



Technical Catalogue PSSUniversal

pilz
more than automation
safe automation

Planning Guide

DRAFT

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Basics

System description

Modular structure

The PSS universal (PSSu) from Pilz is a modular system for use in the decentralised periphery of plant and machinery. A modular PSSu type system consists of:

- ▶ One head module
- ▶ At least one supply voltage module
- ▶ Input/output modules for standard and failsafe applications, which may be installed in any sequence
- ▶ End bracket at the start of the system to secure the system on the mounting rail
- ▶ Terminating plate with integratable end bracket at the end of the system to secure the system on the mounting rail

Head module

- ▶ Connects the sensor/actuator level for standard applications to master controllers via various standard bus systems (e.g. PROFIBUS)
- ▶ Connects the sensor/actuator level for failsafe applications to SafetyBUS p
- ▶ Co-ordinates the entire process data traffic for standard and failsafe applications
- ▶ Permits a failsafe output to be switched via a standard signal, depending on an enable from a failsafe signal (local enable principle)

Supply voltage modules

- ▶ Available for various functions
- ▶ Consist of an electronic module and a base module

Input/output modules

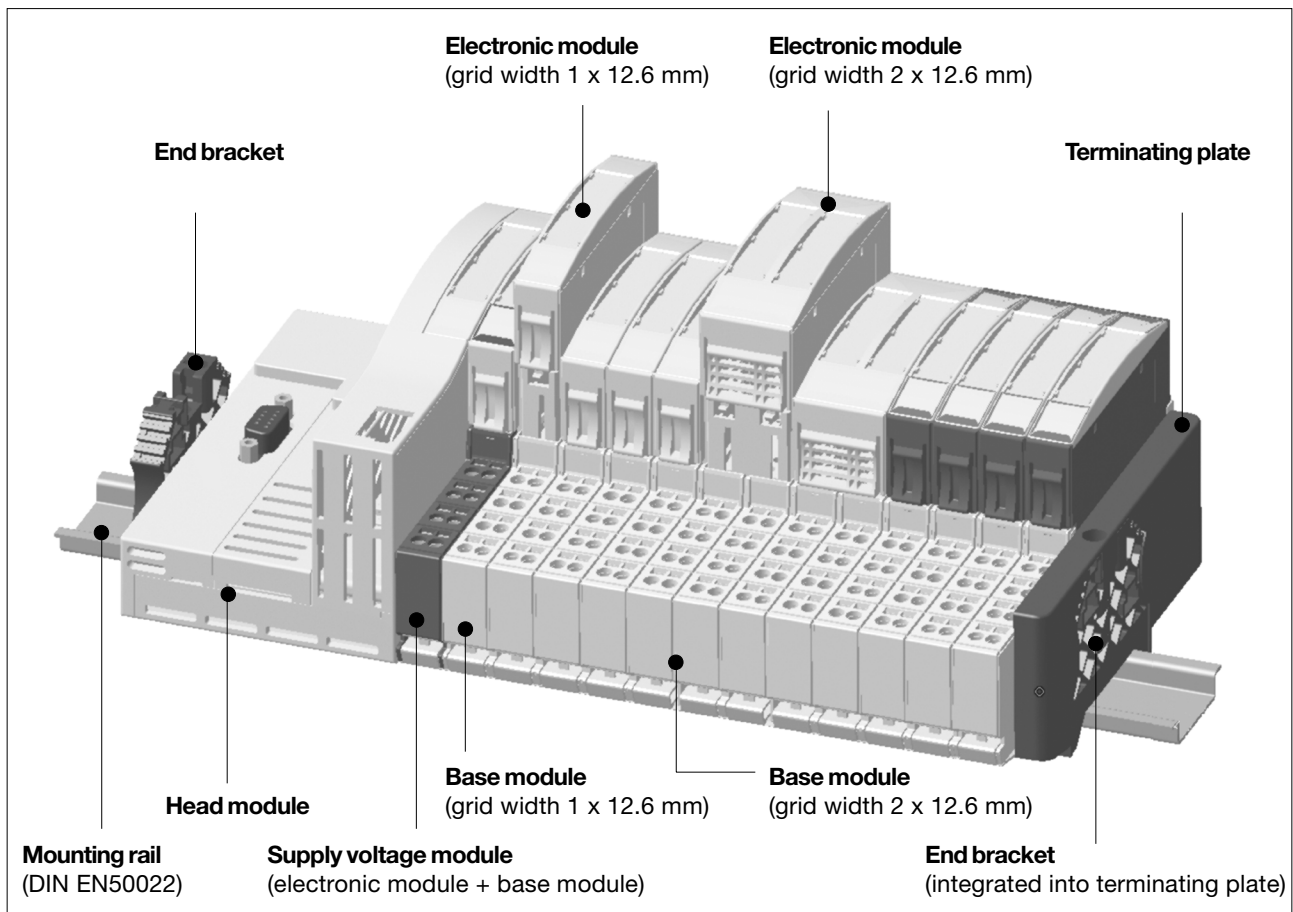
- ▶ Available for a wide range of input/output functions
- ▶ Consist of an electronic module and a base module

Base modules

- ▶ Carrier units for the supply voltage and input/output modules
- ▶ Used to connect the field wiring
- ▶ Available with the following connection types:
 - Cage clamp terminals or
 - Screw terminals

Electronic modules

- ▶ Are plugged into base modules
- ▶ Can be inserted/removed independently from the base module
- ▶ Determine the function of the supply voltage or input/output module
- ▶ Communicate with the head module via the module bus



Basics

System description

Module bus

The module bus is formed by arranging the base modules together and connecting them via a mechanical latch.

► Data

2 independent bus systems are available for FS data and ST data. The data is processed in the head module.

► Module supply

Supply for the head module and the electronic modules. Various supply voltage modules are available for different functions (e.g. voltage refresh, separating the supply).

► Periphery supply

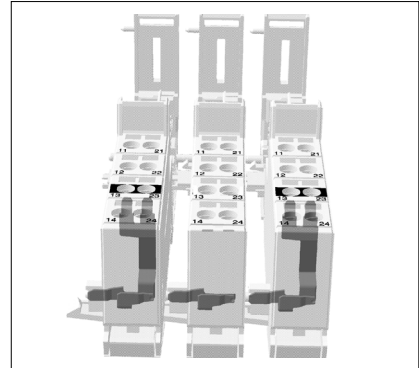
The supply for the actuators (load) or input test pulses is provided at the base module contacts, depending on the function of the electronic module. Various supply voltage modules are available for different functions. The connection on the module bus can be disconnected in order

to form supply groups. In this case it is necessary to use an appropriate supply module, which disconnects the supply (module supply, periphery supply and C-rail supply) to the preceding (left-hand) modules and provides a new supply to subsequent (right-hand) modules.

► C-rail

The C-rail is routed through all the base modules via the module bus. The C-rail is an additional power rail, which is attached to the base module connections. It is intended as an option, providing additional power if required.

Access to the C-rail is available through the use of base modules which contain the letter "C" in their description (e.g. PSSu BP-C 1/8 S). The base module connections on which the C-rail is available are marked with a black bar across the whole connection level. I/O modules normally route the C-rail connections on connection level 3.

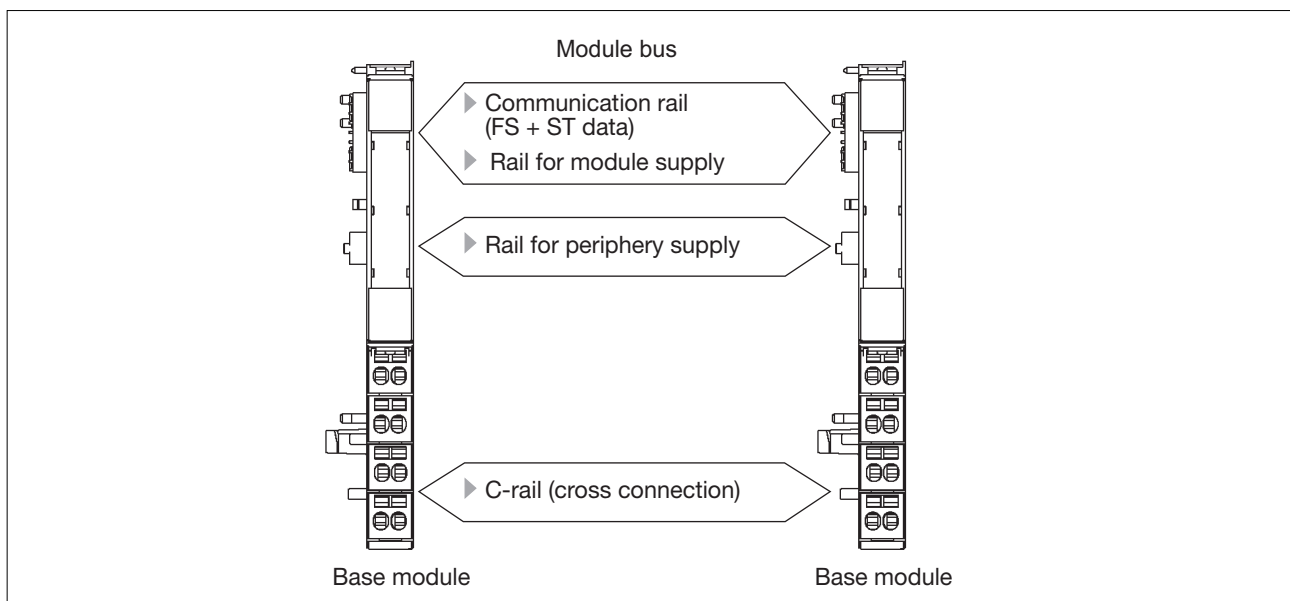


If the supply is separated on base modules containing supply modules, this is symbolised by the fact that only the right-hand connection on the connection level is marked with a black bar. This is normally connection 24. Permitted infeed at C-rail:

- PE or
- 0 V or
- Screen or
- - 24 VDC ... + 24 VDC, max. 10 A

Make sure that the C-rail supply belongs to the same circuit as the other base module connections.

Structure of module bus



Basics

System description

Maximum system expansion

Module type	Number of modules per system	Explanation
Input/output modules in total (identifier: PSSu E F ... / PSSu E S ...)	Max. 64	Details are valid for designing a PSSu system with any combination of ST modules and FS modules, provided all the following conditions are met.
Input/output modules for ST applications (identifier: PSSu E S ...)	Max. 64	Details are valid for designing a PSSu system with ST modules only. Restrictions may apply, depending on the standard bus system that is used.
Input/output modules for FS applications (identifier: PSSu E F ...)	Max. 32	Details are valid for designing a PSSu system with FS modules only.
Output modules with dual-pole outputs for FS applications (identifier: PSSu E F ... OZ ...)	Max. 16	Details are valid for designing a PSSu system with dual-pole FS output modules only (e.g. PSSu E F DI OZ 2).

System limits

System supply	Max. current load	Explanation
Module supply when supplied via - PSSu E F PS	Max. 1.5 A	The load is determined by the current consumption of the head module and electronic modules that are used. If a heavier load arises, an additional supply module must be used to refresh the module supply. Further details can be found in the description of the relevant supply module.
Module supply when supplied via - PSSu E F PS1	Max. 2 A	
Periphery supply when supplied via - PSSu E F PS - PSSu E F PS1 - PSSu E F PS-P	Max. 10 A	The module bus rail for periphery supply can take a max. 10 A load. If a heavier load arises, an additional supply module must be used to refresh the periphery supply. The load is determined by the current consumption of the sensors/ actuators on the electronic modules that are used. Further details can be found in the description of the relevant supply module.
C-rail	Max. 10 A	The C-rail can take a max. 10 A load. If a heavier load arises, an additional supply module must be used. Further details can be found in the description of the relevant supply module.

Basics

System description

Local enable principle

The new local enable principle technique means that outputs on failsafe output modules can now be switched via a standard bus system (e.g. PROFIBUS).

Configuration of the local enable principle

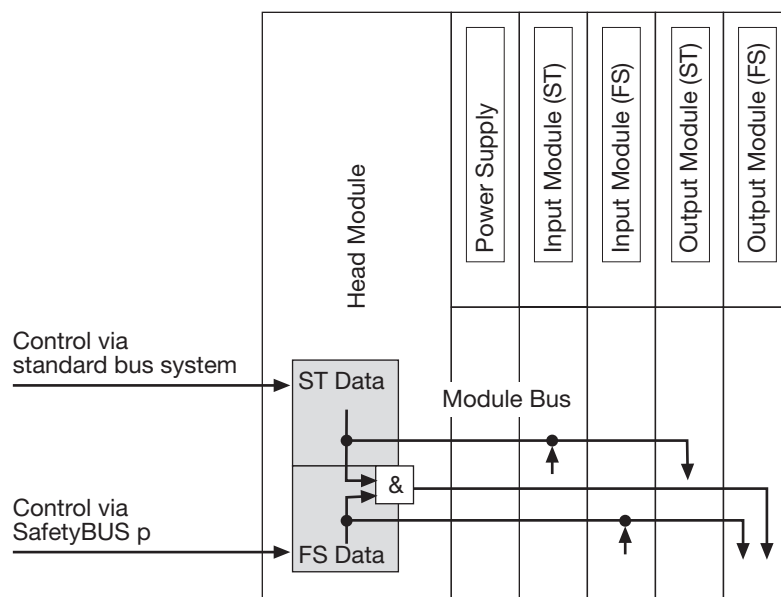
- ▶ Via the PSS WIN-PRO system software
- ▶ By configuring FS output modules for the relevant standard bus system (e.g. in the case of Profibus, included in the GSD file)
- ▶ By assigning an FS output to a bit in the ST process image of outputs (ST-PIO). The FS output will therefore operate as an enable output.
- ▶ Ability to read the FS inputs via the standard bus system.

Operation of the local enable principle

- ▶ The configured FS outputs are driven via a standard bus system.
- ▶ Provided the enable output carries a "1" signal, the configured FS outputs can be driven via a standard bus system.

As soon as the enable output carries a "0" signal, the configured FS outputs are shut down safely. Control via the standard bus system is ignored.

Function model of the local enable principle



Basics

System description

Connection labelling on the base modules

The connections on the base modules are indicated via two-digit numbers. The first digit denotes the column on the module. The second digit denotes the connection level within the PSSu system.

Colour marking of connection levels

The colour marking on the different connection levels is helpful when it comes to wiring. Various colour markers are available to label the connection levels. For the connection diagram to remain consistent it makes sense to arrange I/O modules of the same type into groups (see example).

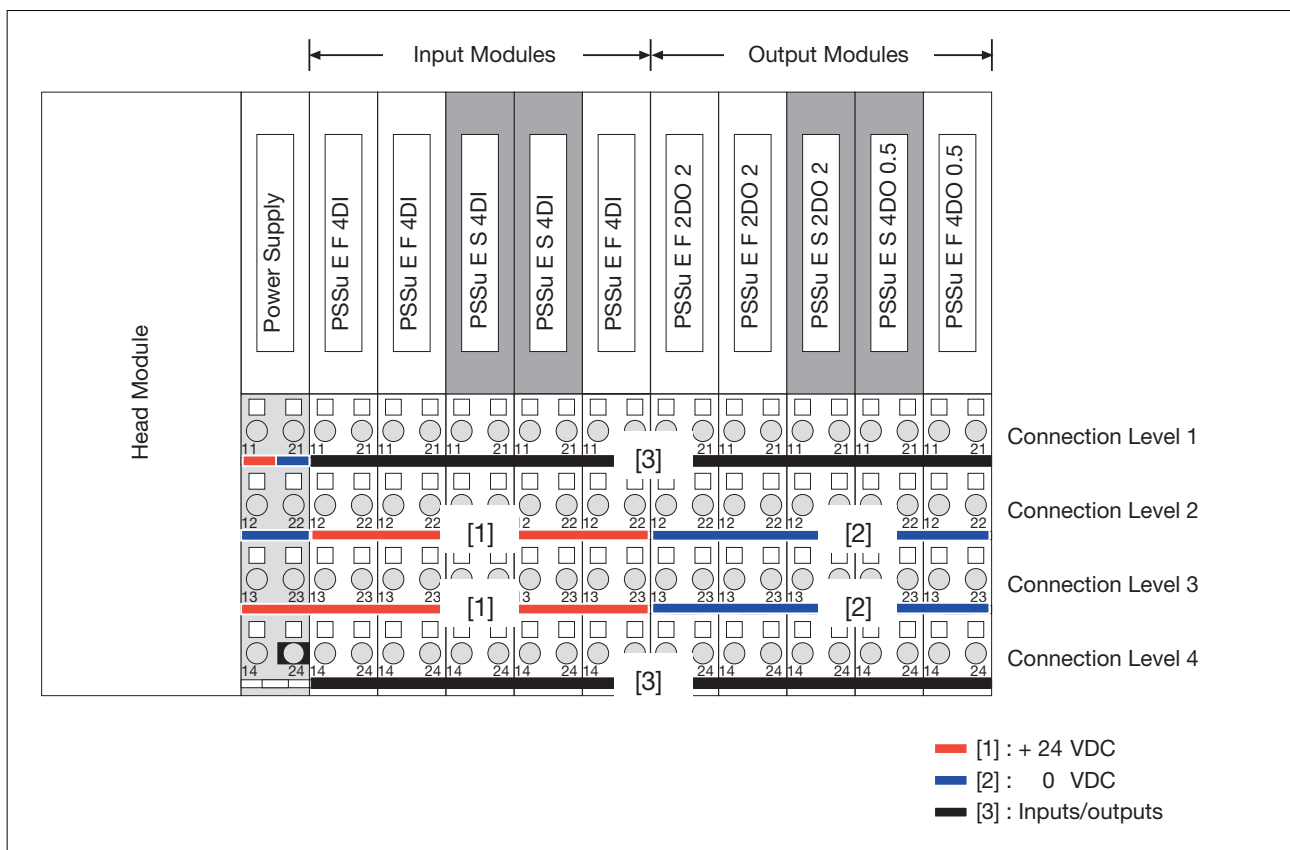
The connection levels are typically assigned as follows:

- ▶ Connection level 1 and 4
On I/O modules, connection levels 1 and 4 typically contain the module's inputs or outputs.
Marking in the example:
- Black [3]

- ▶ Connection levels 2 and 3
On I/O modules, connection levels 2 and 3 typically contain the common supplies (+24 VDC, test pulse outputs, 0 VDC).
Marking in the example:
- Red [1]: +24 VDC/test pulses
- Blue [2]: 0 VDC

Example:

Colour marking of connection levels



Basics

System description

Separating supplies to form supply groups

Supply groups are formed by separating the 24 V supply (periphery supply) and, if necessary, also the 5 V supply (module supply). In this case it is necessary to use a supply module that disconnects the supply (periphery supply, C-rail supply and, if necessary, the module supply) to the preceding (left-hand) modules and provides a new supply to subsequent (right-hand) modules.

Provided an appropriate base module is used, in principle any electronic supply voltage module is suitable for separating supplies.

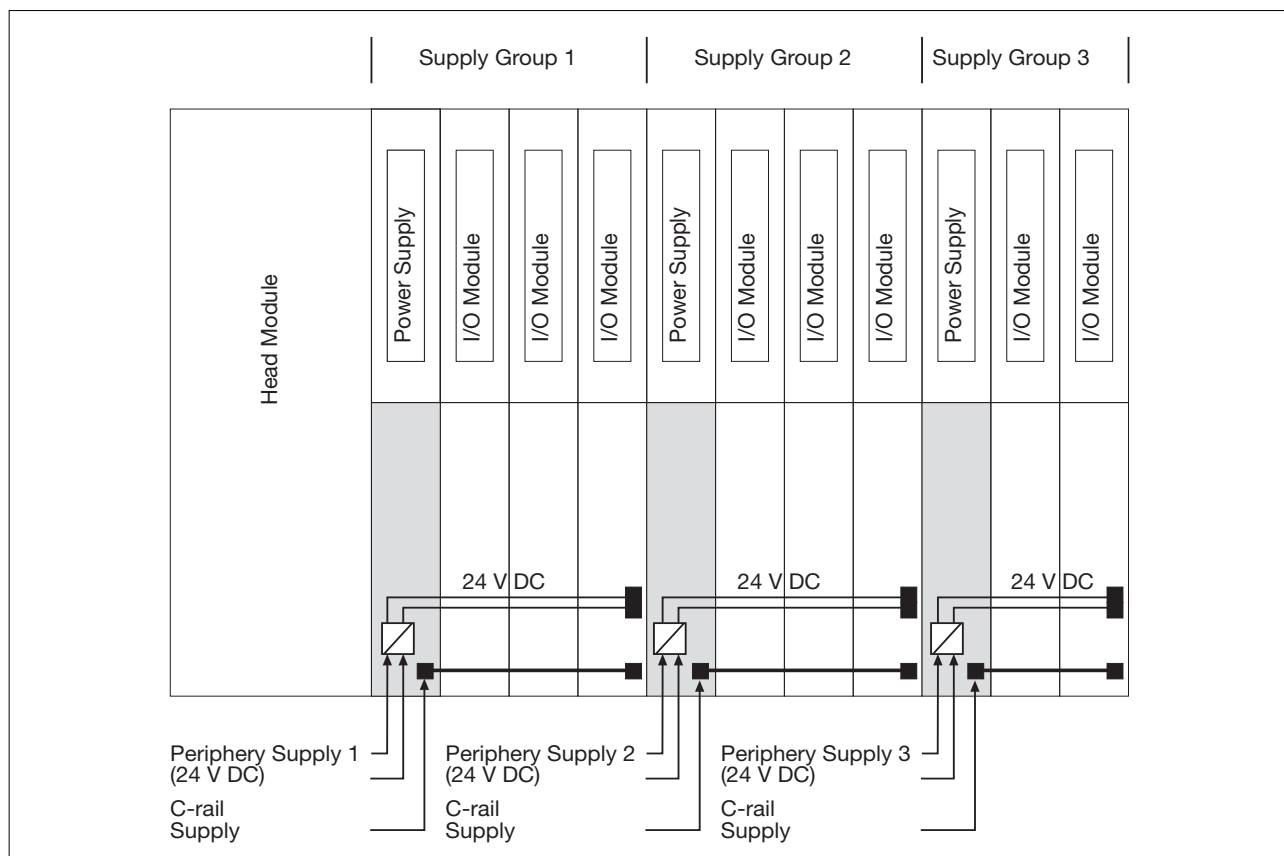
In each case you should take note of the description of the relevant electronic supply voltage module.

