



► PSSu XB F-T

PILZ
THE SPIRIT OF SAFETY

Operating Manual-21878-EN-06

- Decentralised system PSSuniversal I/O



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Where unavoidable, for reasons of readability, the masculine form has been selected when formulating this document. We do assure you that all persons are regarded without discrimination and on an equal basis.

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SD means Secure Digital

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1 Introduction

1.1 Validity of documentation

This documentation is valid for the product PSSu XB F-T. 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.

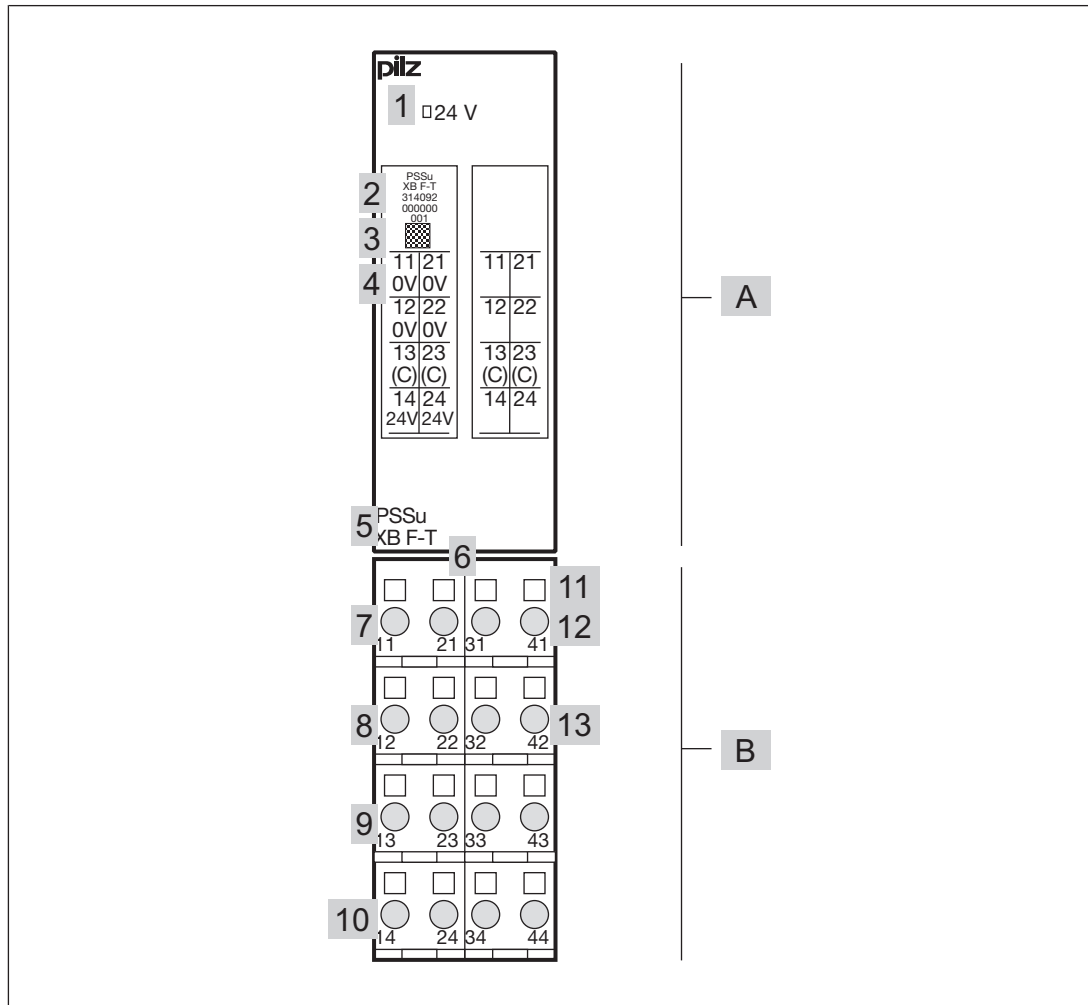
Details of the base modules that can be used are available in the chapter entitled “Intended Use”.

