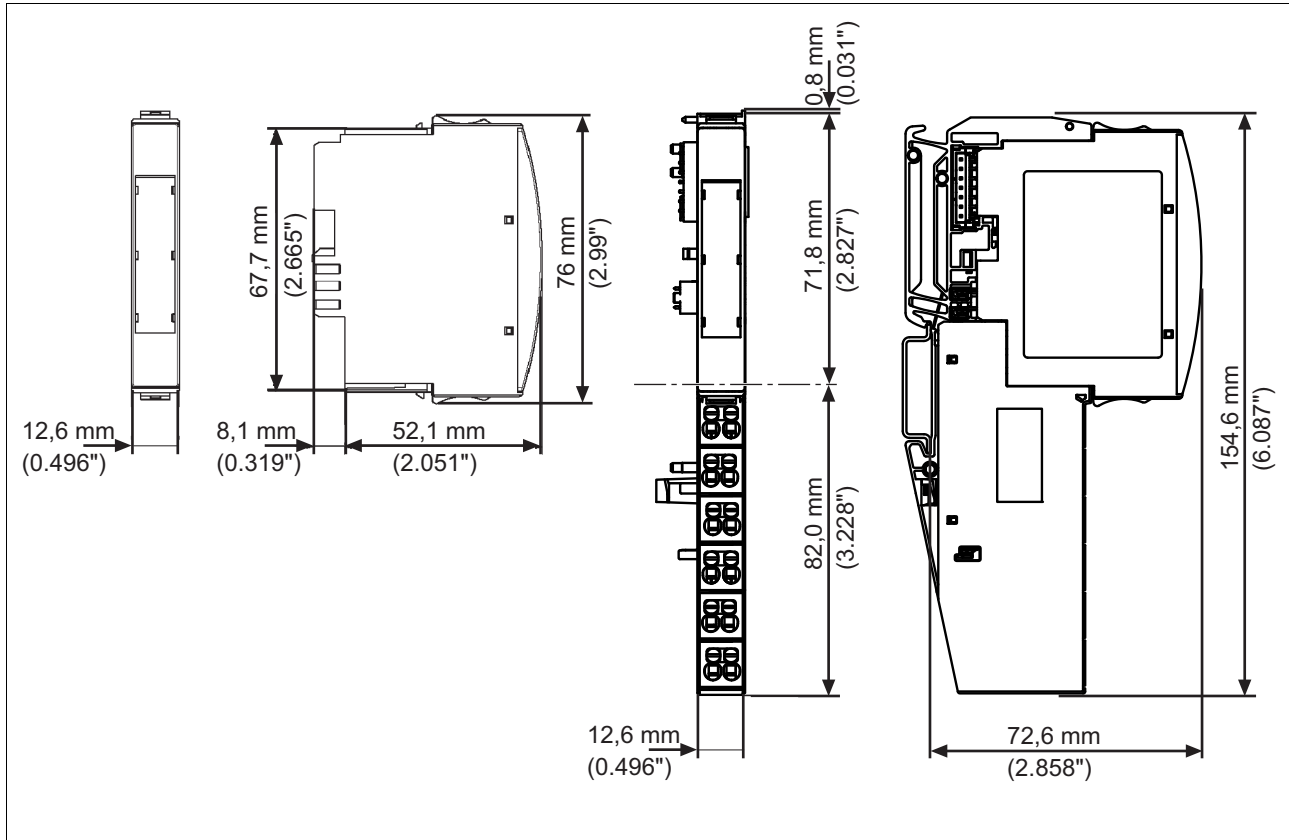
5.1.1 Dimensions

Base modules with four connection levels:



5.1 General installation guidelines

Base modules with six 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.