For example, supplies can be separated on the following modules:

Modules		Separation of supply		
Electronic module	Base module	C-rail	Periphery supply	Module supply
PSSu E F PS (no module buffer)	PSSu BS-R 1/8 S PSSu BS-R 1/8 C	Separation of supply from left-hand modules and supply infeed to right-hand modules		
PSSu E F PS1 (module buffer for max. 20 modules)	PSSu BS-R 2/8 S PSSu BS-R 2/8 C			
PSSu E F PS-P	PSSu BS 1/8 S PSSu BS 1/8 C	Separation of supply from left-hand modules and supply infeed to right-hand modules		No separation of supply (5 V potential looped through)
PSSu E F BSW (block switching)	PSSu BS 2/8 S PSSu BS 2/8 C			

Principle:

Formation of supply groups for periphery supply



Basics Installation

Mounting position

- ▶ A PSSu system should preferably be installed horizontally on a vertical wall.
- ▶ If other mounting positions are used (e.g. vertical installation), there will be certain restrictions with regard to
 - Ambient temperature
Optimum upward heat dissipation can no longer be guaranteed.
 - Vibration and shock stress
There will be increased requirements on the system fastenings: use additional metallic end brackets!

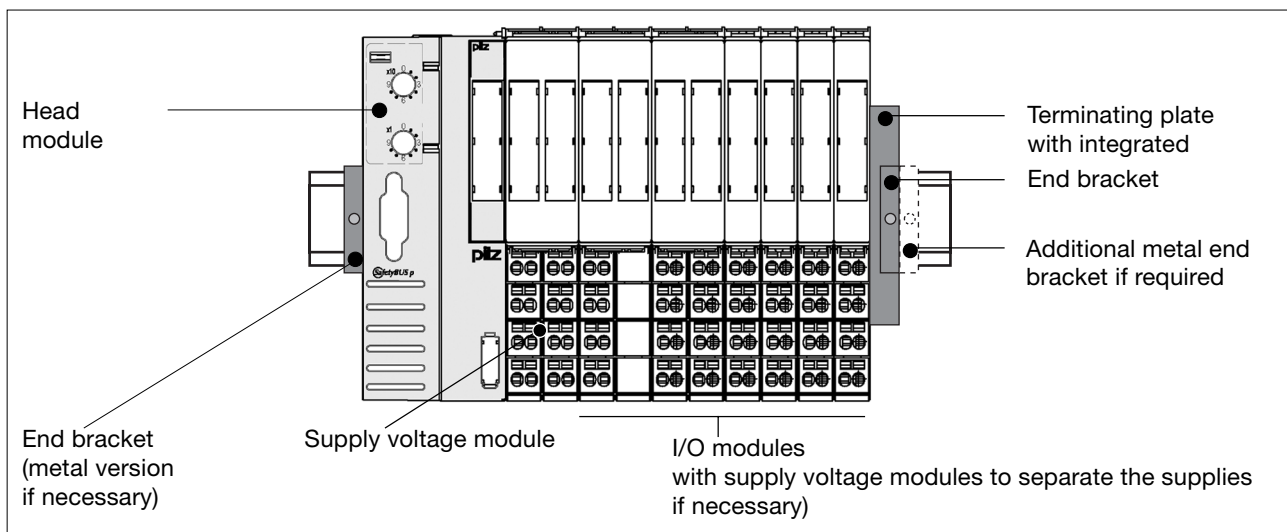
Mounting rail

- ▶ A PSSu system is designed to be installed on a zinc plated DIN rail in accordance with DIN EN 50022. Dimensions:
35 x 7.5 mm or 35 x 15 mm
- ▶ Where vibration and shock stress place increased requirements on the system fastenings, it is recommended that the mounting rail is screwed to the mounting plate approximately every 200 mm.

Module layout

- ▶ The first module on a PSSu system is always a head module.
- ▶ A supply voltage module is always connected to the right of the head module
 - To supply the module electronics to the head module and subsequent I/O modules
 - To provide 24 VDC for the periphery supply
- ▶ Next right it is possible to install I/O modules for FS and ST applications.
 - The I/O modules (input modules, output modules) can be installed in any order.
 - I/O modules for FS applications and ST applications can be combined as required.
 - In various applications it makes sense to combine specific modules into groups.
 - It is not possible to mix base modules with screw terminals and cage clamp terminals.
 - The max. number of I/O modules is determined through the defined system limits.
- ▶ Supply voltage modules may be required to refresh the supply to the module electronics. This can be determined through the defined system limits.

- ▶ To form supply groups, an additional voltage supply module is required at the start of each group. The modules belonging to the supply group will then follow to the right.
- ▶ The final element in a PSSu system is always a terminating plate, containing the bus terminating resistors.
- ▶ Various fastening elements are used at the start and end of the system to secure the system on the mounting rail:
 - End bracket at the start of the system
 - Plastic version (standard)
 - Metal version (increased requirements with regard to vibration and shock stress)
 - End bracket at the end of the system
 - Plastic version (standard)
 - Metal version (increased requirements with regard to vibration and shock stress)

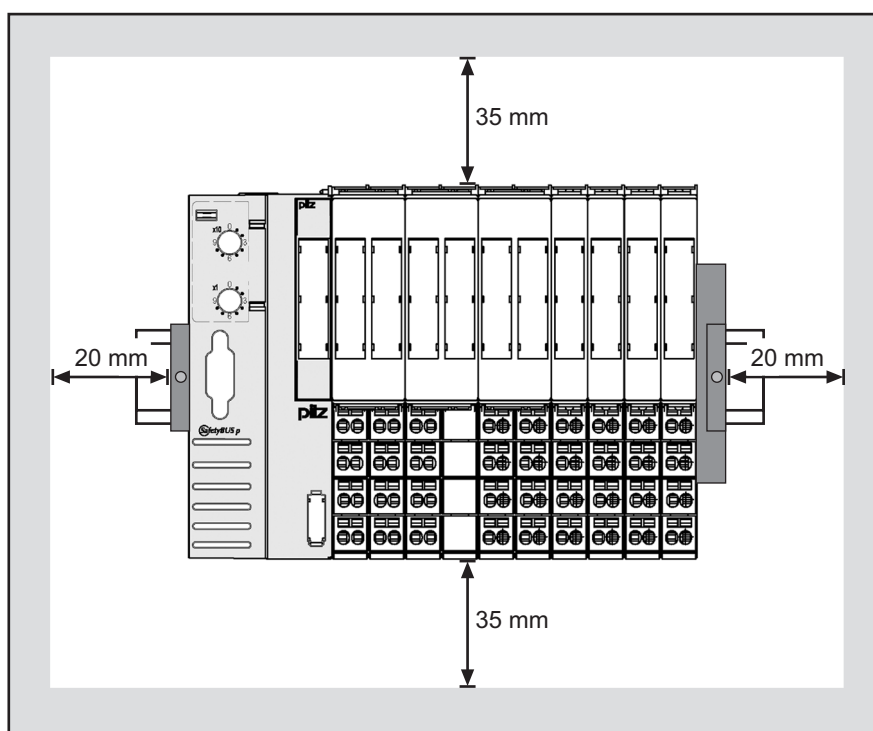


Basics Installation

Mounting distances

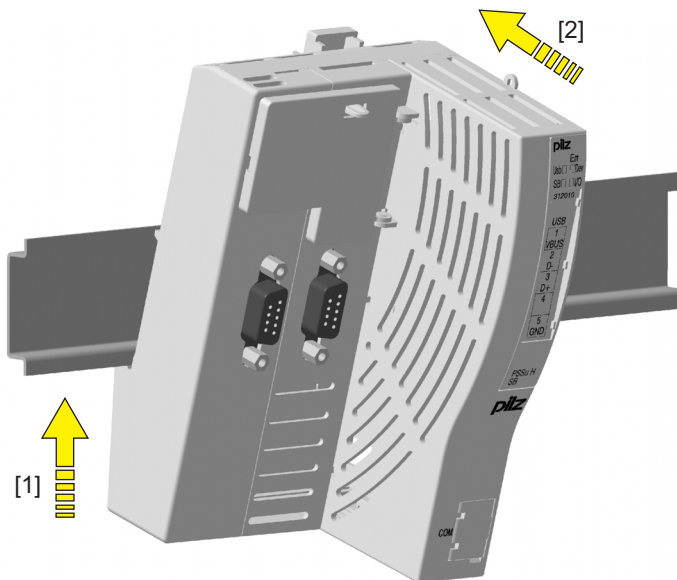
The values stated in the diagram below are minimum specifications.

Appropriate air conditioning may also be required. The values stated for ambient temperature must be maintained. These values can be found in the technical details for the individual modules.



Installing the head module

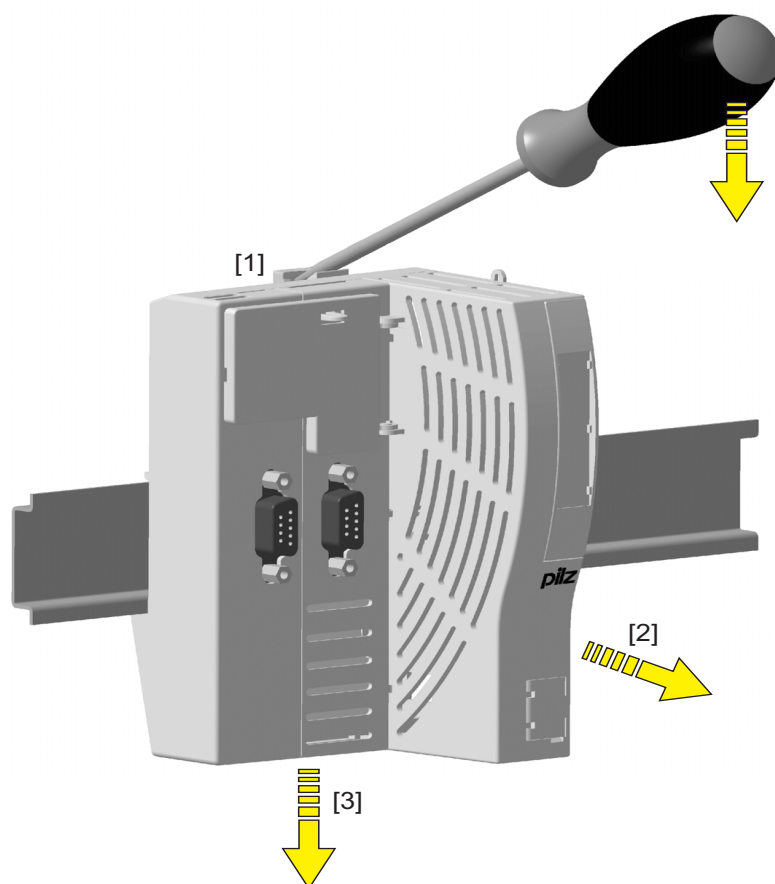
- ▶ Procedure:
 - Slot the groove on the head module on to the mounting rail from below [1].
 - Push the head module back [2] until you hear it lock into position.



Basics Installation

Removing the head module

- ▶ Prerequisite:
 - The supply voltage must be switched off
 - The bus connections must be disconnected
 - All the wiring must be removed
 - All the base modules must have been moved to the right (min. 30 mm) or have already been removed.
- ▶ Procedure:
 - Using a screwdriver, push the rear locking element [1] upwards until the locking hook releases the anchor.
 - Pivot the head module and screw driver forwards [2] and remove in a downward direction [3].



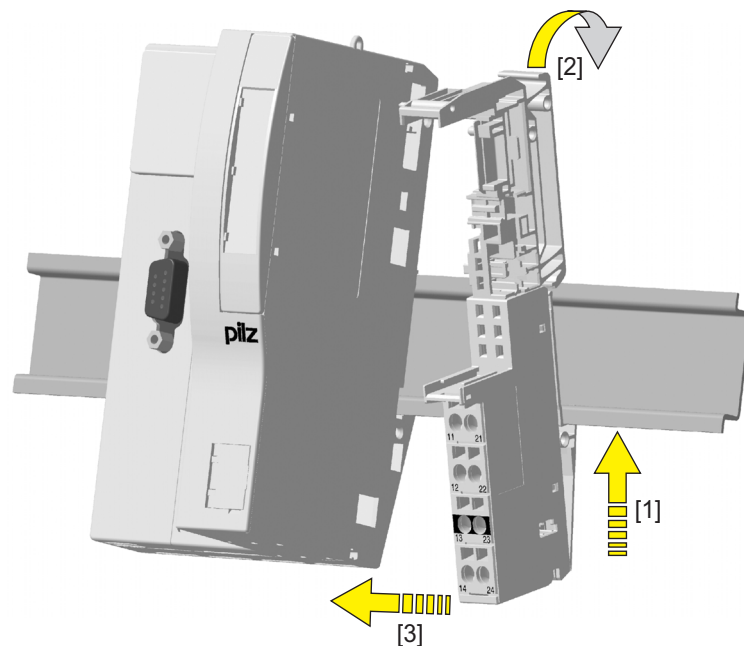
Basics Installation

Installing base modules

- ▶ Prerequisite: The head module must already be installed.
- ▶ The head module must always be followed on the right by a base module that is suitable for an appropriate supply voltage module.
- ▶ The wiring should preferably be carried out after the base modules are installed, but before the electronic modules are installed.
- ▶ 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.
- ▶ Procedure:
The same procedure applies for all base modules (e.g. base modules in grid widths 1 x 12.6 mm, 2 x 12.6 mm).
- Base modules should always be installed to the right of the head module.
- 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 (head module or base module) lock into position [3].



Basics Installation

Removing base modules

► Prerequisite:

- The supply voltage on the corresponding supply module must be switched off
- All the wiring must be removed
- The electronic module on the relevant base module must have been removed, plus the electronic module on the base module to the left.
- All the base modules to the right of the relevant base module must have been moved to the right (min. 30 mm) or have already been removed.

► Procedure:

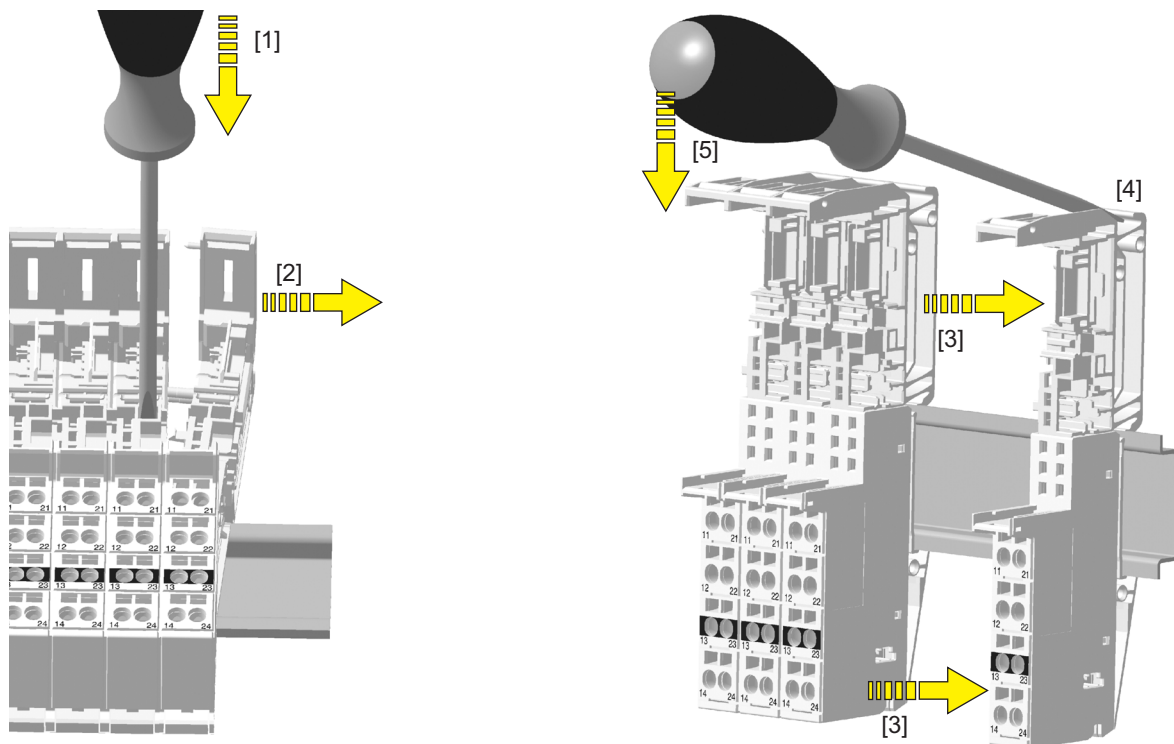
The same procedure applies for all base modules (e.g. base modules in grid widths 1 x 12.6 mm, 2 x 12.6 mm).

- Insert the screwdriver into the square opening on the base module to the left of the relevant module [1].
- Push the screwdriver downwards and keep it pressed down.
- Use the other hand to pull the base module to the right [2] until the locking element on the base module you are removing is completely free.

- On the mounting rail, slide the base module to the right [3]
- Using a screwdriver, push the rear locking element [4] upwards [5] until the locking hook releases the anchor.
- Pivot the base module and screw driver forwards and remove in a downward direction.

NOTICE

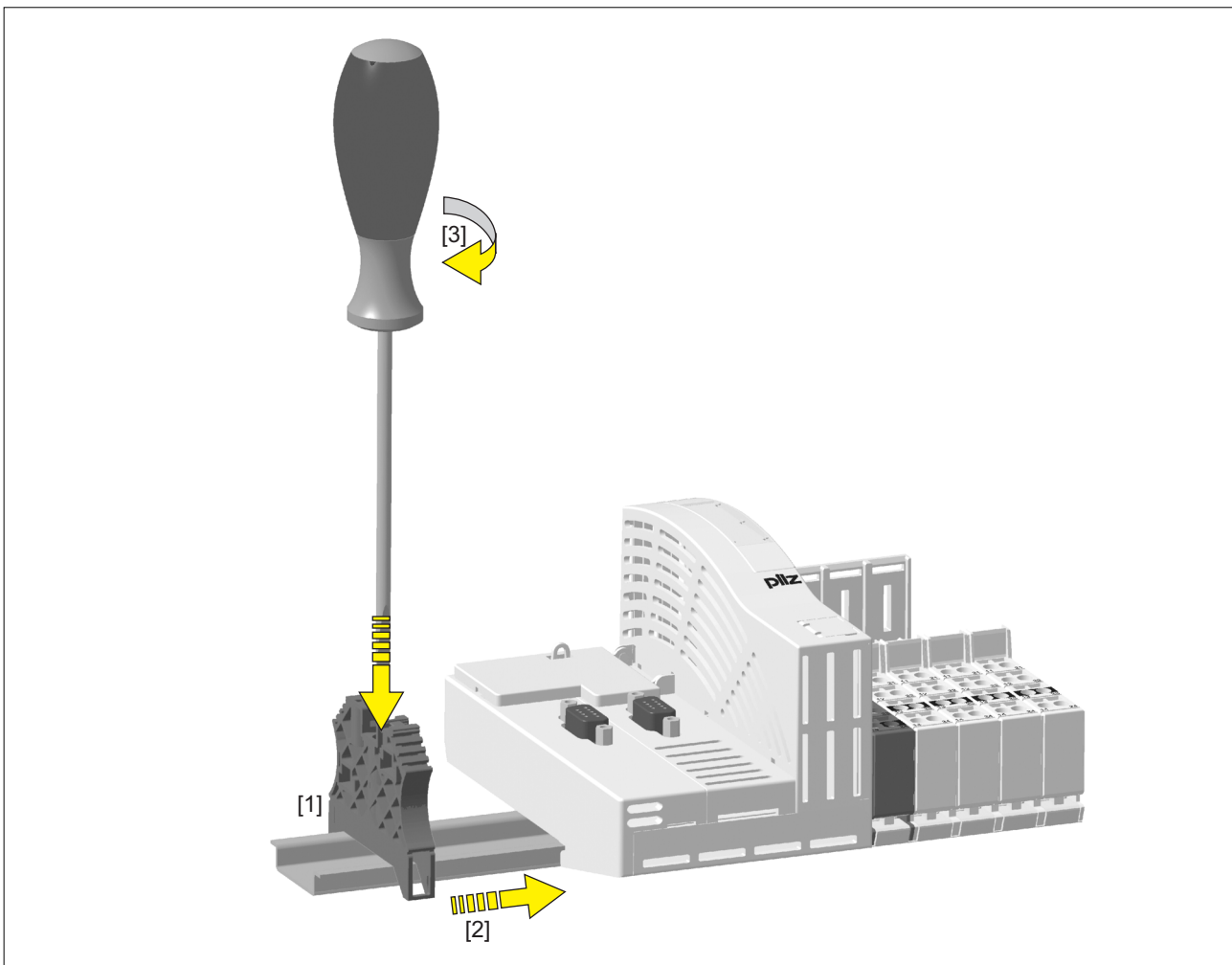
Modules may be inserted and removed a maximum of 20 times. After this point a correct contact can no longer be guaranteed.