2.2 Module features

The product has the following features:

- ▶ The module terminates a PSSu system and extends the module bus via a cable connection.
- ▶ The module supports a remote station PSSu XR F-T.
- ▶ Plug for the module bus connection cable
- ▶ The cable connection transfers:
 - FS data
 - ST data
 - Module supply
- ▶ The module routes the periphery supply from the module bus to the base module terminals.
- ▶ LED for:
 - Periphery supply
- ▶ For standard and failsafe applications in system environment A and B

2.3 Front view



Legend:

- ▶ 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
- ▶ 3: 2D code
- ▶ 4: Labelling strip for the terminal configuration on the base module
- ▶ 5: Name of electronic module
- ▶ 6: RJ45 interface (on the rear of the electronic module, not visible in the drawing)
- ▶ 7: Connection level 1
- ▶ 8: Connection level 2

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

3 Safety

3.1 Intended use

Use in a PSSu system

The module may be used in a PSSu system in system environment A and B.

The head module establishes in what system environment a PSSu system can be used.

► System environment A

A PSSu system in system environment A is a decentralised system PSSu I/O with a field-bus, but without SafetyNET p interface. The automation system PSS 4000 does **not** belong to the system environment A.

► System environment

A PSSu system in system environment B is a PSSu system in the h automation system PSS 4000. The PSSu system can belong to one of the following performance classes:

- Decentralised system PSSu I/O (with SafetyNET p)
- Control system PSSu PLC
- Control system PSSu multi

Module's function

The module may be used as a base station to extend the PSSuniversal module bus inside a control cabinet via a cable connection. It can be operated with a remote station of type PSSu XR F-T plus the connection cable PSSu A RJ45-CAB 1.5M.

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.

Failsafe and standard applications

The module may be used for failsafe and standard applications.

Particular application areas

The module PSSu XB F-T is suitable for use where there are increased environmental requirements (see [Technical Details](#)  23]).

EMC-compliant installation

Intended use includes making the electrical installation EMC-compliant. Please refer to the guidelines stated in the "PSSuniversal Installation Manual". The module is intended for use in an industrial environment. Interference may occur if used within a domestic environment.

Improper use

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 operating manual,
- Any use of the module that is not in accordance with the technical details.

Software tools

The module is supported by

- ▶ PSSuniversal Configurator and PSSuniversal Assistant from Version 1.7.0
- ▶ PAS4000 from Version 1.2.0



INFORMATION

We recommend that you always use the latest version of the software tool (download from www.pilz.com).

Base modules

The PSSu XB F-T 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
- ▶ 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 persons who are competent to do so.

A competent person is a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. In order to inspect, assess and handle products, devices, systems, plant and machinery, this person must be familiar with 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

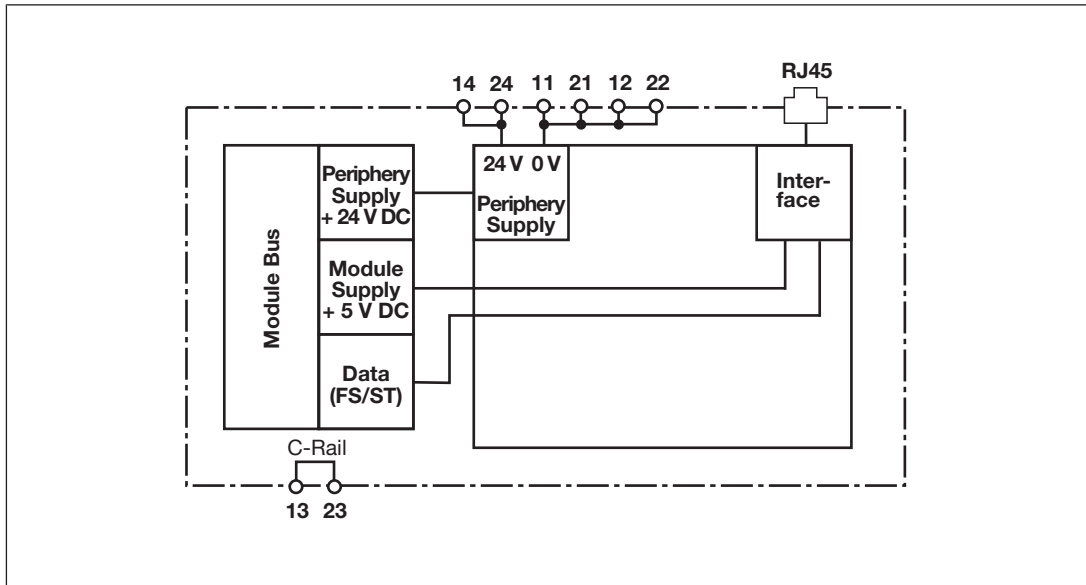
- ▶ The product was used contrary to the purpose for which it is intended,
- ▶ Damage can be attributed to not having followed the guidelines in the manual,
- ▶ Operating personnel are not suitably qualified,
- ▶ Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering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

The module is a base station used to extend the PSSu module bus via a cable connection. The base station is always the termination module in a base system.