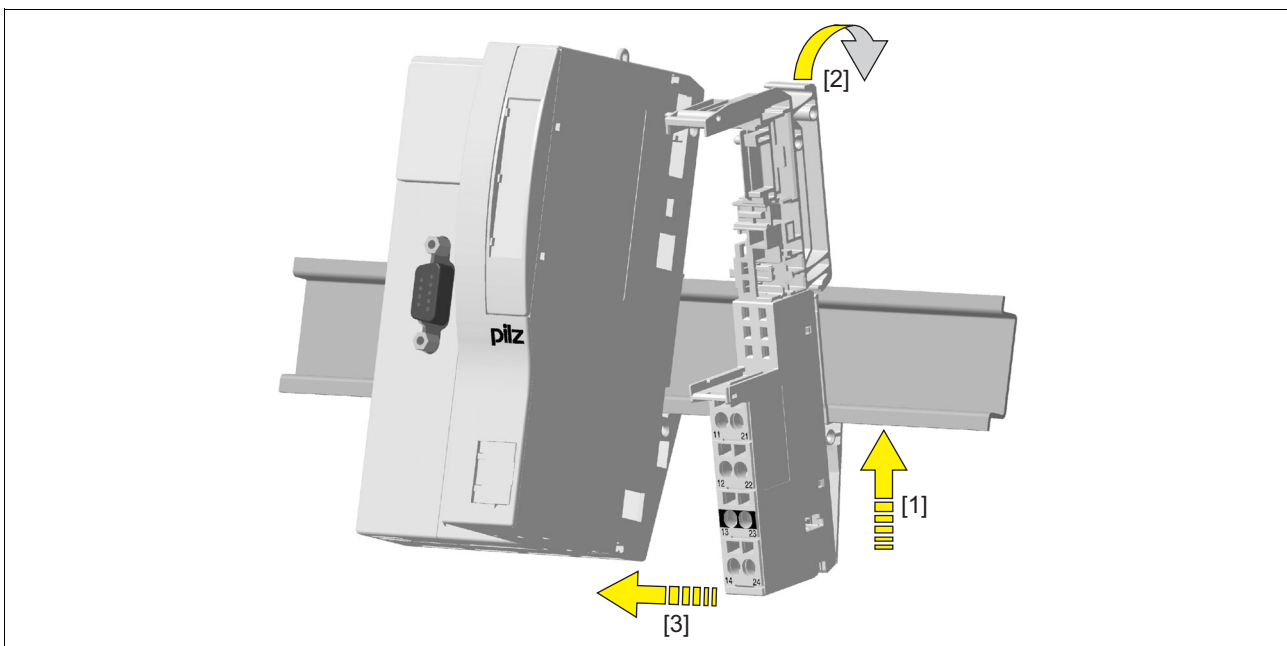
Please note:

- ▶ 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:

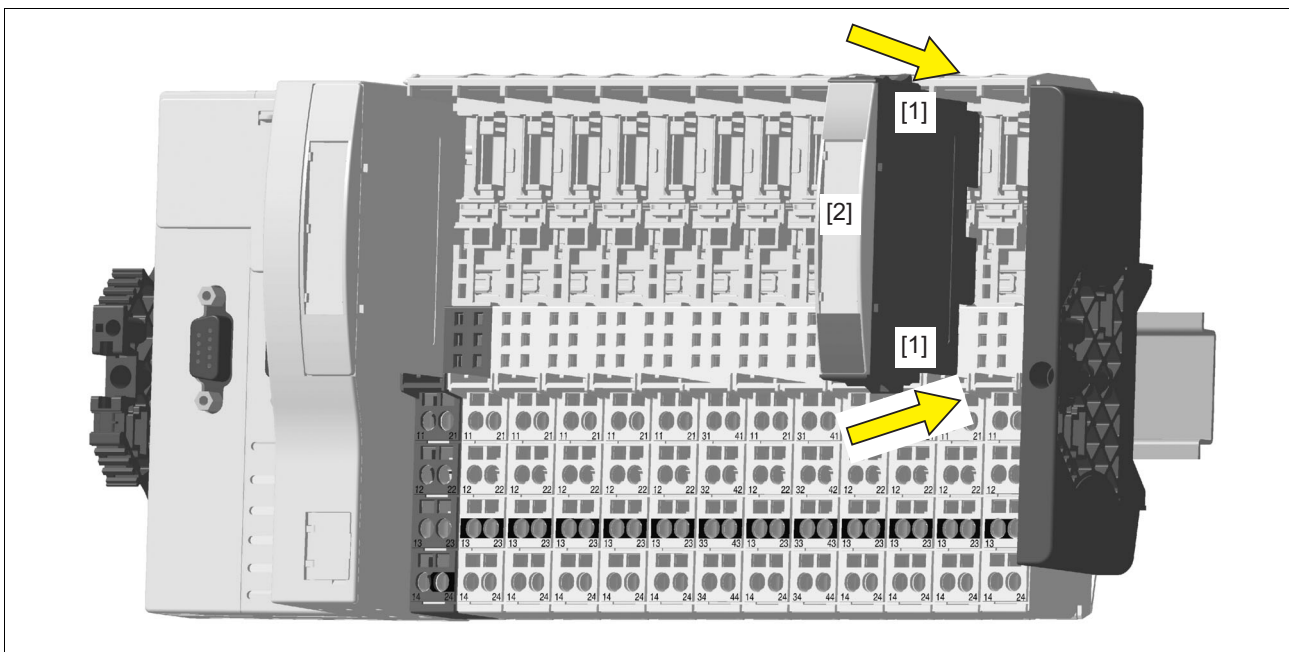
- ▶ Only insert on to base modules that are already installed.
- ▶ Preferably these base modules should be ready wired.
- ▶ Electronic modules with outputs may only be inserted and removed when the load is switched off. Unforeseeable error reactions may be triggered if modules are inserted and removed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