Basics Installation

Installing an end bracket at the start of the system

- ▶ Select an end bracket, depending on the vibration and shock stress (plastic version/metal version)
- ▶ Procedure:
 - Use a screwdriver for slotted-head screws (M2).
 - Loosen the fixing screw on the end bracket until the terminals are far enough apart for the end bracket to be positioned on the mounting rail.
- Place the end bracket on the mounting rail, to the left of the head module [1].
- Slide the end bracket up close to the head module [2]
- Tighten up the end bracket [3].



Removing an end bracket at the start of the system

- ▶ Procedure:
 - Use a screwdriver for slotted-head screws (M2).
 - Loosen the fixing screw on the end bracket until the terminals' clamping force is lifted.
 - Remove the end bracket from the mounting rail.

Basics Installation

Installing a terminating plate and end bracket at the end of the system

- ▶ Select an end bracket, depending on the vibration and shock stress
 - Plastic version of end bracket (integrated into terminating plate)
 - Additional end bracket if required (metal version)
- ▶ Procedure:
 - Use a screwdriver for slotted-head screws (M2).
 - Attach the terminating plate to the mounting rail as the final element on the system [1].
 - Loosen the fixing screw on the end bracket until the terminals are far enough apart for the end

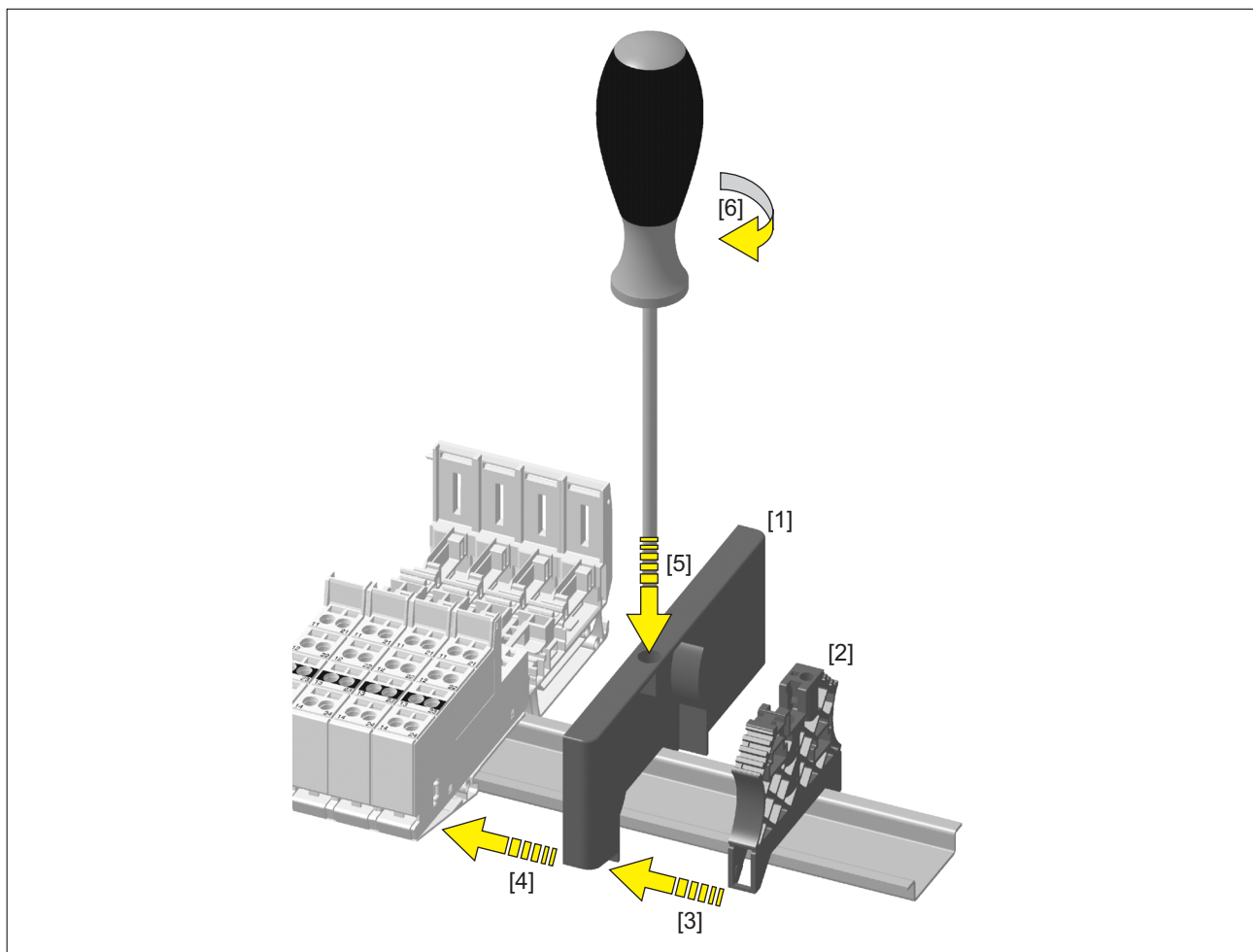
bracket to be positioned on the mounting rail.

- Place the end bracket on the mounting rail, to the right of the terminating plate [2].
- Slide the end bracket and terminating plate into each other [3]
- Slide the terminating plate with integrated end bracket up to the final base module as far as it will go [4]; ensure that contact is made with the integrated bus terminating resistors.
- Insert the screwdriver into the terminating plate [5]
- Tighten up the integrated end bracket [6].

- ▶ If an additional end bracket (metal version) is required to secure the system, this additional end bracket is installed to the right of the terminating plate.

Procedure:

- Loosen the fixing screw on the metallic end bracket
- Place the metallic end bracket on the mounting rail
- Slide the metallic end bracket up close to the terminating plate with the integrated end bracket
- Tighten up the metallic end bracket



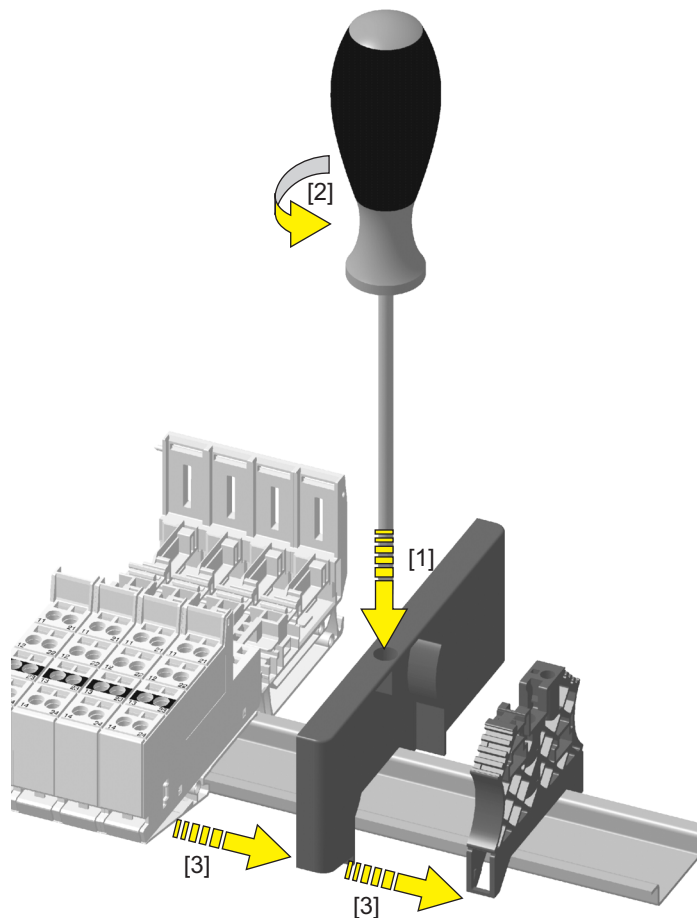
Basics Installation

Removing a terminating plate and end bracket at the end of the system

► Procedure:

- Use a screwdriver for slotted-head screws (M2).
- Insert the screwdriver into the terminating plate [1]
- Loosen the fixing screw on the end bracket [2].
- Move the terminating plate and integrated end bracket to the right [3].

Note: Do not damage the elements used to connect to the adjacent base module.



Basics Installation

Inserting an electronic module

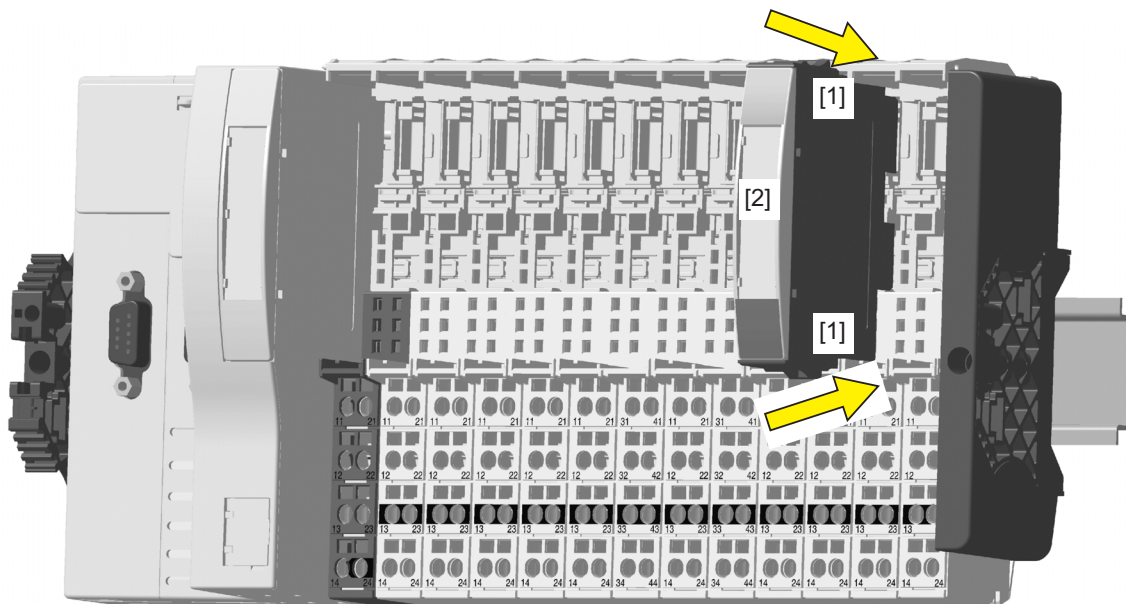
NOTICE

Modules may be inserted and removed a maximum of 20 times. After this point a correct contact can no longer be guaranteed.

- ▶ Electronic modules should only be plugged into base modules that are installed and, preferably, wired.

- ▶ Electronic modules with outputs (output modules) may only be inserted or removed when the load is switched off. If modules are inserted/removed under load, the possibility of the PSSu system switching to a safe condition (STOP condition) cannot be excluded. The corresponding I/O-Group (SafetyBUS p) may also switch to a STOP condition.

- ▶ Procedure:
 - The electronic module must audibly lock into position [1].
 - Identify the electronic module using the labelling strips [2]



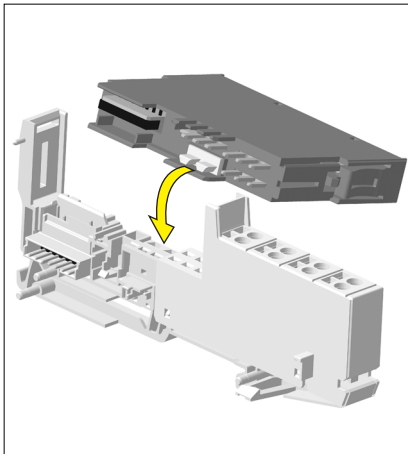
Basics Installation

Mechanical coding

Electronic modules have a two-part coding element. The first time an electronic module is plugged into a base module, one part of the coding element remains on the electronic module, while its counterpart is fixed on to the base module.

The coding element is designed to help prevent plugging errors (e.g. when exchanging modules).

- ▶ Once a base module has been coded, only electronic modules with the same coding can be inserted.
- ▶ If a new electronic module is to be plugged into a base module that has already been coded, you will initially need to remove the coding counterpart on the electronic module.



Overview of the mechanical coding elements on electronic modules

Electronic module	Mechanical coding element (rear view of electronic module)
PSSu E F PS-P Coding: yellow, A	
PSSu E PD Coding: light grey, A	
PSSu E F PS Coding: yellow, B	
PSSu E F PS1 Coding: yellow, C	
PSSu E F 4DI Coding: yellow, D	
PSSu E F 4DO 0.5 Coding: yellow, E	
PSSu E F 2DO 2 Coding: yellow, F	
PSSu E F DI OZ 2 Coding: yellow, G	
PSSu E F 2DOR 8 Coding: yellow, H	
PSSu E F BSW Coding: yellow, I	
PSSu E S 4DI Coding: dark grey, A	
PSSu E S 4DO 0.5 Coding: dark grey, B	
PSSu E S 2DO 2 Coding: dark grey, C	

Basics Installation

Removing an electronic module

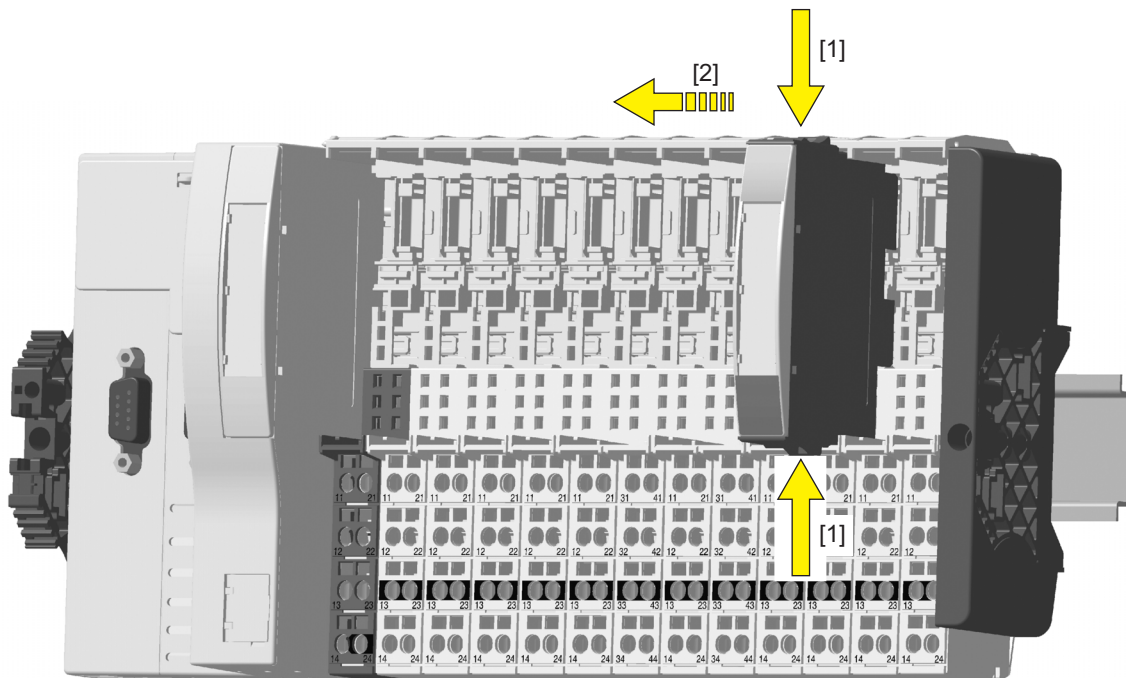
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

- ▶ Electronic modules with outputs (output modules) may only be inserted or removed when the load is switched off.
- If modules are inserted/removed under load, the possibility of the PSSu system switching to a safe condition (STOP condition) cannot be excluded. The corresponding I/O-Group (SafetyBUS p) may also switch to a STOP condition.

Procedure:

- ▶ Press the locking mechanisms [1] together and at the same time
- ▶ Pull out the electronic module [2]

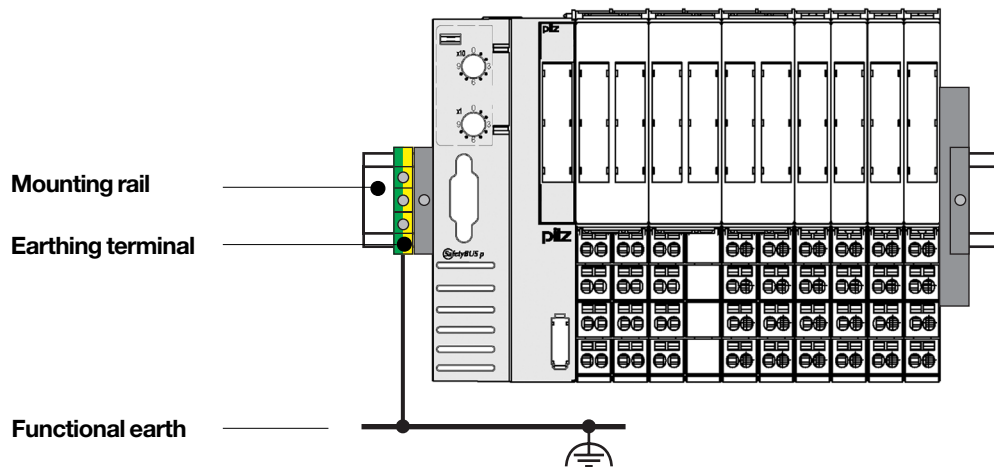


Basics Installation

Earthing

When modules are attached to the mounting rail, contact with the mounting rail is made via a contact spring. The mounting rail should be earthed appropriately.

A special earthing terminal that can be attached to the mounting rail is available as an accessory.

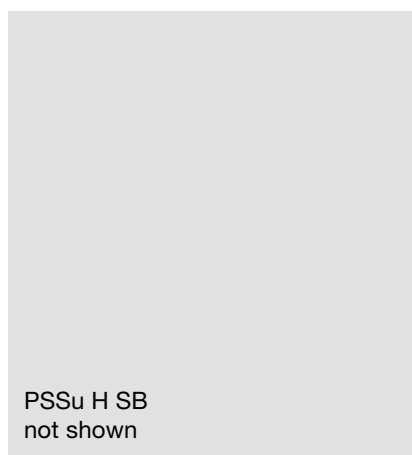


Basics Installation

Notes

Head modules

PSSu H SB



Head module to connect a PSSu type system to SafetyBUS p. Suitable for safety-related functions.

Module features

- ▶ SafetyBUS p interface for switching failsafe inputs/outputs via SafetyBUS p
- ▶ USB port for PC connection
 - Commissioning and service
- ▶ LED indicators for:
 - System status
 - SafetyBUS p status
 - USB status
- ▶ Electronic modules suitable for use for input/output:
 - All failsafe modules (identifier: PSSu F...)

Safety features

The module meets the following safety requirements:

- ▶ Watchdog for life monitoring
- ▶ Protection against over-temperature
- ▶ Safe voltage monitoring

Module description

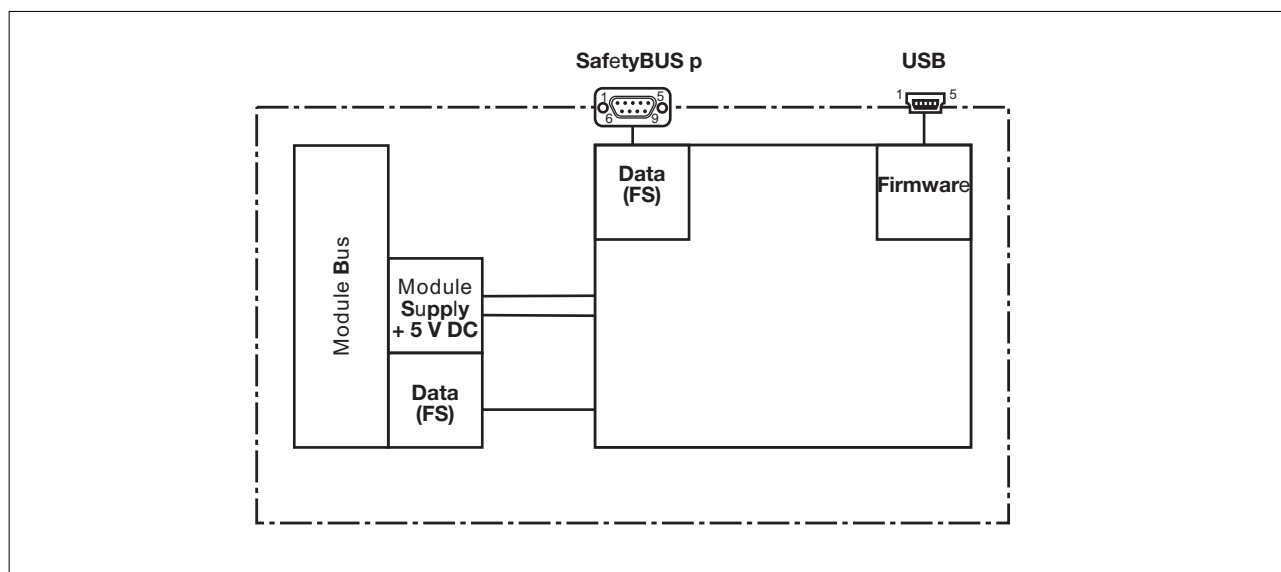
The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. The module may be used to connect the system to

- ▶ SafetyBUS p

Approvals

	PSSu H SB
	In progress

Block diagram



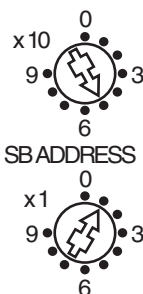
Head modules

PSSu H SB

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ SafetyBUS p
The system can be connected to SafetyBUS p as a SafetyBUS p subscriber via the SafetyBUS p interface.
 - SafetyBUS p interface: male 9-pin D-SUB connector "SafetyBUS p"
 - Ability to connect the Pilz FO coupler PSS SB SUB-D F0.
 - Device address: can be set via the two rotary switches "SB ADDRESS".
Valid device addresses:
 $32_D \dots 95_D$.
 - SafetyBUS p status: displayed via the LEDs "SB" and "I/O".
- ▶ USB
For commissioning and service work, a PSSu system can be connected to a PC via the USB port.
 - USB port:
Mini-B USB connector "USB"
 - USB status: displayed via the LED "USB"

Setting the device address for SafetyBUS p

Rotary switch "SB ADDRESS"	Key	Example: Device address 51_D
"x 10"	Setting the tens	
"x 1"	Setting the units	

Head modules PSSu H SB

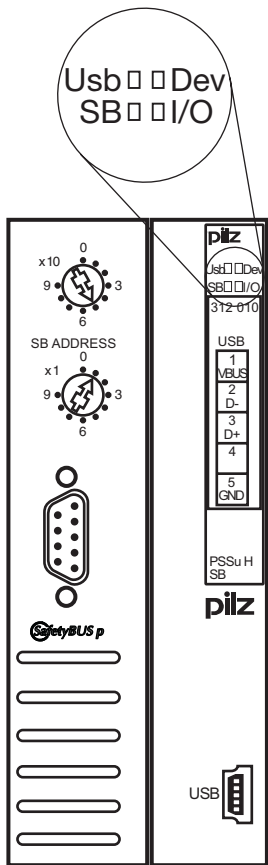
System configuration for SafetyBUS p

The system is configured using Pilz configuration software.