The cable connection disconnects the PSSu module bus on the base station and continues it on the remote station.

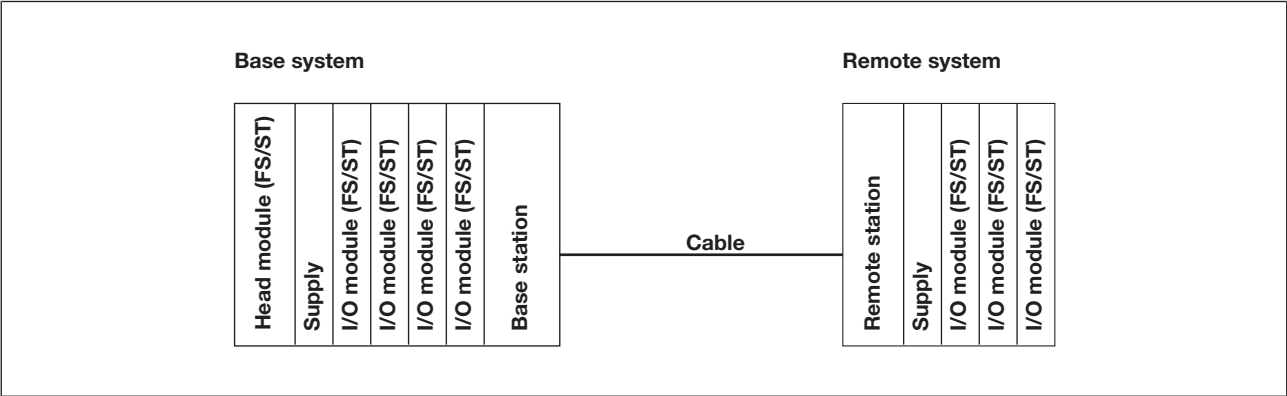
All FS data, all ST data plus the module supply are transferred via the cable connection. The periphery supply and C-rail supply are not transferred. Up to three PSSu systems can be connected, i.e. you can have up to two successive cable connections.

The cable connection does not appear in the process image. The cable connection does not need to be considered in the user program. The reaction times of the modules on the remote system are not affected by the cable connection.

The base system is terminated using a special terminating plate (PSSu A EC XB, supplied with the remote module). The remote system is terminated using the terminating plate supplied with the head module.

- ▶ The module routes the periphery supply from the module bus to the base module terminals.
- ▶ The module does not switch the periphery supply.
- ▶ The periphery supply has no current limitation.

Cable connection PSSu XB F-T – PSSu XR F-T



4.3 Configuration

The module does not have to be configured.
The module does not occupy any addresses in the process image.

5 Installation

5.1 General installation guidelines

Please refer also to the PSSuniversal Installation Manual.