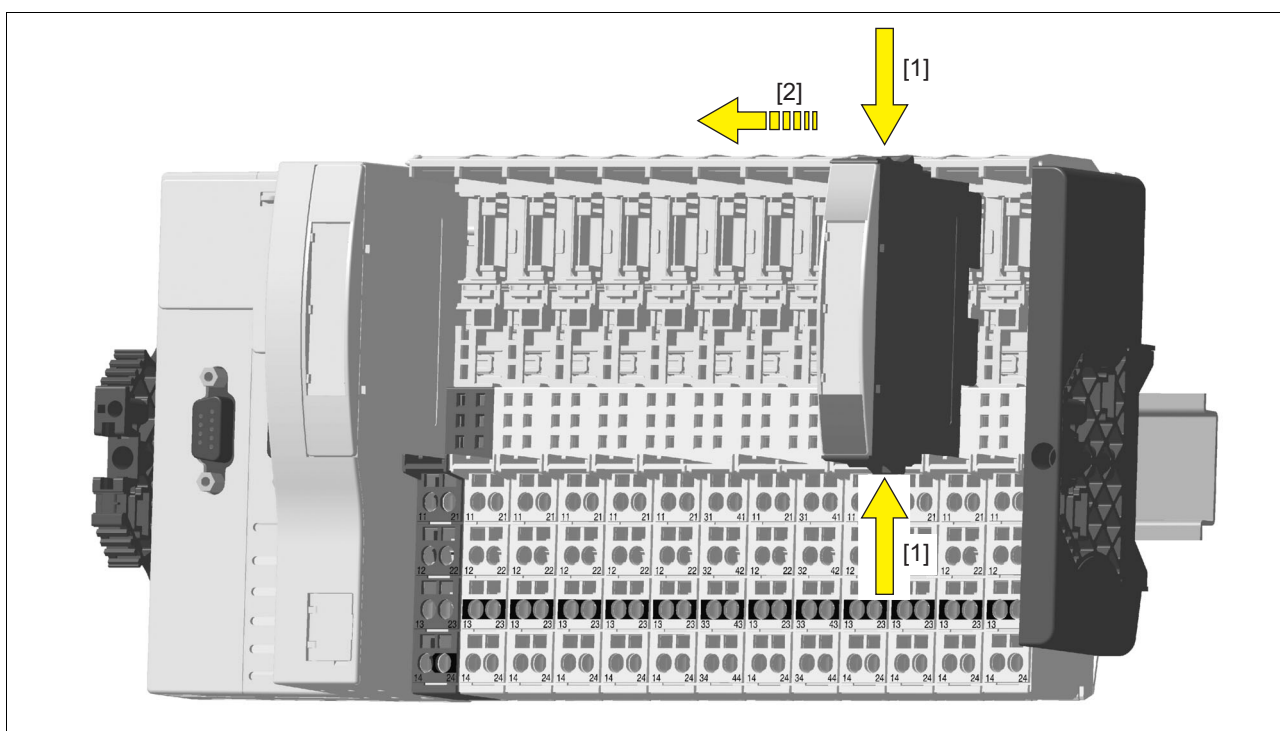
5.3 Inserting and removing an electronic module