Diagnostics

- ▶ The module has various LEDs to display
 - System status
 - SafetyBUS p status
 - I/O-Group status (SafetyBUS p)
 - USB status
 (see table below)

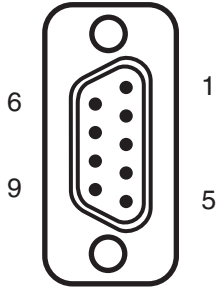
- ▶ SafetyBUS p error reaction:
If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

Head module	LED	LED status	Key
	"Usb"	Off	No data is being exchanged via the USB port
		Lights green	Data is being exchanged via the USB port
	"SB"	Off	No contact with SBp - SBp wiring is faulty or - MD is not in operation
		Flashes green	There is contact with SBp, but the MD does not recognise the SBp device - SBp device address is faulty or - SBp configuration is faulty
		Lights green	There is contact with SBp, the connection to the MD is running correctly
	"Dev"	Off	A PSSu system error is preventing the PSSu system from starting up
		Lights green	The PSSu system is operating without error
		Lights red	A PSSu module error has occurred
		Flashes red	A PSSu periphery error has occurred
	"I/O"	Off	All the I/O-Groups configured on the SBp device are in a STOP condition
		Flashes green	One of the I/O-Groups configured on the SBp device is in a STOP condition
		Lights green	All the I/O-Groups configured on the SBp device are in a RUN condition

Head modules PSSu H SB

Head module

► Interface assignment

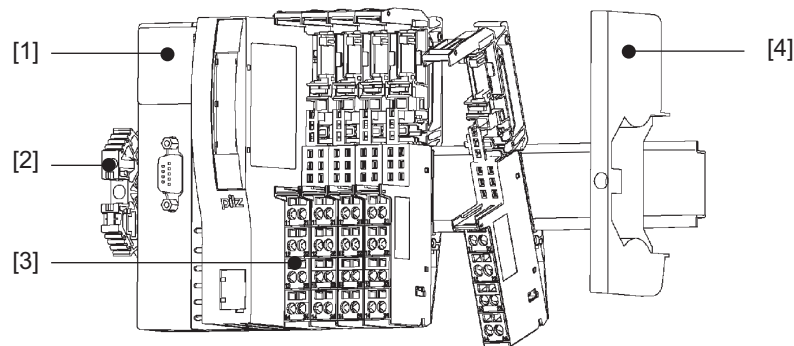
SafetyBUS p	Assignment	
Male 9-pin D-SUB connector	1: n.c. 2: CAN_L (brown) 3: CAN_GND (white) 4: n.c. 5: CAN_SHLD 6: n.c. 7: CAN_H (green) 8: Supply voltage for Pilz FO coupler 9: n.c. n.c. = not connected	
USB	Assignment	
Mini-B USB connector	1: VBUS +5 VDC 2: D- USB Data- 3: D+ USB Data+ 4: n.c. 5: GND Ground n.c. = not connected	

Head modules

PSSu H SB

Installation

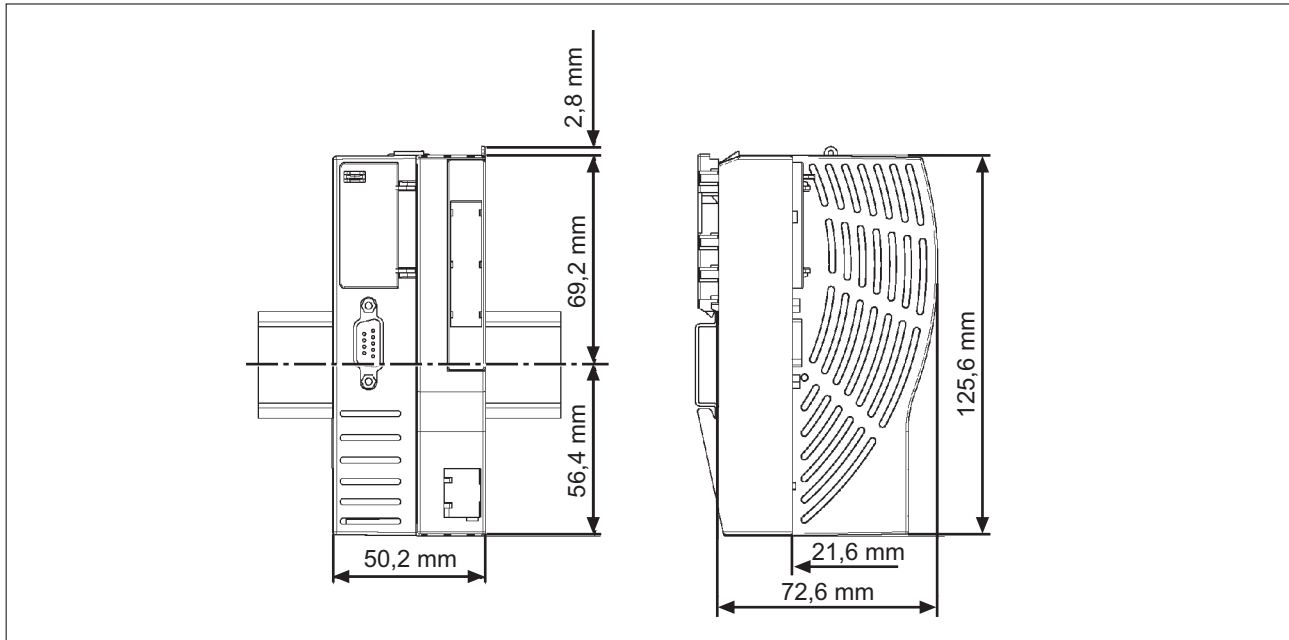
- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ Attach the head module to the mounting rail as the first module on the system and lock into position [1].
- ▶ Install the appropriate end bracket on the mounting rail to the left of the head module [2].
- ▶ Always attach an appropriate supply voltage module to the mounting rail as the first module to the right of the head module and then lock into position [3].
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



Head modules

PSSu H SB

Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Head modules

PSSu H SB

Technical details	PSSu H SB
Function	Modular I/O system for decentralised applications
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data	
Supply voltage from module supply	5 VDC
Current consumption from module supply	≤ 300 mA
Power consumption	1.5 W
SafetyBUS p	
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97
Device address	32 _D ... 95 _D , selectable
Transmission rate	Max. 500 kBit/s
Cable runs	max. 3,500 m
Transmission type	Differential two-wire cable, Fibre-optic cable via fibre-optic coupler
Connection	Male 9-pin D-SUB connector
USB	
Connection	Mini-B USB connector
Mechanical data	
Dimensions (H x W x D)	128.4 x 50.2 x 72.6 mm
Weight	180 g
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock (EN 60068-2-27, 03/93)	15g, 11 ms
Continuous shock (EN 60068-2-29, 04/93)	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Head modules

PSSu H SB

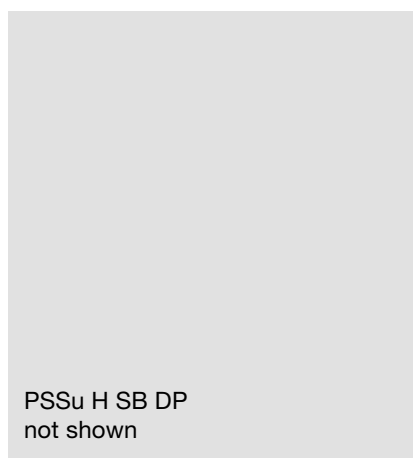
Order reference

Description	Order no.
PSSu H SB (Head module with SafetyBUS p interface)	312 010

Order reference for accessories

Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Head modules PSSu H SB DP



Head module to connect a PSSu type system to SafetyBUS p and PROFIBUS-DP simultaneously. Suitable for safety-related and non-safety-related functions.

Module features

- ▶ SafetyBUS p interface for switching failsafe inputs/outputs via SafetyBUS p
- ▶ PROFIBUS interface for switching
 - Standard inputs/outputs via PROFIBUS-DP and
 - Failsafe outputs via the local enable principle
- ▶ USB port for PC connection for
 - Commissioning and service
- ▶ LED indicators for:
 - System status
 - SafetyBUS p status
 - USB status
 - PROFIBUS interface status
- ▶ Electronic modules suitable for use for input/output:
 - All failsafe modules (identifier: PSSu E F ...)
 - All standard modules (identifier: PSSu E S ...)

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. The module may be used to connect the system to

- ▶ SafetyBUS p
- ▶ PROFIBUS-DP

Safety features

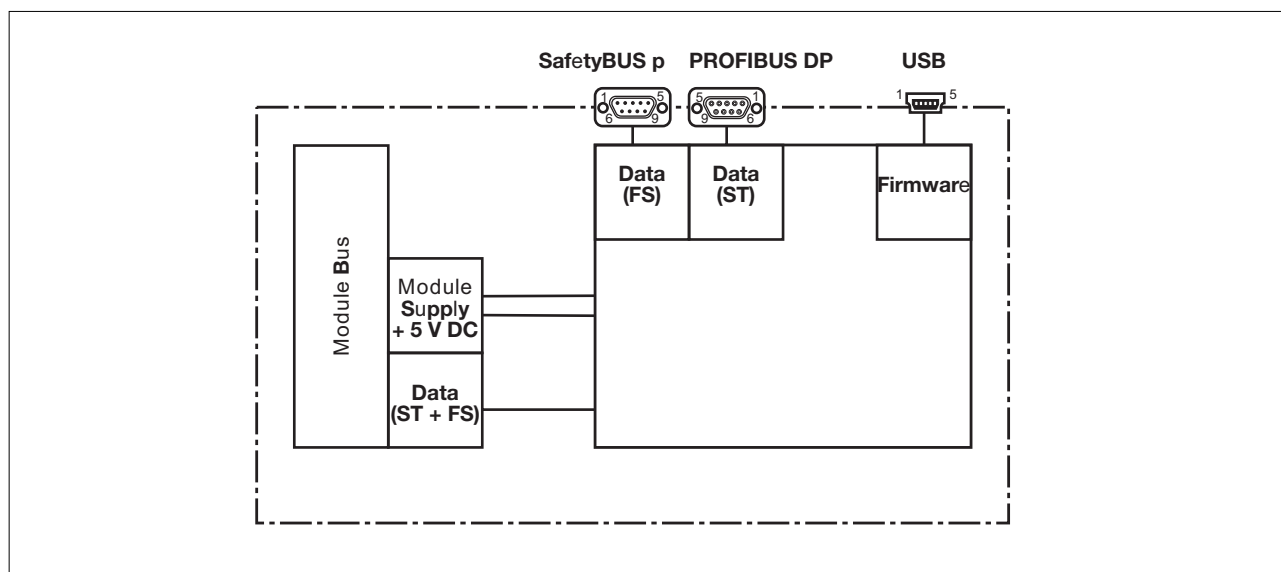
The module meets the following safety requirements:

- ▶ Watchdog for life monitoring
- ▶ Protection against over-temperature
- ▶ Safe voltage monitoring

Approvals

	PSSu H SB DP
	In progress

Block diagram



Head modules PSSu H SB DP

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ SafetyBUS p
The system can be connected to SafetyBUS p as a SafetyBUS p subscriber via the SafetyBUS p interface.
 - SafetyBUS p interface: male 9-pin D-SUB connector "SafetyBUS p"
 - Ability to connect the Pilz FO coupler PSS SB SUB-D F0.
 - Device address: can be set via the two rotary switches "SB ADDRESS".
Valid device addresses: $32_D \dots 95_D$.
 - SafetyBUS p status: displayed via the LEDs "SB" and "I/O"

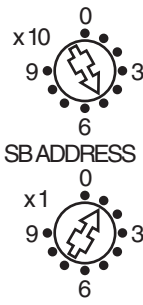
▶ PROFIBUS

- The system can be connected to PROFIBUS as a PROFIBUS-DP Slave via the PROFIBUS interface. The basic functions of communication with PROFIBUS-DP conform to EN 50170.
- PROFIBUS interface: female 9-pin D-SUB connector "PROFIBUS-DP"
 - Ability to connect an FO coupler for PROFIBUS-DP.
 - Station address can be set via the binary coded DIP switch "ADDRESS"
Valid station addresses: $0_D \dots 125_D$
 - PROFIBUS-DP interface status: displayed via the LEDs "RUN" and "BF"

▶ USB

- For commissioning and service work, a PSSu system can be connected to a PC via the USB port.
- USB port:
Mini-B USB connector "USB"
 - USB status: displayed via the LED "USB"

Setting the device address for SafetyBUS p

Rotary switch "SB ADDRESS"	Key	Example: Device address 51_D
"x 10"	Setting the tens	
"x 1"	Setting the units	

Setting the station address for PROFIBUS

DIP switch “ADDRESS”	Key	Example: Station address 52 _D
“ _ _ ” “64” “32” “16” “8” “4” “2” “1”	A station address is set via a combination of the relevant binary coded switches. OFF ON Not assigned 0 64_D (2⁶) 0 32_D (2⁵) 0 16_D (2⁴) 0 8_D (2³) 0 4_D (2²) 0 2_D (2¹) 0 1_D (2⁰)	OFF ON ADDRESS -- 64 32 16 8 4 2 1

Head modules PSSu H SB DP

System configuration for SafetyBUS p

The system is configured using Pilz configuration software.

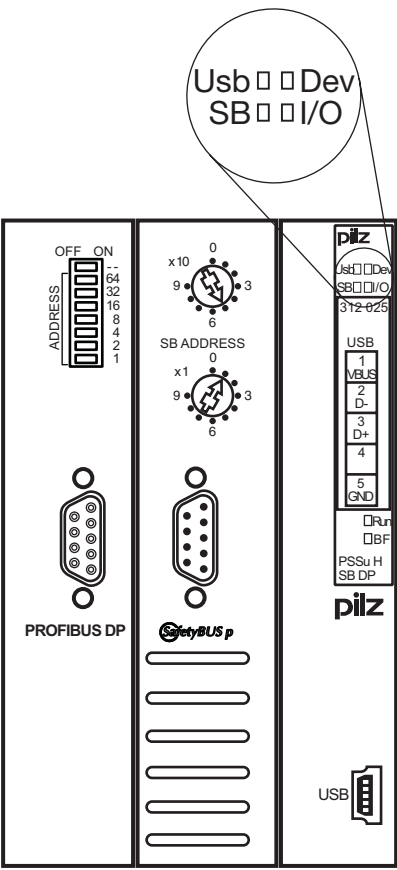
Parameter settings for PROFIBUS-DP

The parameter settings for the PROFIBUS-DP Slave conform to the guidelines of the PROFIBUS User Group (PNO).

Diagnostics

- ▶ The module has various LEDs to display
 - System status
 - SafetyBUS p status
 - I/O-Group status (SafetyBUS p)
 - USB status
 - PROFIBUS interface status
 (see tables below)

- ▶ SafetyBUS p error reaction:
If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.
- ▶ PROFIBUS-DP error reaction:
The error reaction conforms to the guidelines of the PROFIBUS User Group (PNO).

Head module	LED	LED status	Key
	"Usb"	Off	No data is being exchanged via the USB port
		Lights green	Data is being exchanged via the USB port
	"SB"	Off	No contact with SBp - SBp wiring is faulty or - MD is not in operation
		Flashes green	There is contact with SBp, but the MD does not recognise the SBp device - SBp device address is faulty or - SBp configuration is faulty
		Lights green	There is contact with SBp, the connection to the MD is running correctly
	"Dev"	Off	A PSSu system error is preventing the PSSu system from starting up
		Lights green	The PSSu system is operating without error
		Lights red	A PSSu module error has occurred
		Flashes red	A PSSu periphery error has occurred
	"I/O"	Off	All the I/O-Groups configured on the SBp device are in a STOP condition
		Flashes green	One of the I/O-Groups configured on the SBp device is in a STOP condition
		Lights green	All the I/O-Groups configured on the SBp device are in a RUN condition

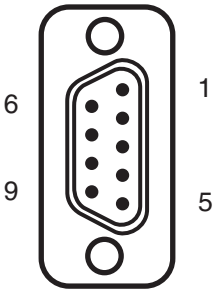
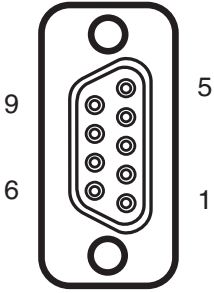
Head modules PSSu H SB DP

Head module	LED status "BF"	LED status "Run"	Key
	Off	Off	No supply voltage or PROFIBUS interface start-up is not yet complete
	Lights red	Off	Bus error on PROFIBUS
	Flashes red	Off	PROFIBUS station address is invalid Remedy: Set a valid PROFIBUS station address
	Flashes red	Lights green	PROFIBUS diagnostics being run prior to PROFIBUS data transfer
	Flashes red	Flashes green	Fatal error (PROFIBUS) Remedy: - Restart the head module or - Reset the head module by switching the supply to the head module off/on
	Off	Flashes green	Static PROFIBUS diagnostics being run during data transfer.
	Off	Lights green	Data is being exchanged between the PROFIBUS interface and the PROFIBUS Master

Head modules PSSu H SB DP

Head module

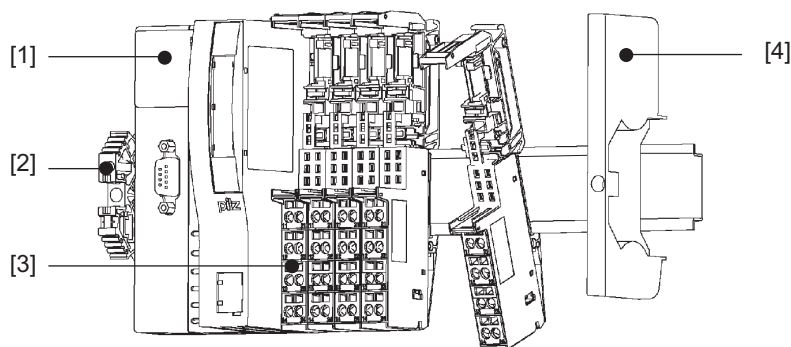
► Interface assignment

SafetyBUS p	Assignment	
Male 9-pin D-SUB connector	1: n.c. 2: CAN_L (brown) 3: CAN_GND (white) 4: n.c. 5: CAN_SHLD 6: n.c. 7: CAN_H (green) 8: Supply voltage for Pilz FO coupler 9: n.c. n.c. = not connected	
PROFIBUS-DP	Assignment	
Female 9-pin D-SUB connector conforms to the guidelines of the PROFIBUS User Group (PNO).	1: n.c. 2: n.c. 3: RxD/TxD-P (B-line) 4: CNTR-P (RTS) 5: DGND (GND ext.) 6: VP (+5 V ext.) 7: n.c. 8: RxD/TxD-N (A-line) 9: n.c. n.c. = not connected	
USB	Assignment	
Mini-B USB connector	1: VBUS +5 VDC 2: D- USB Data- 3: D+ USB Data+ 4: n.c. 5: GND Ground n.c. = not connected	