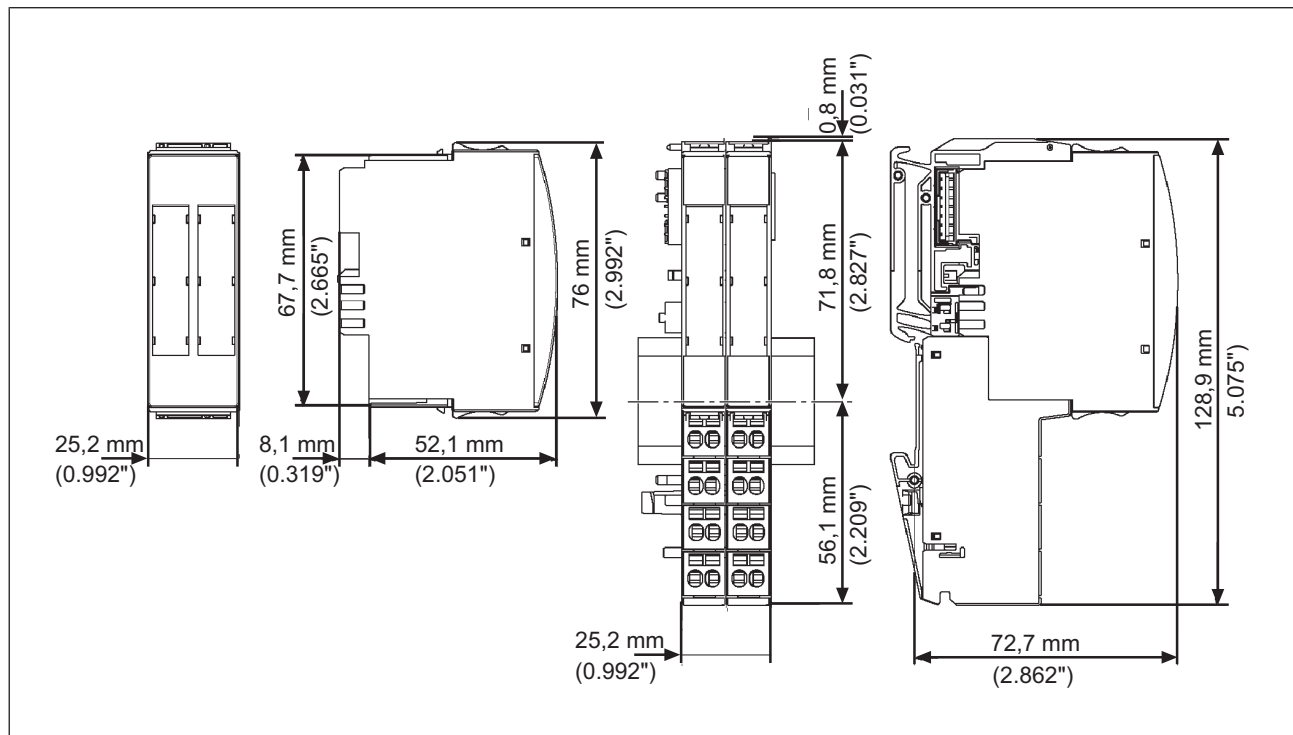


NOTICE

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 Install base station

The base station always provides the termination for a PSSuniversal system. No further modules may be positioned to the right of the base station.

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.

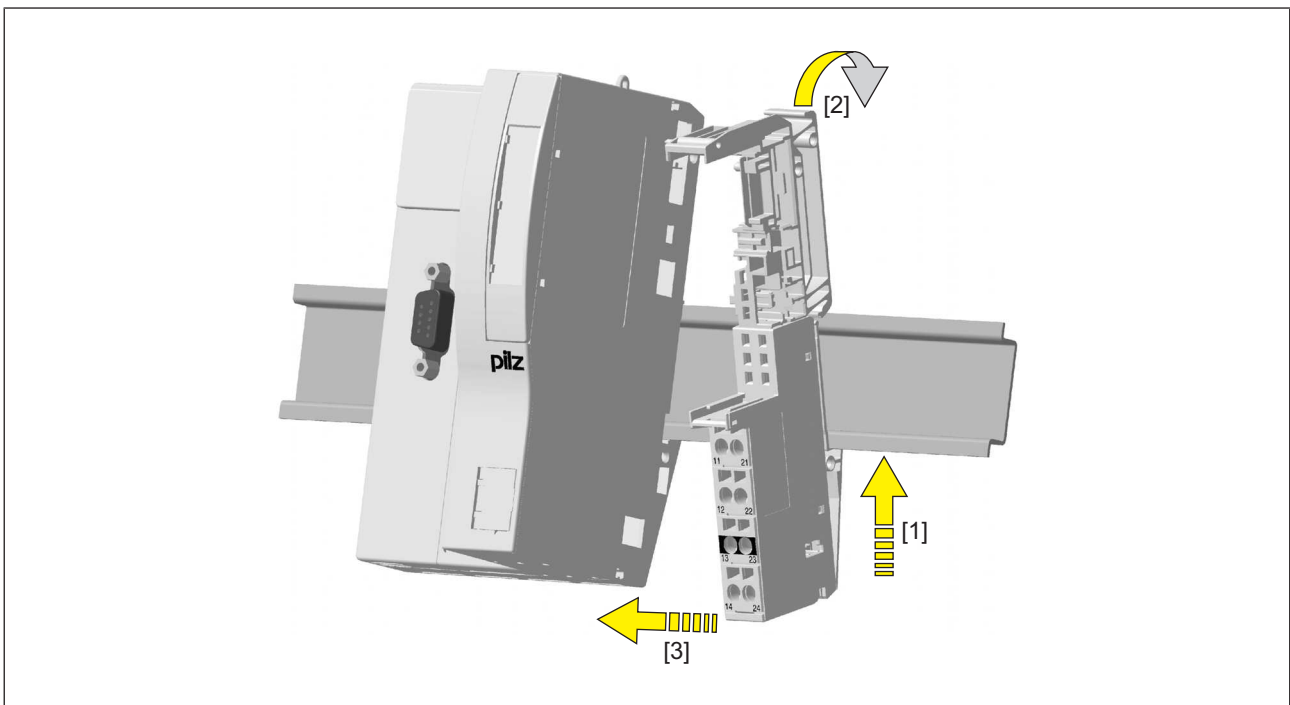
Please note:

- ▶ 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:

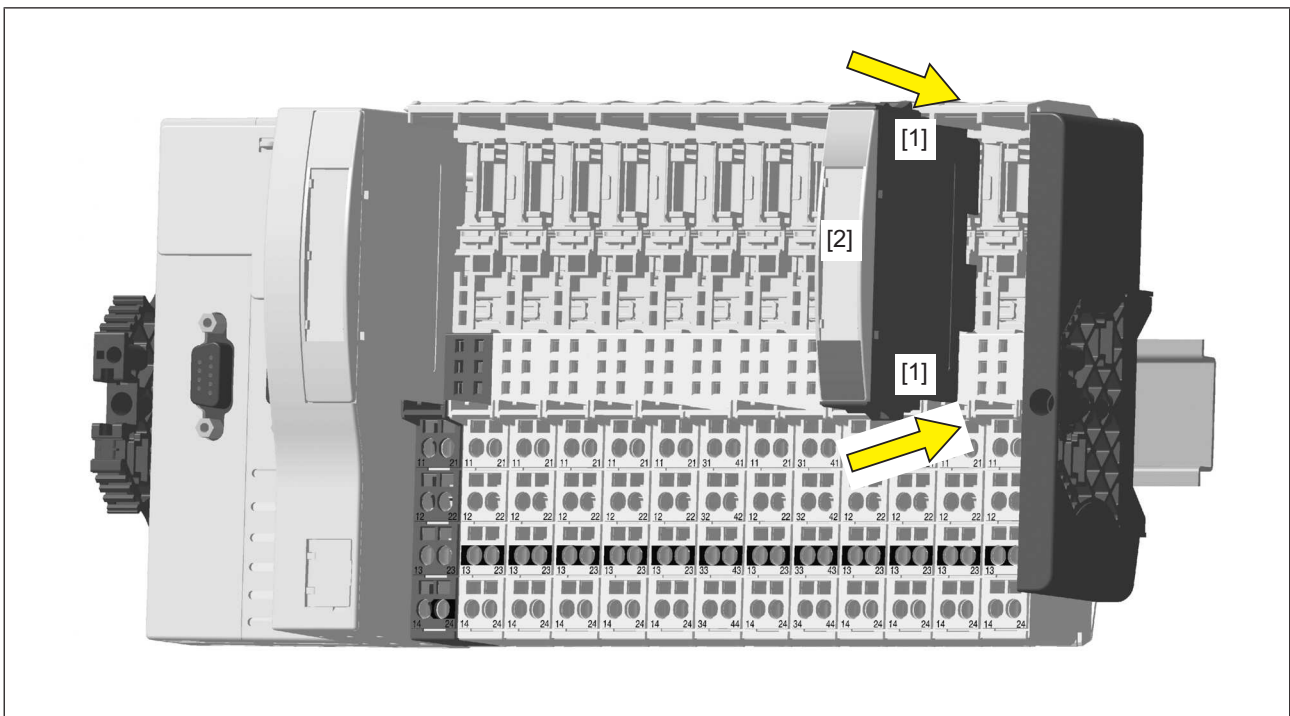
- ▶ Only insert on to base modules that are already installed.
- ▶ Preferably these base modules should be ready wired.
- ▶ Electronic modules with outputs may only be inserted and removed when the load is switched off. Unforeseeable error reactions may be triggered if modules are inserted and removed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