5.3.2 Removing an electronic module

Procedure:

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

Schematic representation:



6.1 General wiring guidelines

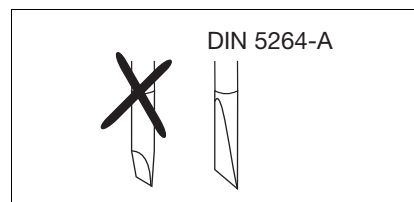
Please note:

- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

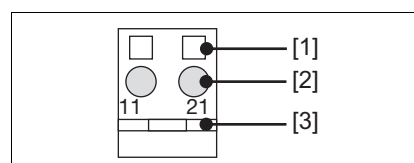
6.1.1 Mechanical connection of the base modules

Procedure:

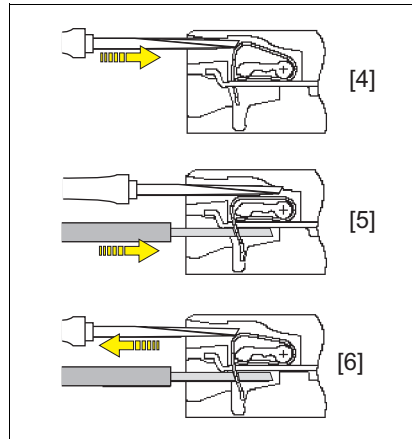
- ▶ Use a flat blade screwdriver (DIN 5264-A)!



- ▶ 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.



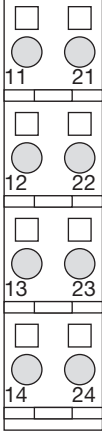
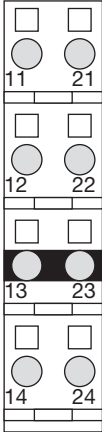
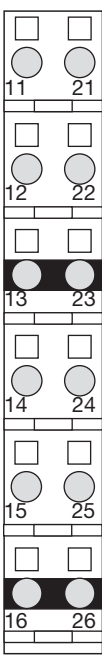
6.1 General wiring guidelines



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)
- ▶ 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	
Screw terminals: PSSu BP 1/8S	Without C-rail:	
Cage clamp terminals PSSu BP 1/8C	11: Output S1 21: Output S2 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: 0 V periphery supply (13-23 linked within the base module) 14: Output S3 24: Output S4	
Screw terminals: PSSu BP-C 1/8S	With C-rail:	
Cage clamp terminals PSSu BP-C 1/8C	11: Output S1 21: Output S2 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23 linked within the base module) 14: Output S3 24: Output S4	
Screw terminals: PSSu BP-C1 1/12S	With C-rail:	
Cage clamp terminals: PSSu BP-C1 1/12C	11: Output S1 21: Output S2 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Output S3 24: Output S4 15-25: 0 V periphery supply (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	



7.1 Messages

An error will be signalled to the head module and will be entered in the head module's error stack. A module error will also be displayed via the "Err" LED (see section entitled "Display elements").

The module can detect the following errors:

Errors	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.
ST communication error	Error during ST 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.
Overload/short circuit	Load on output too high.	Rectify overload or short circuit.
Temperature error: too warm ⁽¹⁾	Ambient temperature too high: Error stack entry	Ensure there is sufficient ventilation in the control cabinet or prevent overload.
Temperature error: too hot ⁽¹⁾	Ambient temperature too high: Outputs are switched off	Ensure there is sufficient ventilation in the control cabinet or prevent overload.

⁽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 switches off the outputs.
- ▶ After the "too hot" message has been received, if the temperature drops back below the "too warm" threshold value, the outputs will switch back on.

Further information on PSSu error messages is available in the online help for the PSSuniversal Assistant system software.