Head modules PSSu H SB DP

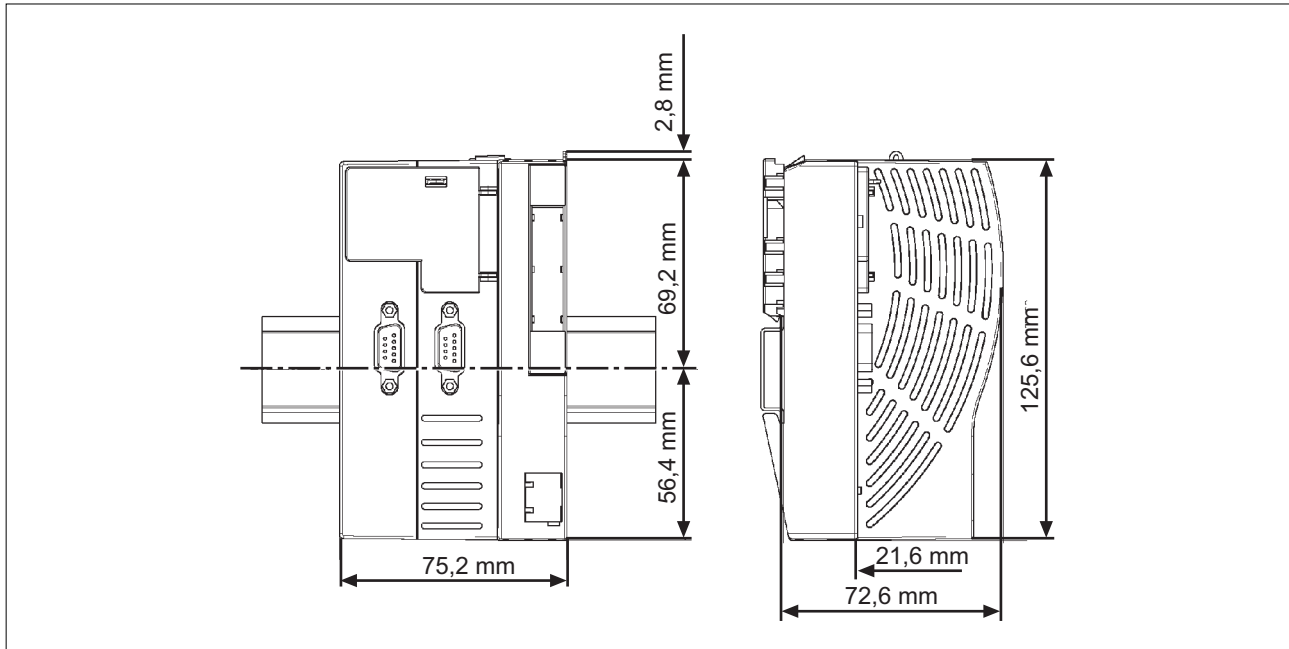
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ Attach the head module to the mounting rail as the first module on the system and lock into position [1].
- ▶ Install the appropriate end bracket on the mounting rail to the left of the head module [2].
- ▶ Always attach an appropriate supply voltage module to the mounting rail as the first module to the right of the head module and then lock into position [3].
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



Head modules PSSu H SB DP

Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Head modules PSSu H SB DP

Technical details	PSSu H SB
Function	Modular I/O system for decentralised applications
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data	
Supply voltage	From module supply: 5 VDC
Current consumption	From module supply: ≤ 500 mA
Power consumption	2.5 W
SafetyBUS p	
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97
Device address	32 _D ... 95 _D , selectable
Transmission rate	Max. 500 kBit/s
Cable runs	max. 3,500 m
Transmission type	Differential two-wire cable, Fibre-optic cable via fibre-optic coupler
Connection	Male 9-pin D-SUB connector
PROFIBUS-DP	
Application range	Non-safety-related applications, failsafe applications in accordance with the local enable principle
Device type	Slave
Status display	LED
Station address	0 ... 125 _D , selectable
Transmission rate	Max. 12 MBit/s
Connection	Female 9-pin D-SUB connector
USB	
Connection	Mini-B USB connector
Mechanical data	
Dimensions (H x W x D)	128.4 x 75.2 x 72.6 mm
Weight	195 g
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock EN 60068-2-27, 03/93 EN 60068-2-29, 04/93	15g, 11 ms 10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Head modules

PSSu H SB DP

Order reference	
Description	Order no.
PSSu H SB DP (Head module with SafetyBUS p interface and PROFIBUS-DP interface)	312 025
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Head modules

PSSu H SB DP

Notes

Supply voltage PSSu E F PS

PSSu E F PS
not shown

Electronic module to provide the system with the module supply, periphery supply and C-rail supply.

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ Supply for max. 12 modules
- ▶ Separate 24 VDC infeed for module supply (5 VDC)
- ▶ Separate 24 VDC infeed for periphery supply (24 VDC)
- ▶ Infeed for C-rail supply (if required)
- ▶ LED indicators for:
 - Module supply status
 - Periphery supply status
 - Module error
- ▶ Application depends on which base module is used
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference".

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

Safety features

The module meets the following safety requirements:

- ▶ Protection against over-temperature
- ▶ Module supply
 - Integral voltage limitation
 - Protection circuit for EMC
- ▶ Periphery supply
 - Integral voltage monitoring (exceeding upper/lower limit)
 - Integral current monitoring (exceeding upper/lower limit)
 - Integral thermistor monitoring
- ▶ Diagnostic capabilities

Approvals

	PSSu E F PS
	In progress

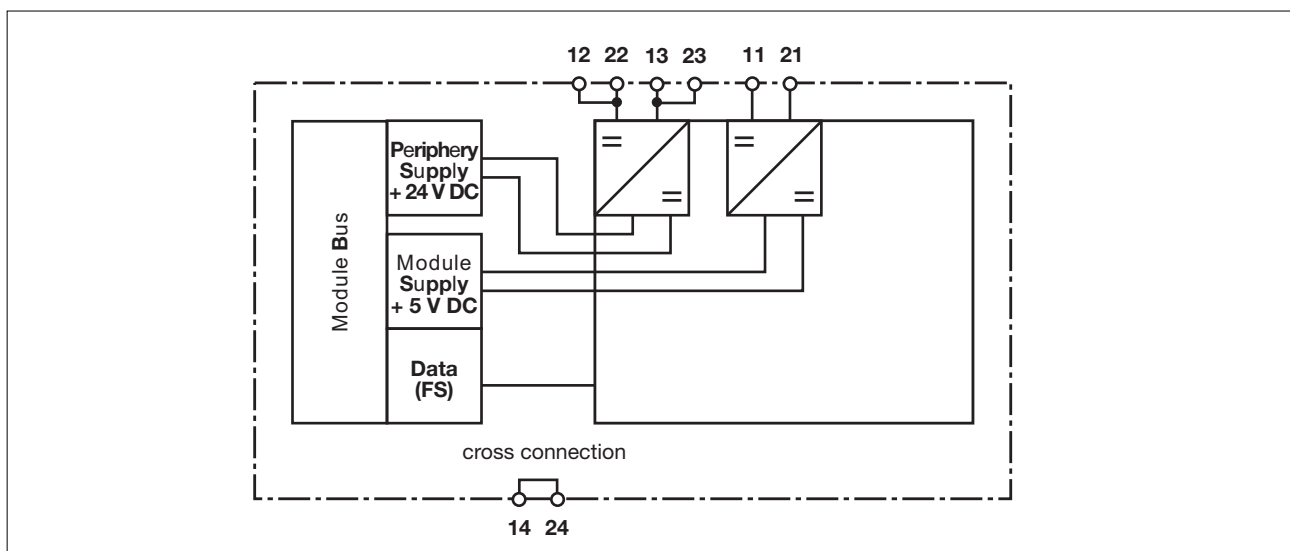
Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides the supply for the module supply and periphery supply within the system.

Depending on which base module is used, the module may be used as a:

- ▶ General supply module (first module after the head module)

Block diagram



Supply voltage PSSu E F PS

Function description

- ▶ Using the module as the **first module after the head module**
When the relevant base module is used, the following supply can be provided to the module bus:
 - Module supply (5 VDC) for head module (left-hand side)
 - Module supply (+5 VDC) for subsequent modules (right-hand side)
 - Periphery supply (24 VDC, 10 A) for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
- ▶ Using the module to **refresh the module supply and periphery supply**
When the relevant base module is used, the connection to the incoming (left-hand) module supply, periphery supply and C-rail is interrupted on the module bus. The following supply is then provided on the module bus for subsequent (right-hand) modules:

- Module supply (5 VDC) for subsequent modules (right-hand side)
- Periphery supply (24 VDC, 10 A) for subsequent modules (right-hand side)
- C-rail supply for subsequent modules (right-hand side)
- ▶ Using the module to **form supply groups**
When the relevant base module is used, the connection to the incoming (left-hand) module supply, periphery supply and C-rail is interrupted on the module bus. The following supply is then provided on the module bus for subsequent (right-hand) modules:
 - Module supply (5 VDC) for subsequent modules (right-hand side)
 - Periphery supply (24 VDC, 10 A) for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
 Each supply group requires its own supply module.

- ▶ If **galvanic isolation** is required between the module supply and periphery supply, this is achieved by feeding the voltages separately (2 x 24 VDC). If this is not required, one power supply is sufficient for periphery supply and module supply.
- ▶ It is not possible to switch off the module supply if the lower voltage limit is exceeded. However, there will be a visual signal (LED "5 V") and a message will be sent to the head module.
- ▶ It is not possible to switch off the periphery supply if the upper/lower limits of the monitored parameters are exceeded. However, there will be a visual signal (LED "24 V") and a message will be sent to the head module.

Overview of current consumption on head modules and electronic modules

Module	Max. current consumption	Explanation
PSSu H SB	≤ 300 mA	The load on the module supply is determined by the current consumption of the head module and electronic modules that are used. A PSSu E F PS supply module provides a max. module supply of 1.5 A. If a heavier load arises, an additional supply module must be used to refresh the module supply.
PSSu H SB DP	≤ 500 mA	
PSSu E S 4DI	≤ 25 mA	
PSSu E S 4DO 0.5	≤ 60 mA	
PSSu E S 2DO 2	≤ 50 mA	
PSSu E F 4DI	≤ 30 mA	
PSSu E F 4DO 0.5	≤ 75 mA	
PSSu E F 2DO 2	≤ 55 mA	
PSSu E F 4DI OZ 2	≤ 35 mA	
PSSu E F 2DOR 8	≤ 70 mA	
PSSu E F BSW	≤ 220 mA	
PSSu E F PS-P	≤ 25 mA	
PSSu E PD	0 mA	

Supply voltage PSSu E F PS

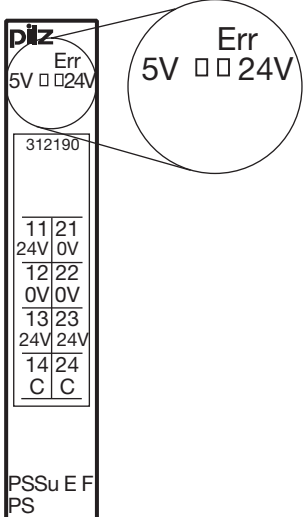
Module diagnostics

- ▶ The module has various LEDs to display
 - Module supply status ("5 V")
 - Periphery supply status ("24 V")
 - Module error ("Err") (see table)
- ▶ Error reaction:
 - Module supply error
If the lower voltage limit is exceeded, a status message is sent to the head module and the "5 V" module LED (see table)
 - Periphery supply error
If the upper/lower limits of the monitored parameters are exceeded, a status message is sent to the head module and the "24 V" module LED (see table)
 - Module error
If a module error occurs (e.g.: error at the inputs, error in programming mode, communication error), a status message is sent to the head module and the "Err" module LED (see table)
 - SafetyBUS p error
All the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

Supply voltage

- ▶ The supply voltages for module supply and periphery supply may be in the range of +18 VDC ... +30 VDC. Safe operation cannot be guaranteed outside this range.
- ▶ Safe electrical isolation must be ensured for both the external 24 V supplies. Failure to do so could result in electric shock.
- ▶ Power supplies must conform to EN 60950, 03/97, section 2.3, EN 60742, 9/95 or EN 50178, 10/97.
- ▶ To achieve the lowest possible residual ripple ($< \pm 1.2$ V), we recommend that you install a three-phase bridge rectifier or an electronically regulated supply.
- ▶ If failsafe inputs are used, the connection between "Ground" (0 V periphery supply) and the earth bar or earth fault monitor must be in accordance with relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ On the module bus, the load current of max. 10 A must not be exceeded for the periphery supply.
- ▶ A total current of max. 10 A must not be exceeded on the C-rail.
- ▶ Connect together the 0 V connections on all the 24 V power supplies and earth the 0 V supply at a single point.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm², in accordance with EN 61131-2, 07/00:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

Wiring

Electronic module	LED	LED status	Key
	Err	Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	24 V	Off	No supply voltage or error in the supply voltage for periphery supply
		Lights green	Supply voltage for periphery supply is error-free
	5 V	Off	No supply voltage or error in the supply voltage for module supply
		Lights green	Supply voltage for module supply is error-free

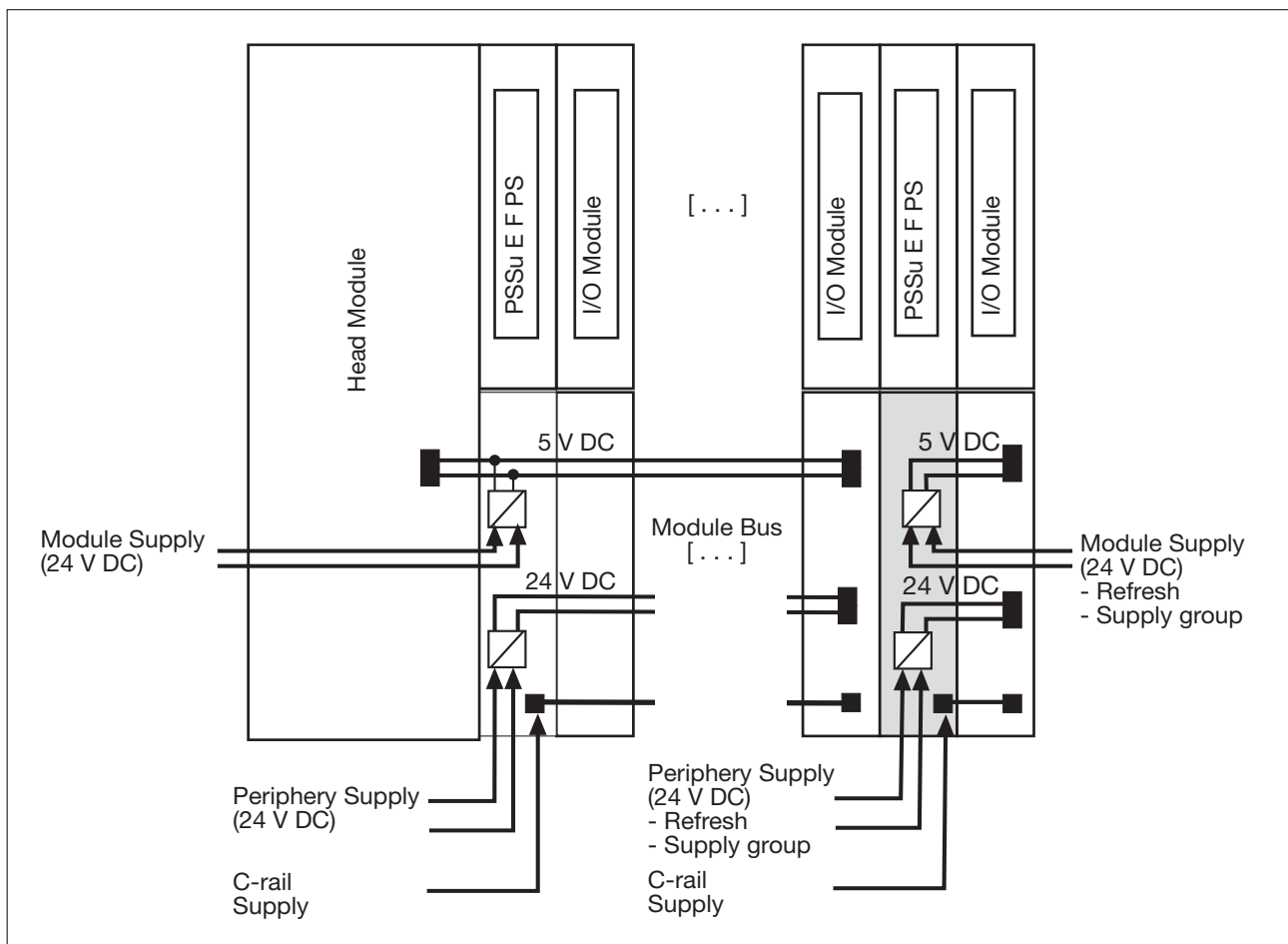
- To provide the head module and subsequent (right-hand) modules with the module supply, periphery supply and C-rail supply.

The diagram illustrates a multi-module system architecture. On the left, a large block represents the 'Head Module'. To its right is a vertical stack of modules, including a 'PSSu E F PS' module, followed by three 'I/O Module's, and an ellipsis indicating further modules. At the bottom, three input lines are shown: 'C-rail Supply', 'Periphery Supply (24 V DC)', and 'Module Supply (24 V DC)'. The 'C-rail Supply' and 'Periphery Supply' lines connect to a common bus that feeds into the 'PSSu E F PS' module. The 'Module Supply (24 V DC)' line connects to a bus that feeds into the 'PSSu E F PS' module and also branches off to feed into the 'I/O Module's. A '5 V DC' line is shown connecting to the 'PSSu E F PS' module. On the right side, a 'Module Bus [...]' is shown, which connects to the 'I/O Module's. The entire system is enclosed in a rectangular frame.

Supply voltage PSSu E F PS

- Supply module to refresh the module supply and periphery supply plus supply module to form supply groups
- To interrupt the incoming (left-hand) module supply, periphery supply, C-rail
- To provide subsequent (right-hand) modules with the module supply, periphery supply and C-rail supply

Base module	Terminal configuration	
Screw terminals: PSSu BS-R 1/8S Cage clamp terminals: PSSu BS-R 1/8C	11: +24 V Module supply, interrupted to the left 21: 0 V Module supply, interrupted to the left 12-22: 0 V Periphery supply, interrupted to the left (12-22 linked internally) 13-23: +24 V Periphery supply, interrupted to the left (13-23 linked internally) 14-24: C-rail infeed, interrupted to the left (14-24 linked internally)	



Supply voltage PSSu E F PS

► Connection

Supply type	Connection
General supply with base module - PSSu BS 1/8S or - PSSu BS 1/8C Note: When the electronic module PSSu E F PS is used with the listed base modules, it may only be used as the first module to the right of the head module!	0 V DC +24 V DC 0 V DC +24 V DC Fuse C-rail Supply Connect to the 0 V supply and earth this at a single point L1 N Module Supply L1 N Periphery Supply
Supply to refresh the - module supply - periphery supply - C-rail supply with base module - PSSu BS-R 1/8S or - PSSu BS-R 1/8C	
Supply to form supply groups with base module - PSSu BS-R 1/8S or - PSSu BS-R 1/8C	

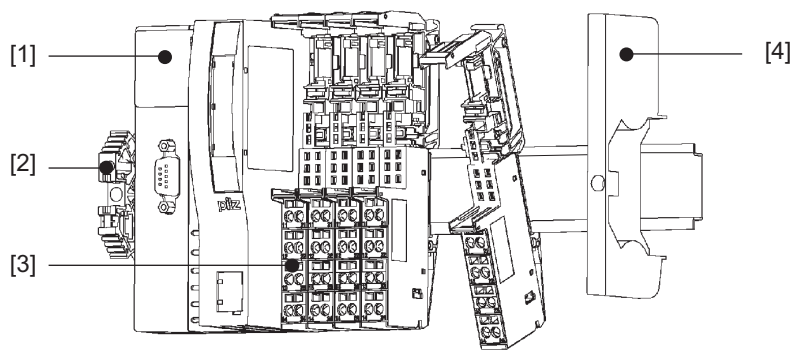
Supply voltage PSSu E F PS

Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module must already be installed.
- ▶ General supply:
 - Attach the base module to the DIN rail as the first module to

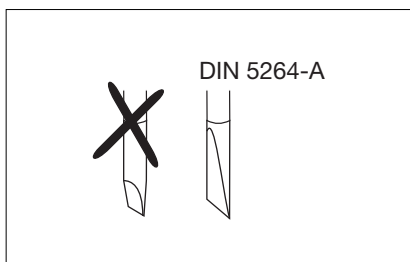
- the right of the head module and click into position on the rail.
- Slide the base module to the left until you hear it click into the head module.
- ▶ Supply to refresh/form supply groups
 - Attach the base module to the DIN rail to the right of the head module [1] and click into position on the rail [2].

- Slide the base module to the left until you hear it click into the last base module to be installed.
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



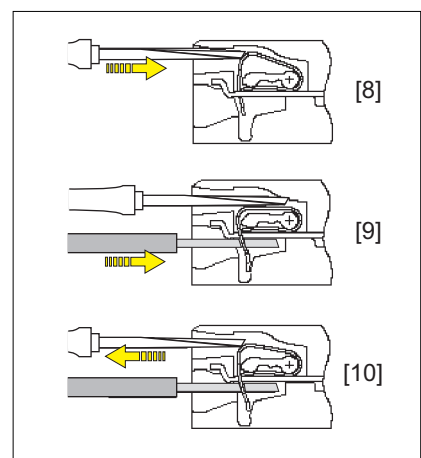
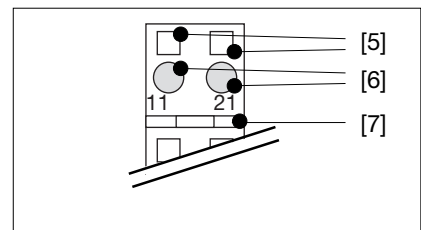
Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal.