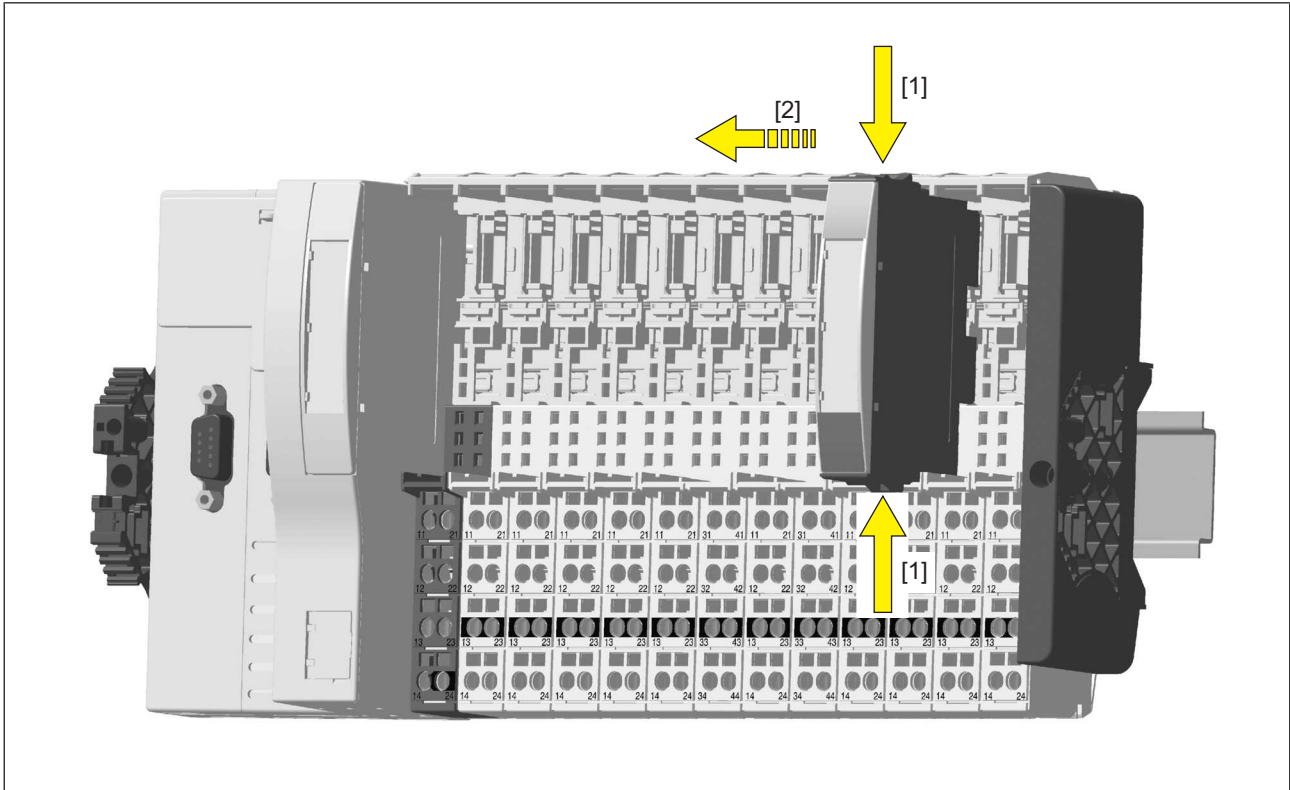


5.3.2 Removing an electronic module

Procedure:

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

Schematic representation:



6 Wiring

6.1 General wiring guidelines

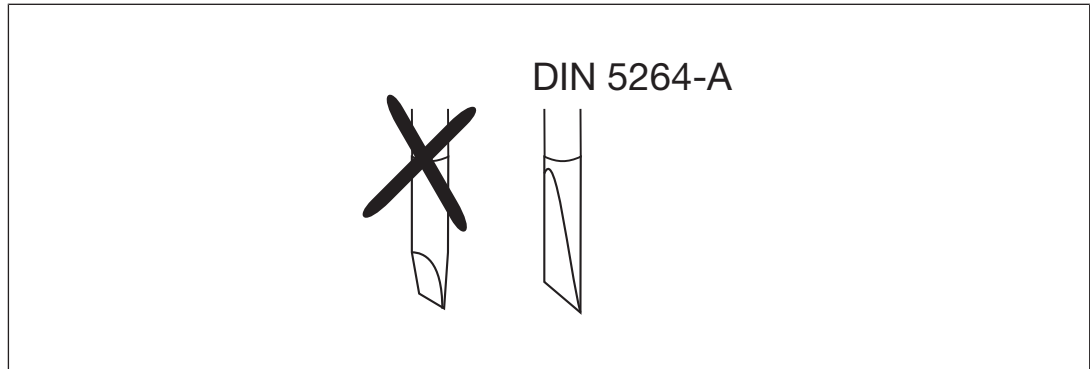
Please note:

- ▶ The connection cable PSSu A RJ45-CAB 1.5M is available as an accessory.
- ▶ The base station and remote station must be in the same control cabinet.
- ▶ 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.