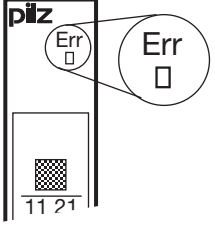
7.2 Display elements

Key:

	LED on
	LED off

7.2.1 Display elements for module diagnostics

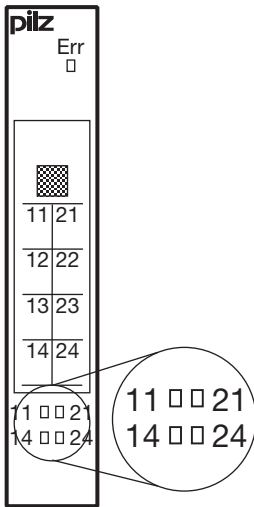
The module has an LED for displaying module errors ("Err" LED).

	LED			Key
	Description	Colour	Status	
	Err	---		No fault
		Red		Module is faulty

7.2 Display elements

7.2.2 Display elements for output status

Each output is assigned an LED for displaying the output status (LEDs “11”, “21”, “14” and “24”)

	LED			Key	
	Description	Colour	Status	Output	Terminal
	11	---	●	Overload on output S1	11
		green	☀	No overload on output S1	
	21	---	●	Overload on output S2	21
		green	☀	No overload on output S2	
	14	---	●	Overload on output S3	14
		green	☀	No overload on output S3	
	24	---	●	Overload on output S4	24
		green	☀	No overload on output S4	

7.3 Status byte

The status byte contains the information on overload and overtemperature.

Structure and contents of the status byte:

Bit number	Signal	Key
0	0	No overload on output S1
	1	Overload on output S1
1	0	No overload on output S2
	1	Overload on output S2
2	0	No overload on output S3
	1	Overload on output S3
3	0	No overload on output S4
	1	Overload on output S4
4	0	No temperature error
	1	Temperature error: too warm
5	0	Switch-off temperature not reached.
	1	Temperature error: too hot. Outputs switch off.
6	0	Reserved
	1	Reserved
7	0	Reserved
	1	Reserved

8.1 Technical details

Technical details	
Application range	Standard
Module's device code	000Ah
Support in system environment A	
from ST firmware version for other head modules	16
from ST firmware version PSSu H S PN	1
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	60 mA
Module's power consumption	0.30 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	30 mA
Module's power consumption with no load	0.72 W
Max. power dissipation of the module	1.50 W
Outputs	
Number of outputs for periphery supply	4
Short-circuit proof	yes
Potential isolation between output and voltage for the internal module bus	yes
Max. output current at rated voltage	1.50 A
Typ. threshold value for overload	8 A
Permitted loads	inductive, capacitive, resistive
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20

8.1 Technical details

Environmental data

Airgap creepage in accordance with **EN 60664-1**,
EN 61131-2

Overvoltage category **II**

Pollution degree **2**

Mechanical data

Housing material

Front **PC**

Bottom **PC**

Coding **PA**

Dimensions

Height **76.0 mm**

Width **12.6 mm**

Depth **60.2 mm**

Weight **34 g**

Mechanical coding

Type **J**

Colour **dark grey**

The standards current on **2008-04** apply.

8.2 Order reference

Order reference	
Designation	Order No.
PSSu E S PD-D (electronic module)	312 197
Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623



Pilz GmbH & Co. KG
Felix-Wankel-Straße 2
73760 Ostfildern, Germany
Telephone: +49 711 3409-0
Telefax: +49 711 3409-133
E-Mail: pilz.gmbh@pilz.de
Internet: www.pilz.com

...
In many countries we are
represented by our subsidiaries
and sales partners.

Please refer to our homepage
for further details or contact our
headquarters.

► Technical support

+49 711 3409-444
support@pilz.com

pilz

IndurNET p[®], Pilz[®], PIT[®], PMCProtego[®], PMI[®], PNOZ[®], Primo[®], PSEN[®], PSS[®], PVS[®], SafetyBUS p[®], SafetyEYE[®], SafetyNET p[®], the spirit of safety[®] are registered and protected trademarks of Pilz GmbH & Co. KG in some countries. We would point out that product features may vary from the details stated in this document, depending on the status at the time of publication and the scope of the equipment. We accept no responsibility for the validity, accuracy and entirety of the text and graphics presented in this information. Please contact our Technical Support if you have any questions.