Supply voltage PSSu E F PS

Inserting an electronic module

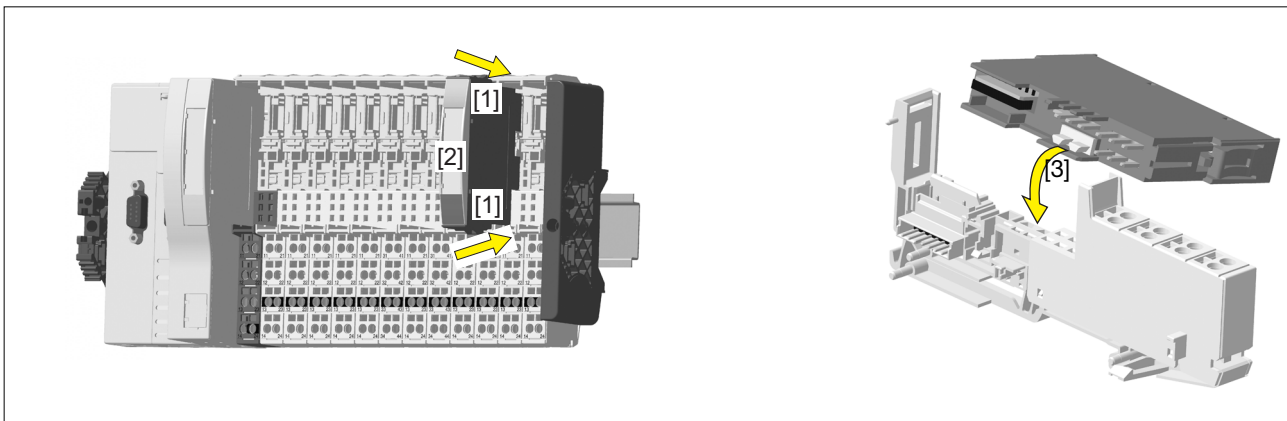
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

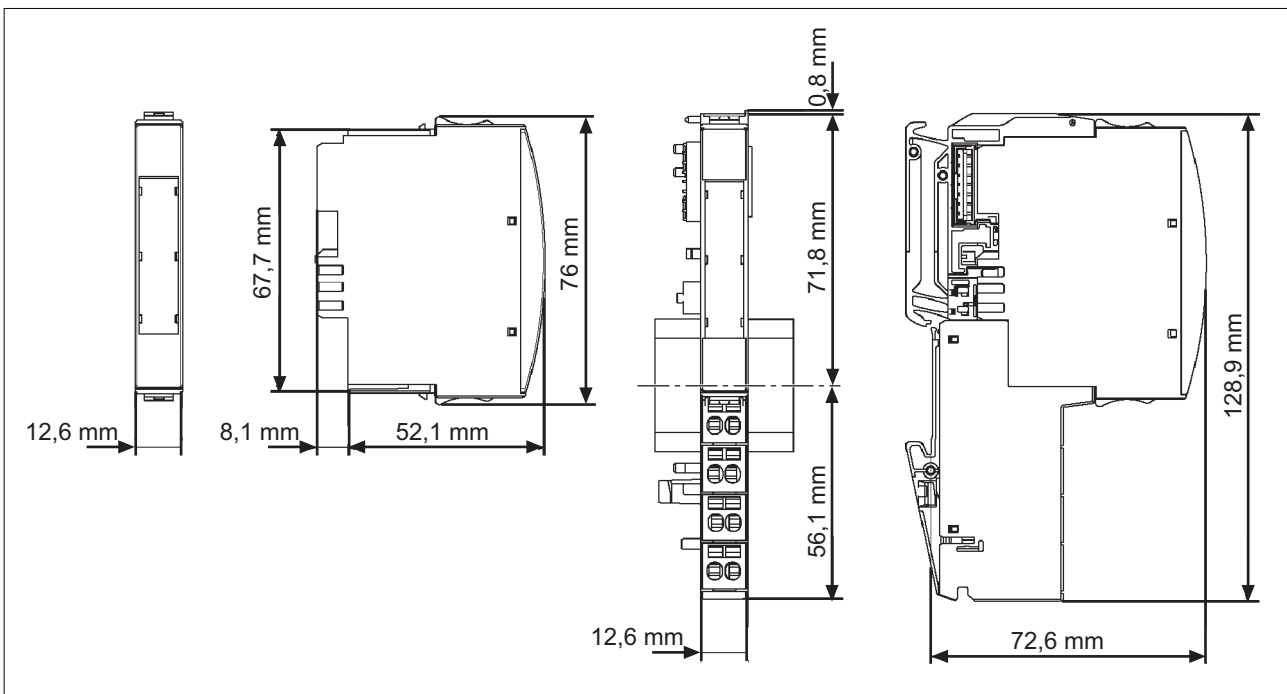
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2]

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Supply voltage

PSSu E F PS

Technical details	PSSu E F PS
Function	Supply voltage for decentralised applications of the PSSu series
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data	
Supply voltage	
Module supply	+18 VDC ... +30 VDC
Periphery supply	+18 VDC ... +30 VDC
Current consumption	
Module supply	Max. 0.6 A
Periphery supply at < +50 °C	Max. 10 A
Load current, module supply	Max. 1.5 A
Load current, periphery supply at < +50 °C	Max. 10 A
C-rail supply	PE, screening, 0 V or 24 VDC ... +24 DC
Total current on C-rail at 24 VDC, +25 °C/+60 °C	Max. 10 A/ max. 8 A
Module supply buffer in the case of a power supply failure	< 4 ms
Periphery supply buffer in the case of a power supply failure	None
Mechanical data	
Weight	
Electronic module	< 40 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Yellow, B
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock (EN 60068-2-27, 03/93)	15g, 11 ms
Continuous shock (EN 60068-2-29, 04/93)	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Supply voltage PSSu E F PS

Order reference	
Description	Order no.
PSSu E F PS (Electronic module)	312 190
PSSu BS 1/8S (Base module with screw terminals, to be used only as the first module after the head module)	312 650
PSSu BS 1/8C (Base module with cage clamp terminals, to be used only as the first module after the head module)	312 651
PSSu BS-R 1/8S (Base module with screw terminals, to be used to refresh the voltage or to form supply groups)	312 652
PSSu BS-R 1/8C (Base module with screw terminals, to be used to refresh the voltage or to form supply groups)	312 653
Order reference for accessories	Order no.
Description	
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Supply voltage PSSu E F PS1

PSSu E F PS1
not shown

Electronic module to provide the system with the module supply, periphery supply and C-rail supply.

Approvals

	PSSu E F PS1
	In progress

Module features

- ▶ Housing width: 25.2 mm (2 x grid width)
- ▶ Supply for max. 20 modules
- ▶ Separate 24 VDC infeed for module supply (5 VDC)
- ▶ Separate 24 VDC infeed for periphery supply (24 VDC)
- ▶ Infeed for C-rail supply (if required)
- ▶ LED indicators for:
 - Module supply status
 - Periphery supply status
 - Module status
- ▶ Application depends on which base module is used
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference".

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides the supply for the module supply and periphery supply within the system.

Depending on which base module is used, the module may be used as a:

- ▶ General supply module (first module after the head module)

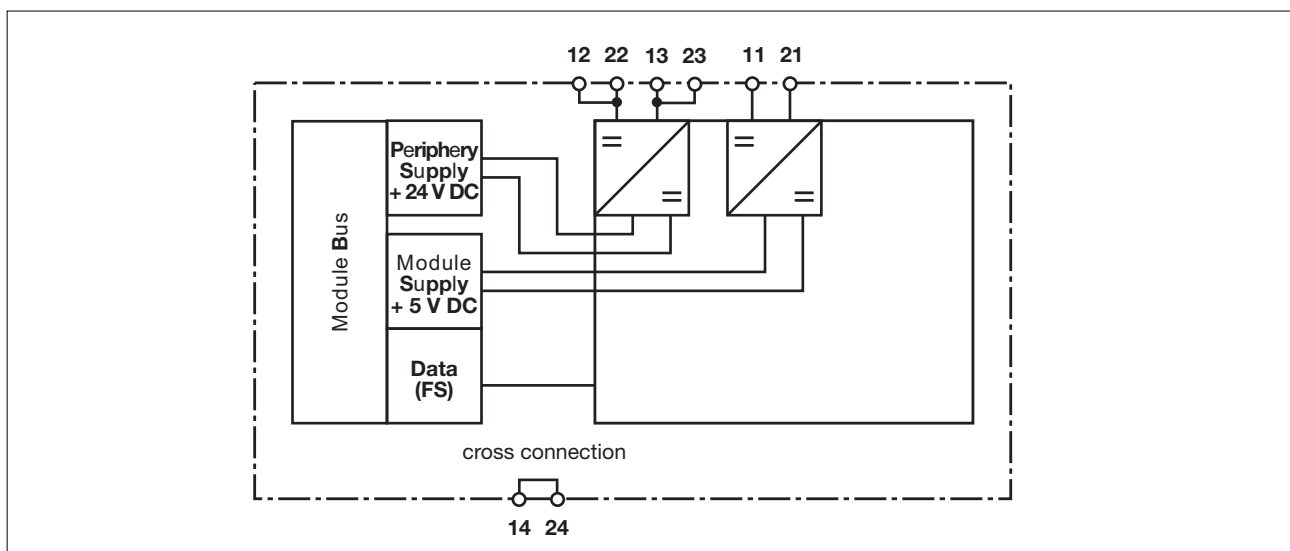
- ▶ Supply module to refresh the module supply and periphery supply
- ▶ Supply module to form supply groups

Safety features

The module meets the following safety requirements:

- ▶ When the module supply is interrupted, the supply to a maximum of 20 modules is buffered for 20 ms.
- ▶ Protection against over-temperature
- ▶ Module supply
 - Integral voltage limitation
 - Protection circuit for EMC
- ▶ Periphery supply
 - Integral voltage monitoring (exceeding upper/lower limit)
 - Integral current monitoring (exceeding upper/lower limit)
 - Integral thermistor monitoring
- ▶ Diagnostic capabilities

Block diagram



Supply voltage PSSu E F PS1

Function description

- ▶ Using the module as the **first module after the head module**
When the relevant base module is used, the following supply can be provided to the module bus:
 - Module supply (+5 VDC) for head module (left-hand side)
 - Module supply (+5 VDC) for subsequent modules (right-hand side)
 - Periphery supply (+24 VDC, 10 A) for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
- ▶ Using the module to **refresh the module supply and periphery supply**
When the relevant base module is used, the connection to the incoming (left-hand) module supply, periphery supply and C-rail is interrupted on the module bus. The following supply is then

- provided on the module bus for subsequent (right-hand) modules:
- Module supply (+5 VDC) for subsequent modules (right-hand side)
 - Periphery supply (+24 VDC, 10 A) for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
- ▶ Using the module to **form supply groups**
When the relevant base module is used, the connection to the incoming (left-hand) module supply, periphery supply and C-rail is interrupted on the module bus. The following supply is then provided on the module bus for subsequent (right-hand) modules:
- Module supply (+5 VDC) for subsequent modules (right-hand side)
 - Periphery supply (+24 VDC, 10 A) for subsequent modules (right-hand side)

- C-rail supply for subsequent modules (right-hand side)
Each supply group requires its own supply module.
- ▶ If **galvanic isolation** is required between the module supply and periphery supply, this is achieved by feeding the voltages separately (2 x 24 VDC). If this is not required, one power supply is sufficient for periphery supply and module supply.
- ▶ It is not possible to switch off the module supply if the lower voltage limit is exceeded. However, there will be a visual signal (LED "5 V") and a message will be sent to the head module.
- ▶ It is not possible to switch off the periphery supply if the upper/lower limits of the monitored parameters are exceeded. However, there will be a visual signal (LED "24 V") and a message will be sent to the head module.

Overview of current consumption on head modules and electronic modules

Module	Max. current consumption	Explanation
PSSu H SB	≤ 300 mA	The load on the module supply is determined by the current consumption of the head module and electronic modules that are used. A PSSu E F PS supply module provides a max. module supply of 1.5 A. If a heavier load arises, an additional supply module must be used to refresh the module supply.
PSSu H SB DP	≤ 500 mA	
PSSu E S 4DI	≤ 25 mA	
PSSu E S 4DO 0.5	≤ 60 mA	
PSSu E S 2DO 2	≤ 50 mA	
PSSu E F 4DI	≤ 30 mA	
PSSu E F 4DO 0.5	≤ 75 mA	
PSSu E F 2DO 2	≤ 55 mA	
PSSu E F 4DI OZ 2	≤ 35 mA	
PSSu E F 2DOR 8	≤ 70 mA	
PSSu E F BSW	≤ 220 mA	
PSSu E F PS-P	≤ 25 mA	
PSSu E PD	0 mA	

Supply voltage PSSu E F PS1

Module diagnostics

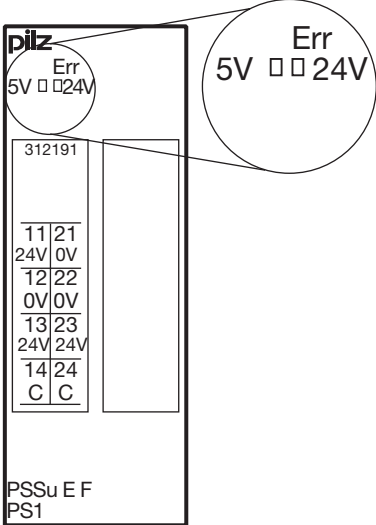
- ▶ The module has various LEDs to display the status of the
 - Module supply (5 V)
 - Periphery supply (24 V)
 (see table below)
- ▶ Error reaction:
 - Module supply error
If the lower voltage limit is exceeded, a status message is sent to the head module and the "5 V" module LED (see table)
 - Periphery supply error
If the upper/lower limits of the monitored parameters are exceeded, a status message is sent to the head module and the "24 V" module LED (see table)
 - Module error
If a module error occurs (e.g.: error at the inputs, error in programming mode, communication error), a status message is sent to the head module and the "Err" module LED (see table)
 - SafetyBUS p error
All the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

Supply voltage

- ▶ The supply voltages for module supply and periphery supply may be in the range of +18 VDC ... +30 VDC. Safe operation cannot be guaranteed outside this range.
- ▶ Safe electrical isolation must be ensured for both the external 24 V supplies. Failure to do so could result in electric shock.
- ▶ Power supplies must conform to EN 60950, 03/97, section 2.3, EN 60742, 9/95 or EN 50178, 10/97.
- ▶ To achieve the lowest possible residual ripple ($< \pm 1.2$ V), we recommend that you install a three-phase bridge rectifier or an electronically regulated supply.
- ▶ If failsafe inputs are used, the connection between "Ground" (0 V periphery supply) and the earth bar or earth fault monitor must be in accordance with relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ On the module bus, the load current of max. 10 A must not be exceeded for the periphery supply.
- ▶ A total current of max. 10 A must not be exceeded on the C-rail.

Wiring

- ▶ Connect together the 0 V connections on all the 24 V power supplies and earth the 0 V supply at a single point.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm², in accordance with EN 61131-2, 07/00:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

Electronic module	LED	LED status	Key
	Err	Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	24 V	Off	No supply voltage or error in the supply voltage for periphery supply
		Lights green	Supply voltage for periphery supply is error-free
	5 V	Off	No supply voltage or error in the supply voltage for module supply
		Lights green	Supply voltage for module supply is error-free

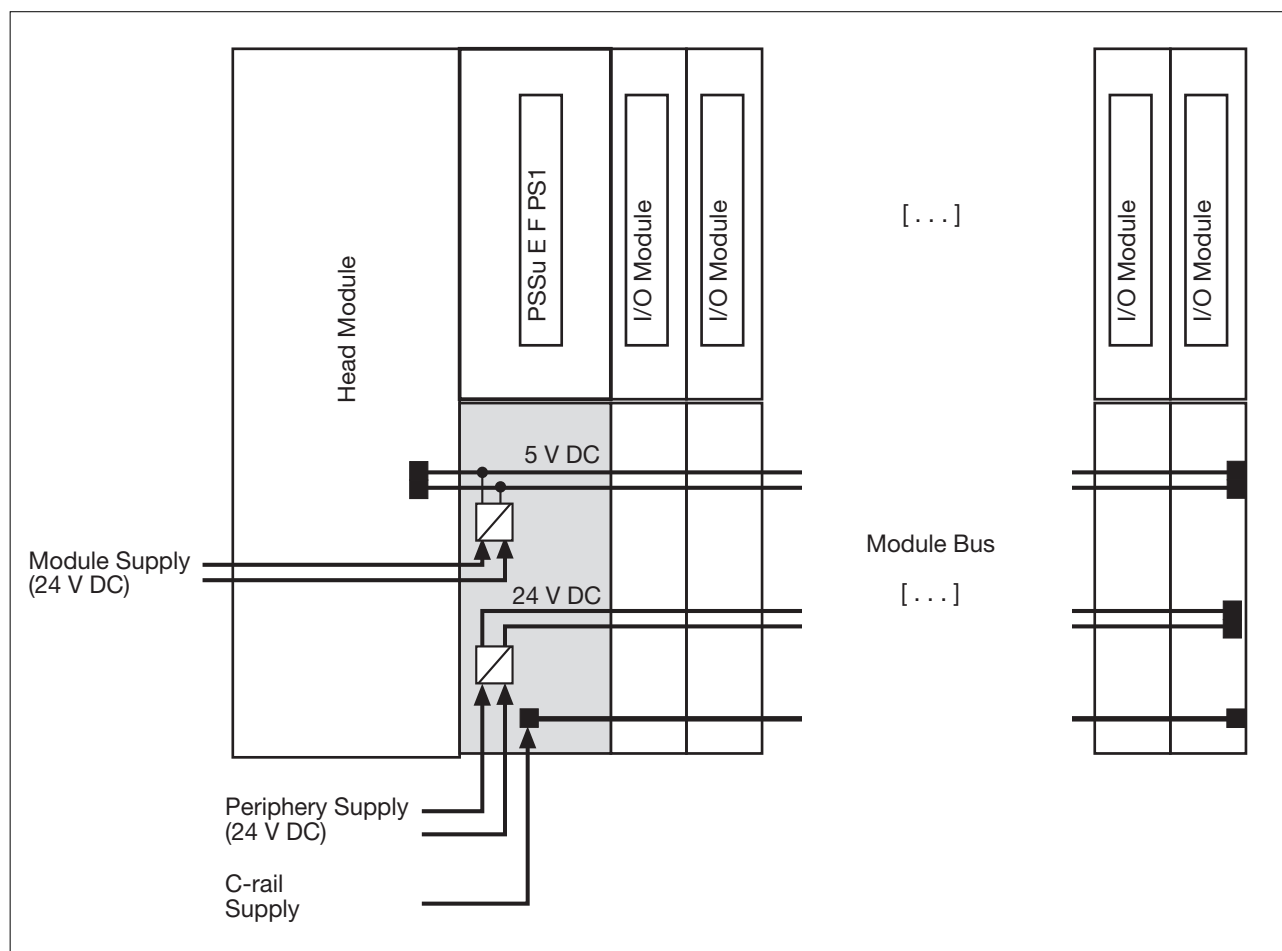
Supply voltage PSSu E F PS1

Base modules

- Terminal configuration
 - General supply module
 - To provide the head module and subsequent (right-hand)

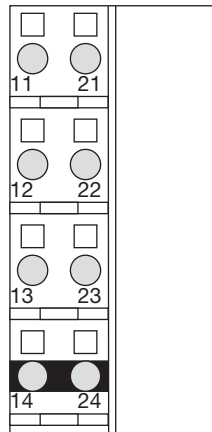
modules with the module supply, periphery supply and C-rail supply

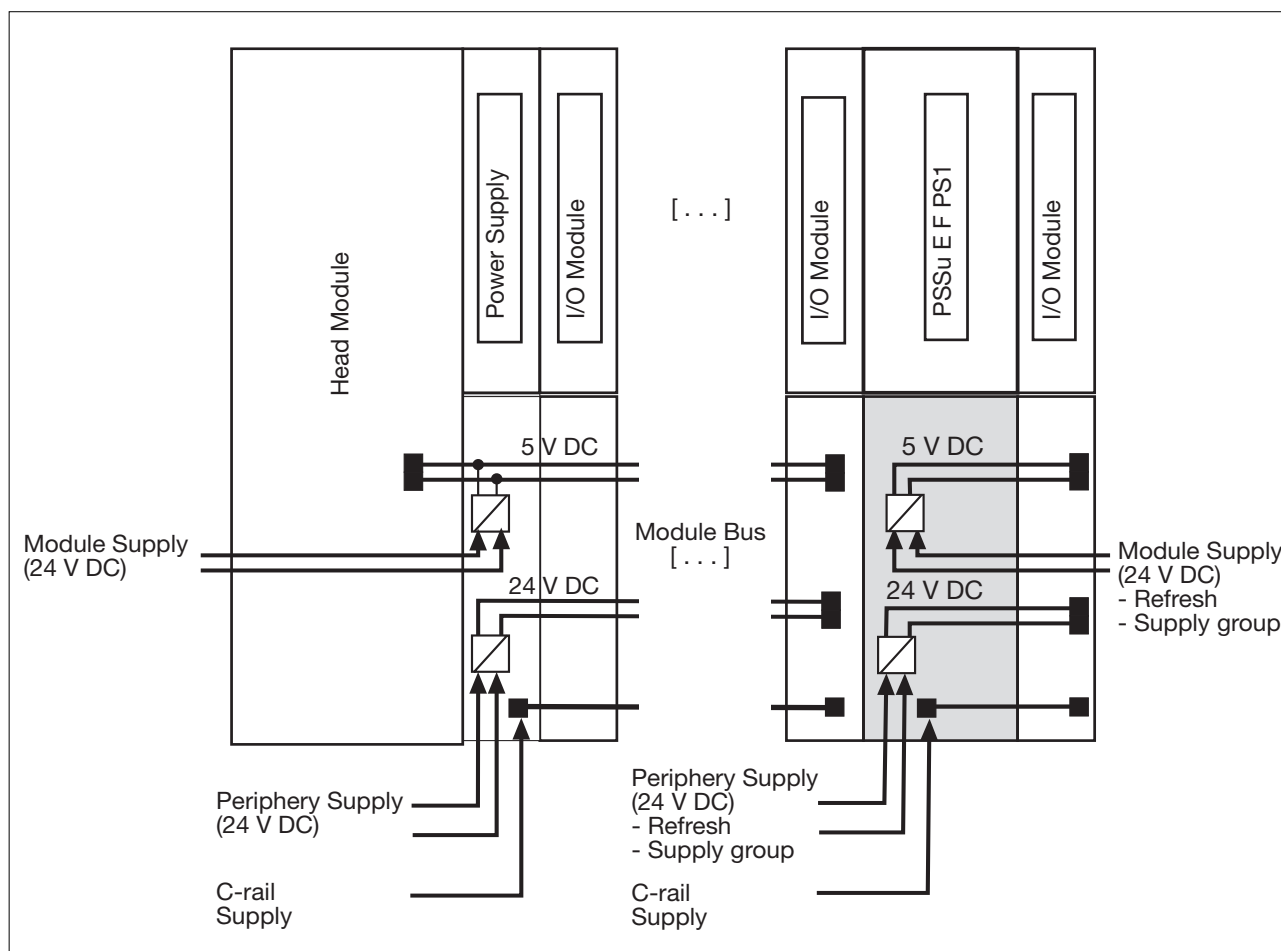
Base module	Terminal configuration	
Screw terminals: PSSu BS 2/8S Cage clamp terminals: PSSu BS 2/8C Note: When the electronic module PSSu E F PS1 is used with the listed base modules it may only be used as the first module to the right of the head module!	11: + 24 V Module supply 21: 0 V Module supply 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: + 24 V Periphery supply (13-23 linked internally) 14-24: Infeed for C-rail supply: - PE - Screening - 0 V - - 24 VDC ... + 24 VDC, 10 A (14-24 linked internally)	