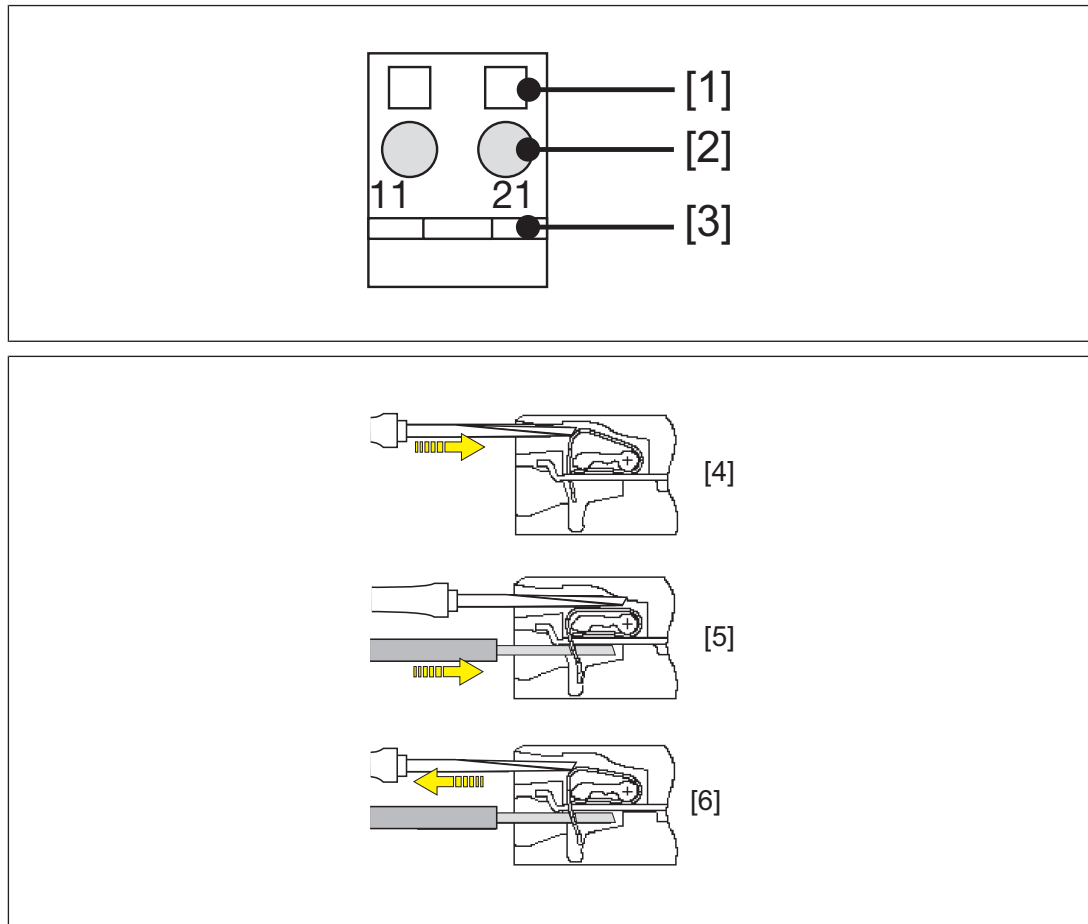
6.1.1 Mechanical connection of the base modules

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.

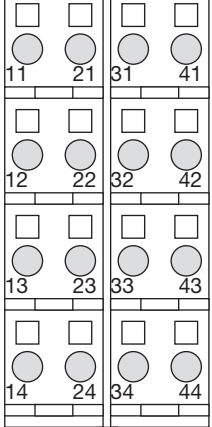


Please note:

- ▶ 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 2/16 S PSSu BP 2/16 S-T Cage clamp terminals: PSSu BP 2/16 C PSSu BP 2/16 C-T	Without C-rail: 11-21: 0 V periphery supply (11-21 linked internally) 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: +24 V periphery supply (13-23 linked within the base module) 14-24: +24 V periphery supply (14-24 linked internally) 31-41-32-42-33-43-34-44 not connected	

Base module	Terminal configuration	
Screw terminals: PSSu BP-C 2/16 S PSSu BP-C 2/16 S-T Cage clamp terminals: PSSu BP-C 2/16 C PSSu BP-C 2/16 C-T	With C-rail: 11-21: 0 V periphery supply (11-21 linked internally) 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23-33-43: C-rail supply (13-23-33-43 linked within the base module) 14-24: +24 V periphery supply (14-24 linked internally) 31-41-32-42-34-44 not con- nected	

6.3 Connecting the module

RJ45 interface	Layout	
RJ45 connector	The connection cable PSSu A RJ45-CAB 1.5M is available as an accessory.	

7 Operation

7.1 Messages

The module can detect the following errors:

Module error	Explanation	Remedy
Polarity error	Polarity of the periphery supply	Correct the polarity
Error in the periphery supply	Lower voltage limit exceeded on the periphery supply	Ensure there is a sufficient supply

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

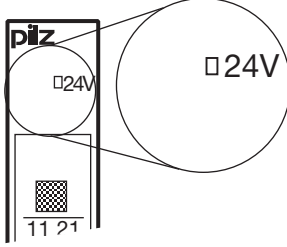
7.2 Display elements

Legend

-  LED on
-  LED off

7.2.1 Display elements for module diagnostics

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

	LED			Key
	Description	Colour	Status	
	24 V	- - -		Periphery supply: No supply voltage or error in the supply voltage
		green		Periphery supply is error-free
		red		Polarity of the periphery supply

8 Technical details

General

Certifications **CE, EAC, KOSHA, TÜV, UKCA, cULus Listed**

Application range **Standard/failsafe**

Application in system environment A

from FS firmware version, other head modules	1
from ST firmware version, other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1

Application in system environment B

from FS firmware version, head modules	1.2.0
from ST firmware version, head modules	1.2.0

Electrical data

Periphery's supply voltage (periphery supply)

Voltage range	16,8 - 30 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0,24 W

Environmental data

Climatic suitability **EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78**

Ambient temperature

in accordance with the standard	EN 60068-2-14
Temperature range	-40 - 70 °C

Storage temperature

in accordance with the standard	EN 60068-2-1/-2
Temperature range	-40 - 70 °C

Climatic suitability

in accordance with the standard	EN 60068-2-78
Humidity	93 % r. h. at 40 °C

Condensation during operation **EN 60068-2-30, short-term**

Max. operating height above SL **5000 m**

EMC **EN 61000-6-2, EN 61000-6-4, EN 61131-2**

Vibration

in accordance with the standard	EN 60068-2-6
Frequency	10 - 150 Hz
Acceleration	10 m/s²

Shock stress

in accordance with the standard	EN 60068-2-27
Number of shocks	6
Acceleration	150 m/s²
Duration	11 ms

Environmental data

Airgap creepage	
in accordance with the standard	EN 61131-2
Overvoltage category	II
Pollution degree	2

Protection type	
in accordance with the standard	EN 60529
Housing	IP20
Mounting area (e.g. control cabinet)	IP54

Mechanical data

Material	
Bottom	PC
Front	PC
Coding	PA
Mounting type	plug-in
Dimensions	
Height	76 mm
Width	25,2 mm
Depth	60,2 mm
Weight	35 g
Mechanical coding	
Type	L
Colour	Yellow

Where standards are undated, the 2022-01 latest editions shall apply.

9 Order reference

9.1 Product

Product type	Features	Order no.
PSSu XB F-T	Base station, T-type	314092

9.2 Accessories

Base modules

Product type	Features	Order no.
PSSu BP 2/16 S	Base module without C-rail with screw terminals	312628
PSSu BP 2/16 S-T	Base module without C-rail with screw terminals, T-type	314628
PSSu BP 2/16 C	Base module without C-rail with cage clamp terminals	312629
PSSu BP 2/16 C-T	Base module without C-rail with cage clamp terminals, T-type	314629
PSSu BP-C 2/16 S	Base module with C-rail and screw terminals	312630
PSSu BP-C 2/16 S-T	Base module with C-rail and screw terminals, T-type	314630
PSSu BP-C 2/16 C	Base module with C-rail and cage clamp terminals	312631
PSSu BP-C 2/16 C-T	Base module with C-rail and cage clamp terminals, T-type	314631

Connection cable

Product type	Features	Order no.
PSSu A RJ45-CAB 1.5M	Connection cable	314094

Support

Technical support is available from Pilz round the clock.

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