Supply voltage PSSu E F PS1

- Supply module
 - To refresh the module supply and periphery supply plus supply module to form supply groups
- To interrupt the incoming (left-hand) module supply, periphery supply, C-rail
- To provide subsequent (right-hand) modules with the module supply, periphery supply and C-rail supply

Base module	Terminal configuration
Screw terminals: PSSu BS-R 2/8S Cage clamp terminals: PSSu BS-R 2/8C	11: + 24 V Module supply, interrupted to the left 21: 0 V Module supply, interrupted to the left 12-22: 0 V Periphery supply, interrupted to the left (12-22 linked internally) 13-23: + 24 V Periphery supply, interrupted to the left (13-23 linked internally) 14-24: C-rail infeed, interrupted to the left (14-24 linked internally) 



Supply voltage PSSu E F PS1

► Connection

Supply type	Connection
General supply with base module - PSSu BS 2/8S or - PSSu BS 2/8C Note: When the electronic module PSSu E F PS1 is used with the listed base modules it may only be used as the first module to the right of the head module!	0 V DC +24 V DC 0 V DC +24 V DC Fuse C-rail Supply Connect to the 0 V supply and earth this at a single point L1 N Module Supply L1 N Periphery Supply
Supply to refresh the - module supply - periphery supply - C-rail supply with base module - PSSu BS-R 2/8S or - PSSu BS-R 2/8C	
Supply to form supply groups with base module - PSSu BS-R 2/8S or - PSSu BS-R 2/8C	

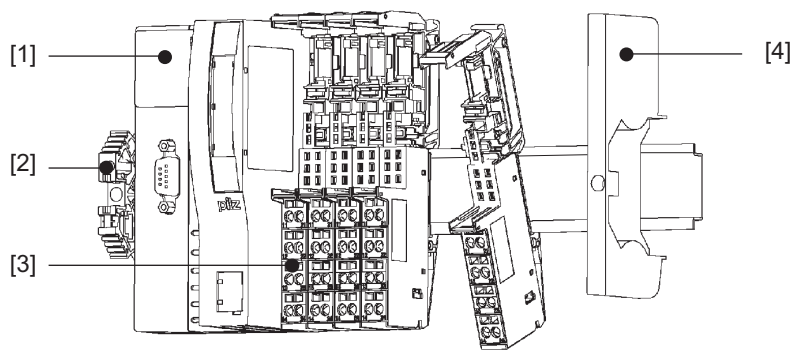
Supply voltage PSSu E F PS1

Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module must already be installed.
- ▶ General supply:
 - Attach the base module to the DIN rail as the first module to

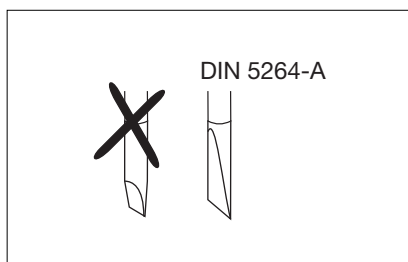
- the right of the head module and click into position on the rail.
- Slide the base module to the left until you hear it click into the head module.
- ▶ Supply to refresh/form supply groups
 - Attach the base module to the DIN rail to the right of the head module [1] and click into position on the rail [2].

- Slide the base module to the left until you hear it click into the last base module to be installed.
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



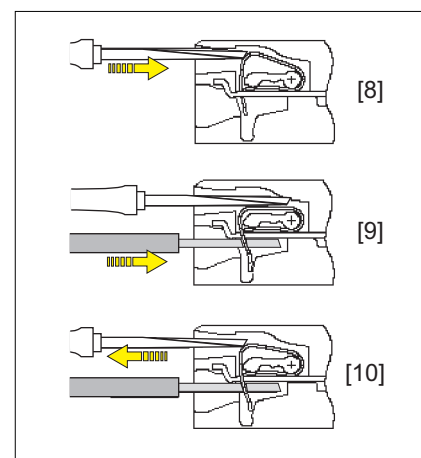
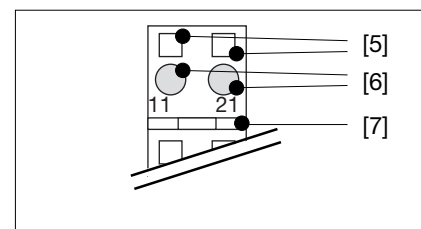
Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"!
- ▶ Use a flat blade screwdriver (DIN 5264-A)!



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal.



Supply voltage PSSu E F PS1

Inserting an electronic module

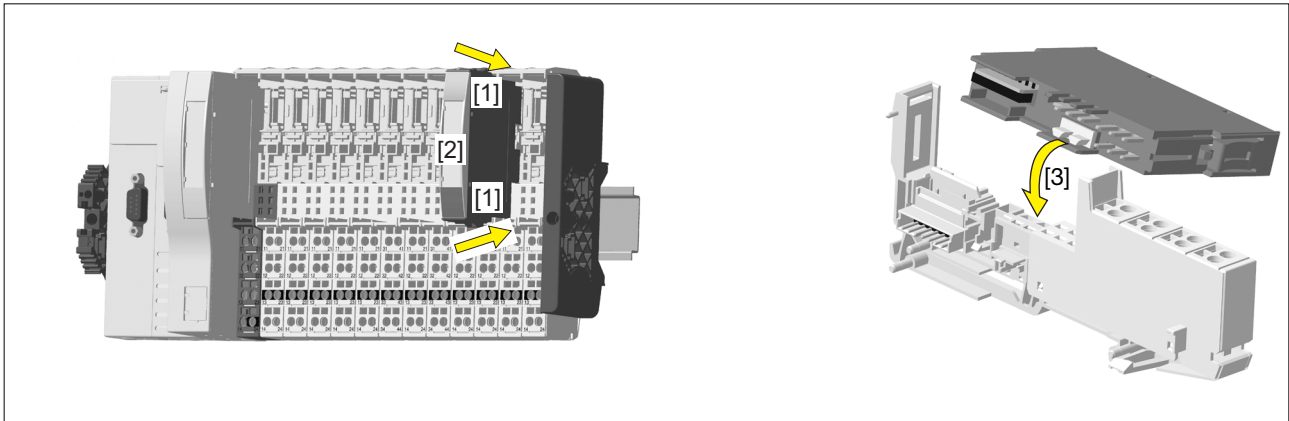
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

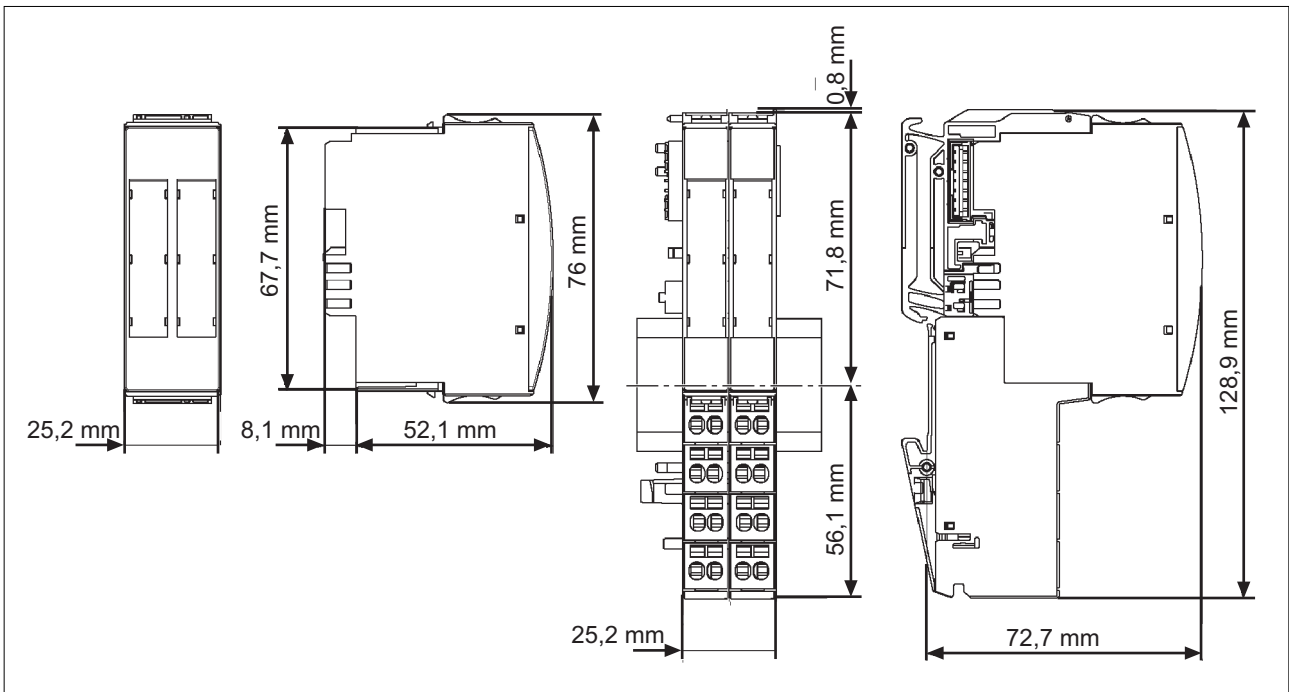
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Supply voltage

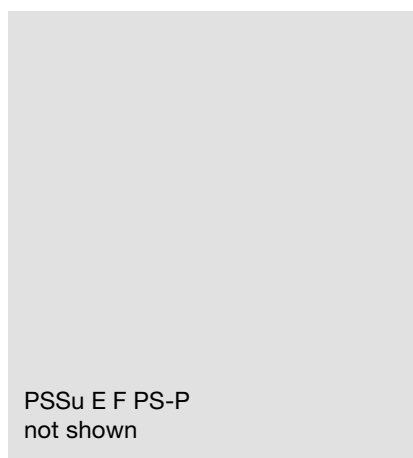
PSSu E F PS1

Technical details	PSSu E F PS1
Function	Supply voltage for decentralised applications of the PSSu series
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data	
Supply voltage	
Module supply	+18 VDC ... +30 VDC
Periphery supply	+18 VDC ... +30 VDC
Current consumption	
Module supply	Max. 0.7 A
Periphery supply at < +50 °C	Max. 10 A
Load current, module supply	Max. 2 A
Load current, periphery supply at < +50 °C	Max. 10 A
C-rail infeed	PE, screening, 0 V or 24 VDC ... +24 DC
Total current on C-rail at +24 VDC, +25 °C/+60 °C	Max. 10 A/ max. 8 A
Module supply buffer in the case of a power supply failure	> 20 ms
Periphery supply buffer in the case of a power supply failure	None
Mechanical data	
Weight	
Electronic module	< 40 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Yellow, C
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock (EN 60068-2-27, 03/93)	15g, 11 ms
Continuous shock (EN 60068-2-29, 04/93)	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Supply voltage PSSu E F PS1

Order reference	
Description	Order no.
PSSu E F PS1 (Electronic module)	312 191
PSSu BS 2/8S (Base module with screw terminals, to be used only as the first module after the head module)	312 656
PSSu BS 2/8C (Base module with cage clamp terminals, to be used only as the first module after the head module)	312 657
PSSu BS-R 2/8S (Base module with screw terminals, to be used to refresh the voltage or form supply groups)	312 654
PSSu BS-R 2/8C (Base module with cage clamp terminals, to be used to refresh the voltage or form supply groups)	312 655
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Supply voltage PSSu E F PS-P



Electronic module to provide the system with the periphery supply and C-rail supply.

Approvals

	PSSu E F PS-P
	In progress

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ Provides the module with the module supply (5 VDC) via the module bus
- ▶ 24 VDC infeed for periphery supply (24 VDC)
- ▶ Infeed for C-rail supply (if required)
- ▶ LED indicators for:
 - Module error
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference".

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides the periphery supply within the system.

Depending on which base module is used, the module may be used as a:

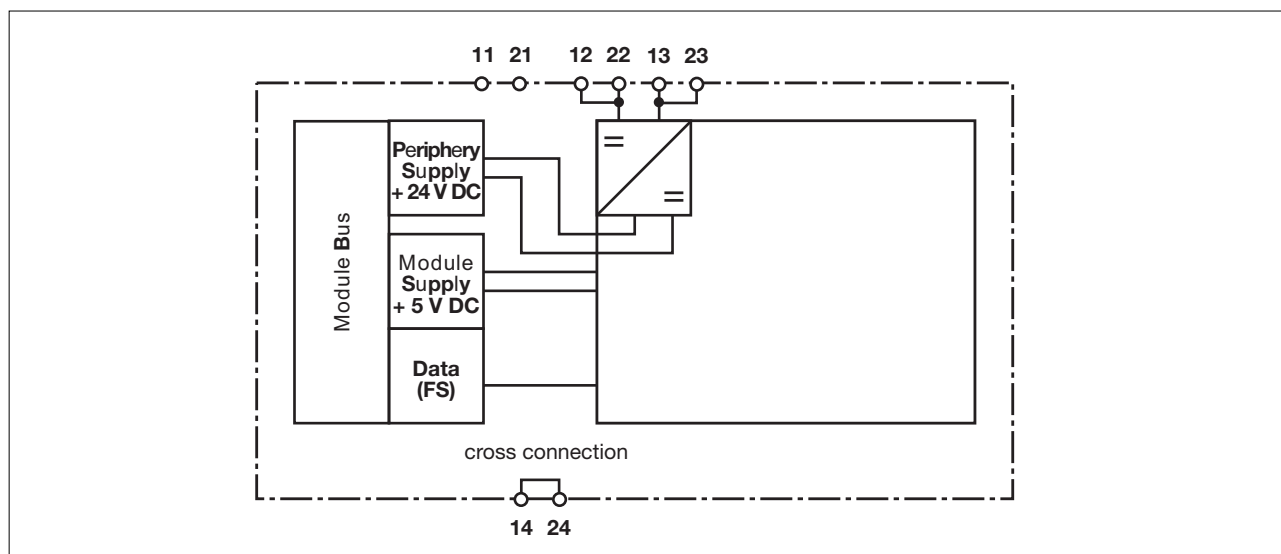
- ▶ Supply module to refresh the periphery supply

Safety features

The module meets the following safety requirements:

- ▶ Protection against over-temperature
- ▶ Periphery supply
 - Integral voltage monitoring (exceeding upper/lower limit)
 - Integral current monitoring (exceeding upper/lower limit)
 - Integral thermistor monitoring
- ▶ Diagnostic capabilities

Block diagram



Supply voltage PSSu E F PS-P

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Using the module to **refresh the periphery supply**
The connection to the incoming (left-hand) periphery supply and C-rail is interrupted on the module bus through the base module. The following supply is then provided on the module bus for subsequent (right-hand) modules:
 - Periphery supply (24 VDC, 10 A) for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
- ▶ If **galvanic isolation** is required between the module supply and periphery supply, this is achieved by feeding the voltages separately (2 x 24 VDC). If this is not required, one power supply is sufficient for periphery supply and module supply.
- ▶ It is not possible to switch off the periphery supply if the upper/lower limits of the monitored parameters are exceeded. However, there will be a visual signal (LED "24 V") and a message will be sent to the head module.

Supply voltage PSSu E F PS-P

Module diagnostics

- ▶ The module has various LEDs to display
 - Periphery supply status ("24 V")
 - Module error ("Err") (see table below)
- ▶ Error reaction:
 - Periphery supply error
If the upper/lower limits of the monitored parameters are exceeded, a status message is sent to the head module and the "24 V" module LED (see table)
 - Module error
If a module error occurs (e.g.: error at the inputs, error in programming mode, communication error), a status message is sent to the head module and the "Err" module LED (see table)
 - SafetyBUS p error
All the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

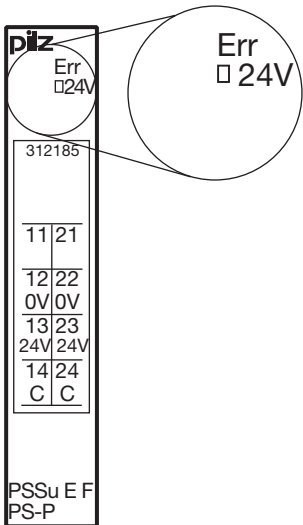
Supply voltage

- ▶ The supply voltage for periphery supply may be in the range of +18 VDC ... +30 VDC. Safe operation cannot be guaranteed outside this range.
- ▶ Safe electrical isolation must be ensured for the external 24 V supply. Failure to do so could result in electric shock.
- ▶ The power supply must conform to EN 60950, 03/97, section 2.3, EN 60742, 9/95 or EN 50178, 10/97.
- ▶ To achieve the lowest possible residual ripple ($< \pm 1.2$ V), we recommend that you install a three-phase bridge rectifier or an electronically regulated supply.
- ▶ If failsafe inputs are used, the connection between "Ground" (0 V periphery supply) and the earth bar or earth fault monitor must be in accordance with relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250, for example).

- ▶ On the module bus, the load current of max. 10 A must not be exceeded for the periphery supply.
- ▶ A total current of max. 10 A must not be exceeded on the C-rail.

Wiring

- ▶ Connect together the 0 V connections on all the 24 V power supplies and earth the 0 V supply at a single point.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm², in accordance with EN 61131-2, 07/00:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

Electronic module	LED	LED status	Key
	Err	Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	24 V	Off Lights green	No supply voltage or error in the supply voltage for periphery supply Supply voltage for periphery supply is error-free

Supply voltage PSSu E F PS-P

Base modules

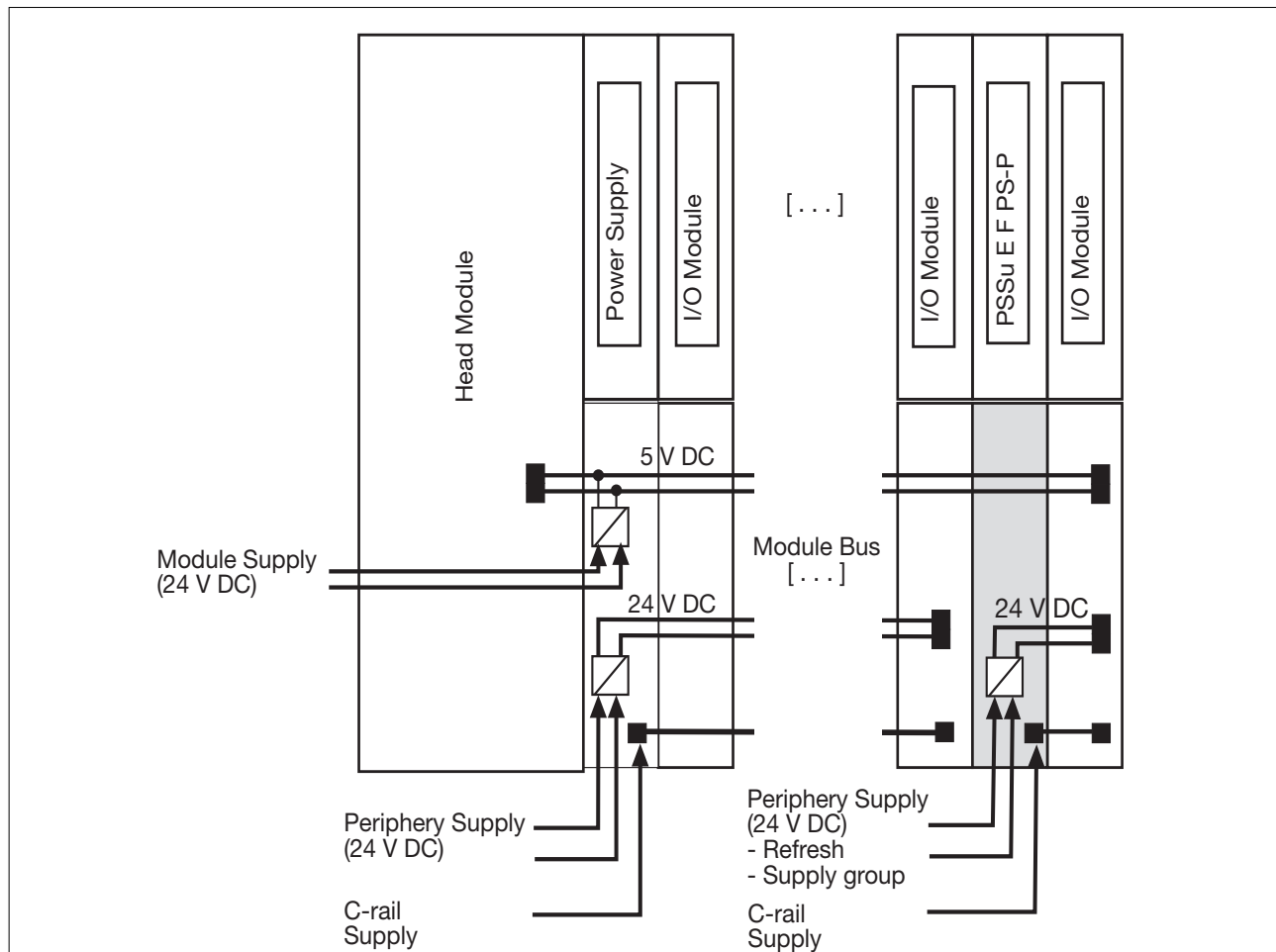
- Terminal configuration
- Supply module

- To refresh the periphery supply

- To interrupt the incoming (left-hand) periphery supply and C-rail

- To provide the subsequent (right-hand) modules with the periphery supply and C-rail supply

Base module	Terminal configuration	
Screw terminals: PSSu BS 1/8S Cage clamp terminals: PSSu BS 1/8C	11: Not assigned 21: Not assigned 12-22: 0 V Periphery supply, interrupted to the left (12-22 linked internally) 13-23: +24 V Periphery supply, interrupted to the left (13-23 linked internally) 14-24: Infeed for C-rail supply, interrupted to the left: - PE - Screening - 0 V - - 24 VDC ... + 24 VDC, 10 A (14-24 linked internally)	



Supply voltage PSSu E F PS-P

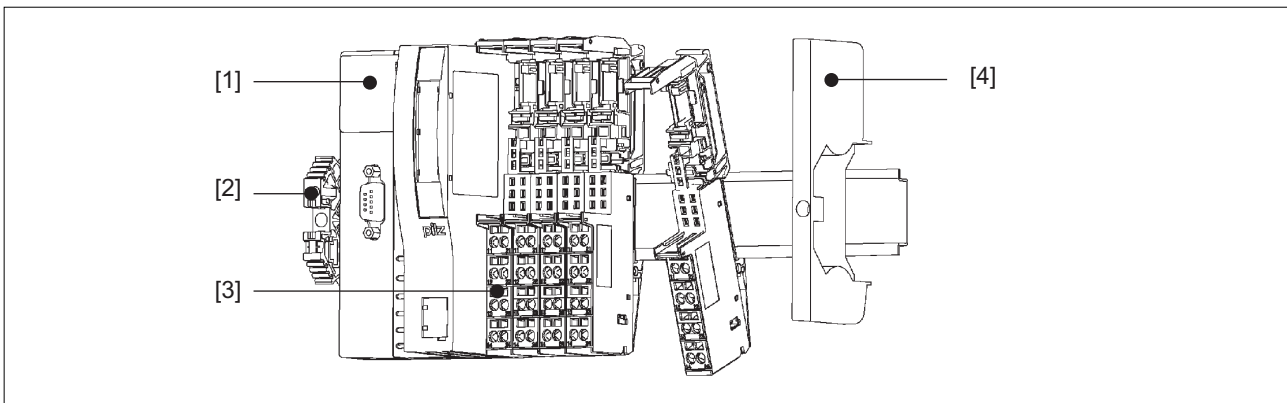
► Connection

Supply type	Connection
Supply to refresh the - Periphery supply - C-rail supply with base module - PSSu BS 1/8S or - PSSu BS 1/8C	0 V DC +24 V DC C-rail Supply Fuse Periphery Supply Connect to the 0 V supply and earth this at a single point L1 N
Supply to form supply groups with base module - PSSu BS 1/8S or - PSSu BS 1/8C	

Supply voltage PSSu E F PS-P

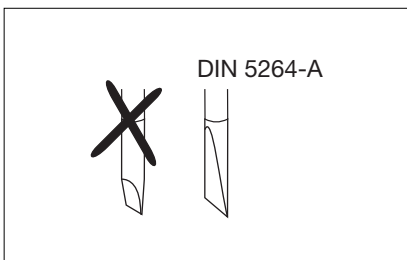
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the head module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed.
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



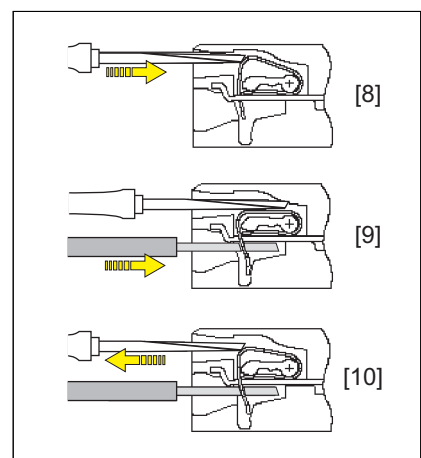
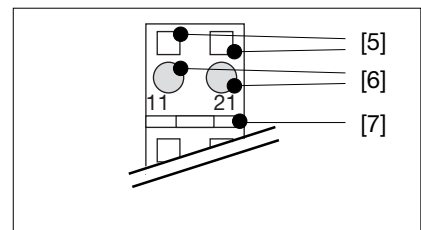
Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal.



Supply voltage PSSu E F PS-P

Inserting an electronic module

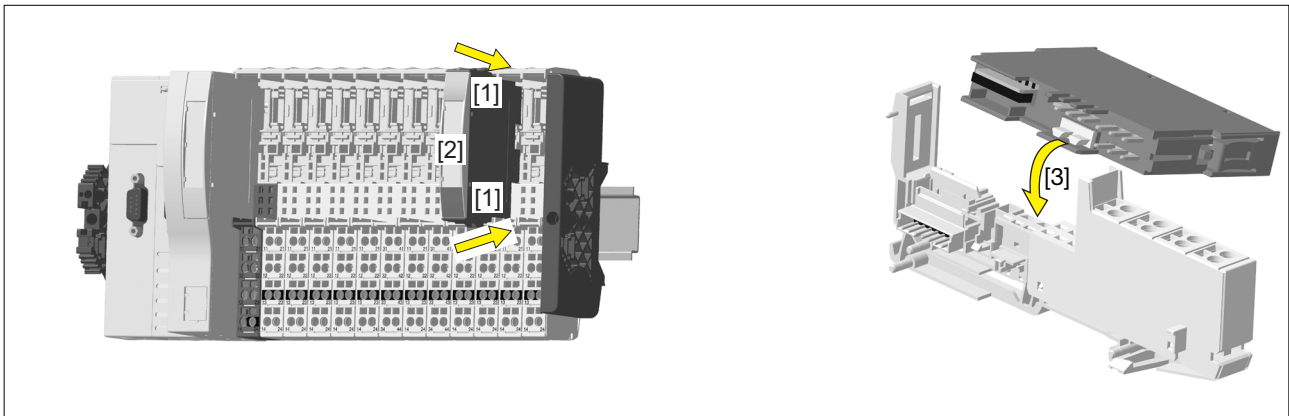
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

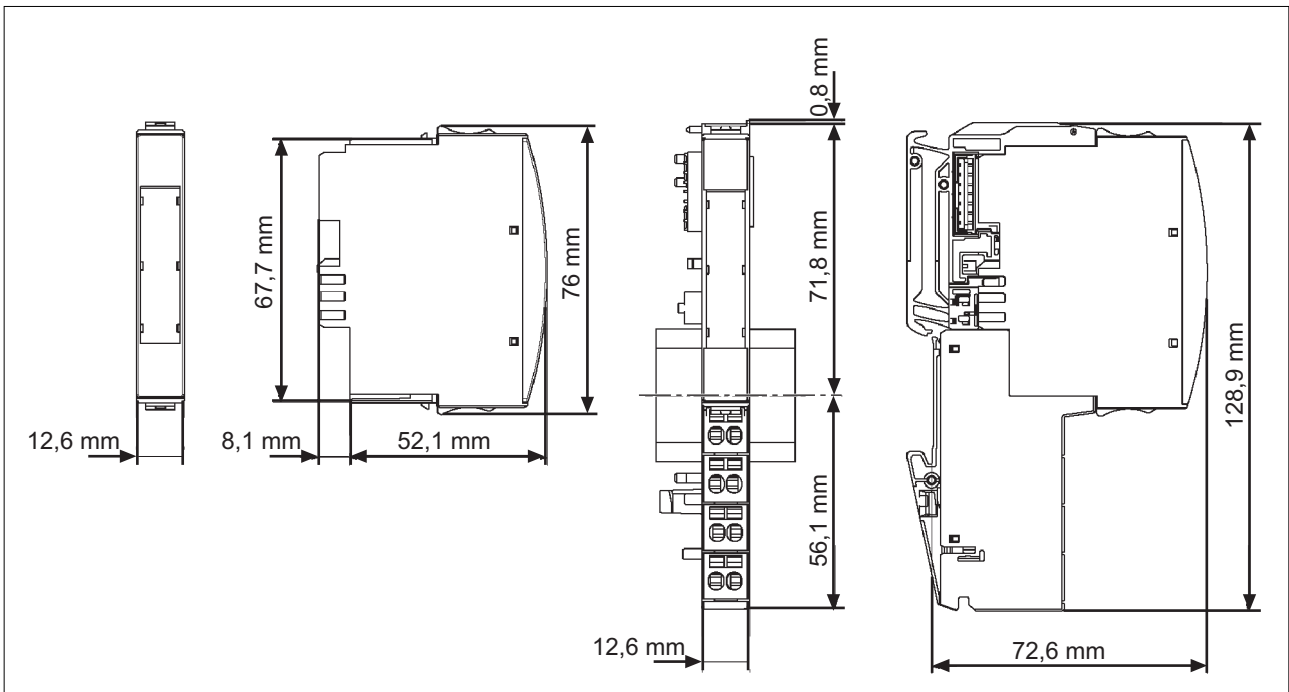
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Supply voltage

PSSu E F PS-P

Technical details		PSSu E F PS-P
Function	Supply voltage for decentralised applications of the PSSu series	
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98	
Electrical data		
Supply voltage		
Periphery supply	+18 VDC ... +30 VDC	
Current consumption		
Module supply	< 30 mA	
Periphery supply at < +50 °C	Max. 10 A	
Load current, periphery supply at < +50 °C	Max. 10 A	
C-rail supply	PE, screening, 0 V or 24 VDC ... +24 DC	
Total current on C-rail at +24 VDC, +25 °C/+60 °C	Max. 10 A/ max. 8 A	
Module supply buffer in the case of a power supply failure	None	
Periphery supply buffer in the case of a power supply failure	None	
Mechanical data		
Weight		
Electronic module	< 40 g	
Base module with cage clamp terminals	40 g	
Base module with screw terminals	50 g	
Mechanical coding	Yellow, A	
Plug in/out cycles		
Electronic module	Max. 20	
Base module	Max. 20	
Max. cross section of external conductors with screw terminals		
Flexible with crimp connectors	0.5 ... 1.5 mm ²	
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²	
Max. cross section of external conductors with cage clamp terminals		
Flexible with crimp connectors	0.5 ... 1.5 mm ²	
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²	
Torque setting with screw terminals	0.8 Nm	
Environmental data		
Protection type (EN 60529, 02/00)	IP20	
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C	
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C	
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C	
Condensation	Not permitted	
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g	
Shock (EN 60068-2-27, 03/93)	15g, 11 ms	
Continuous shock (EN 60068-2-29, 04/93)	10g, 16 ms	
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02	

Supply voltage PSSu E F PS-P

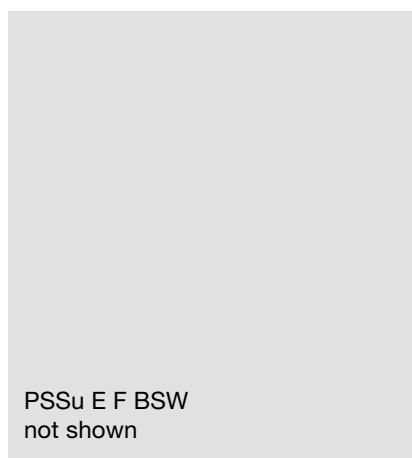
Order reference	
Description	Order no.
PSSu E F PS-P (Electronic module)	312 185
PSSu BS 1/8S (Base module with screw terminals)	312 650
PSSu BS 1/8C (Base module with cage clamp terminals)	312 651
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Supply voltage

PSSu E F PS-P

Notes

Supply voltage PSSu E F BSW



Electronic module for switching the periphery supply on non-safety-related input/output modules arranged in blocks. For safety-related functions

Approvals

	PSSu E F BSW
	In progress

Module features

- ▶ Housing width: 25.2 mm (2 x grid width)
- ▶ 24 VDC infeed for periphery supply (24 VDC)
- ▶ Infeed to C-rail supply (if required)
- ▶ Failsafe switching on/off of the periphery supply (+24 VDC, 0 V) (block switching)
- ▶ LED indicators for: Module error
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference"

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 3. The module may be used for safety-related switching of the periphery supply on non-safety-related output modules (standard modules). If the module is used in conjunction with non-safety-related modules it is possible to achieve Category 3 in accordance with EN IEC 61508 and EN 954-1.

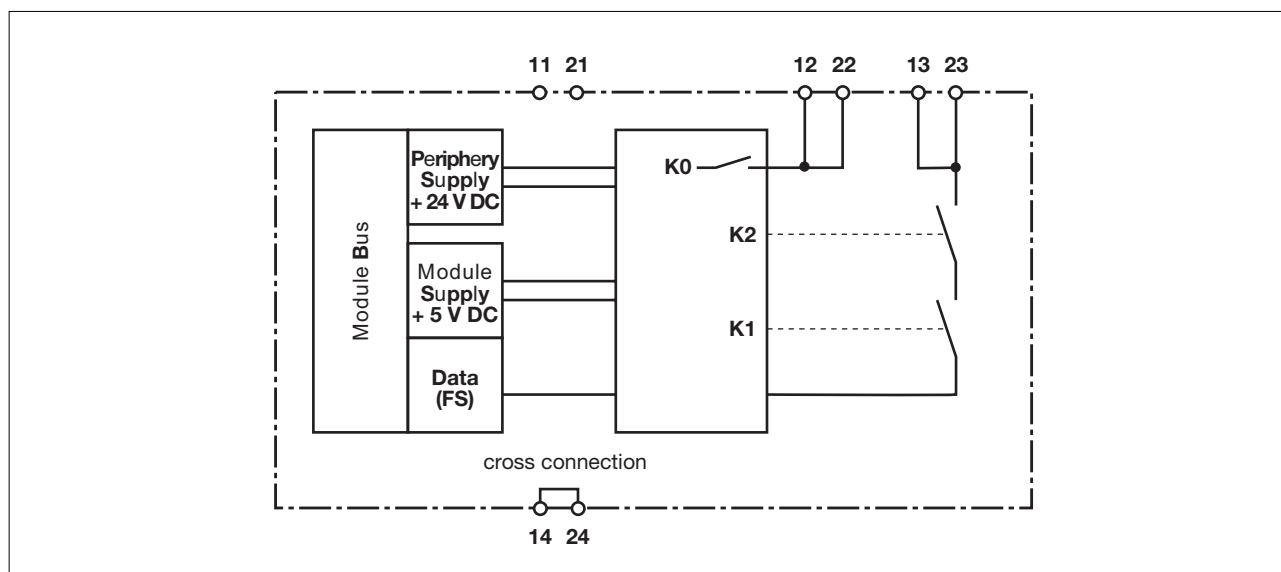
- ▶ Max. switchable current at 25°C: 8 A

Safety features

The module meets the following safety requirements:

- ▶ 2 N/O relay contacts connected in series to feed the periphery supply: +24 VDC
- ▶ 1 N/O contact to feed the periphery supply: 0 VDC
- ▶ Protection against over-temperature
- ▶ Diagnostic capabilities

Block diagram

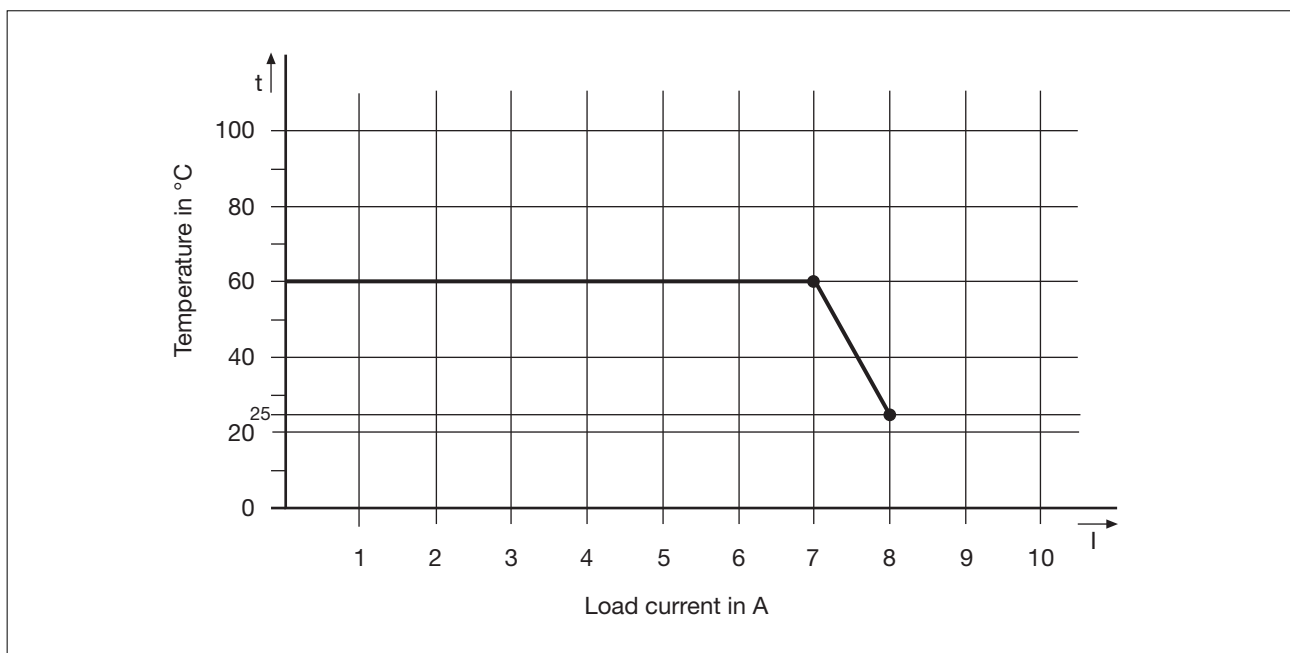


Supply voltage PSSu E F BSW

Function description

- ▶ **Module supply (5 VDC)**
The electronics are supplied via the module bus.
- ▶ **Periphery supply (24 VDC)**
When the relevant base module is used, the connection to the incoming (left-hand) periphery supply and C-rail is interrupted on the module bus. The following supply is then provided on the module bus for subsequent (right-hand) modules:
 - Periphery supply (24 VDC, max. 8 A) for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
- ▶ Each output block requires its own block switching module.
- ▶ The relationship between the switchable load current and the operating temperature is illustrated in the derating curve below (see graph). The operating point should be on or below the characteristic curve.
- ▶ The periphery supply is switched on/off via the controller's user program.
- ▶ The periphery supply is switched off if a module error is detected.
- ▶ The module is generally used to switch the periphery supply safely on standard modules that are arranged in blocks.
- ▶ Any modules following an output block (on the right-hand side) will require a new voltage supply of their own.

Derating curve



Supply voltage PSSu E F BSW

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err) (see table)
- ▶ Error reaction:
 - If an error occurs, the block switching module switches off the periphery supply to subsequent (right-hand) modules.
- ▶ SafetyBUS p error reaction:

If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

System configuration

The system is configured using Pilz configuration software.

Addressing the outputs

The outputs are addressed using Pilz PSS WIN-PRO system software.

Supply voltage

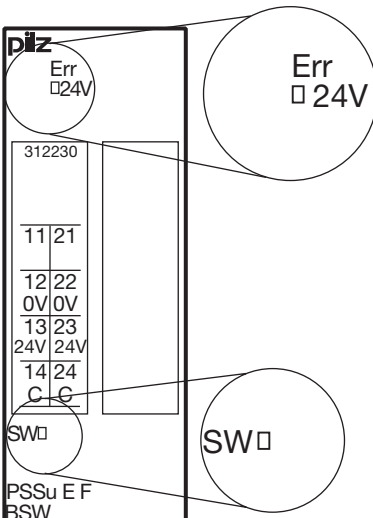
- ▶ The supply voltages for module supply and periphery supply may be in the range of +18 VDC ... +30 VDC. Safe operation cannot be guaranteed outside this range.
- ▶ Safe electrical isolation must be ensured for the external 24 V supplies. Failure to do so could result in electric shock.
- ▶ The power supply must conform to EN 60950, 03/97, section 2.3, EN 60742, 9/95 or EN 50178, 10/97.
- ▶ To achieve the lowest possible residual ripple ($< \pm 1.2$ V), we recommend that you install a three-phase bridge rectifier or an electronically regulated supply.
- ▶ The external periphery supply must be able to provide a load current of max. 10 A. On the module bus, the load current of max. 8 A must not be exceeded for the periphery supply.
- ▶ The load current of max. 10 A must not be exceeded on the C-rail.

Wiring

- ▶ Connect together the 0 V connections on all the 24 V power supplies and earth the 0 V supply at a single point.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm², in accordance with EN 61131-2, 07/00:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

NOTICE

To prevent contact welding, a fuse should be connected before the output contacts (see technical details).

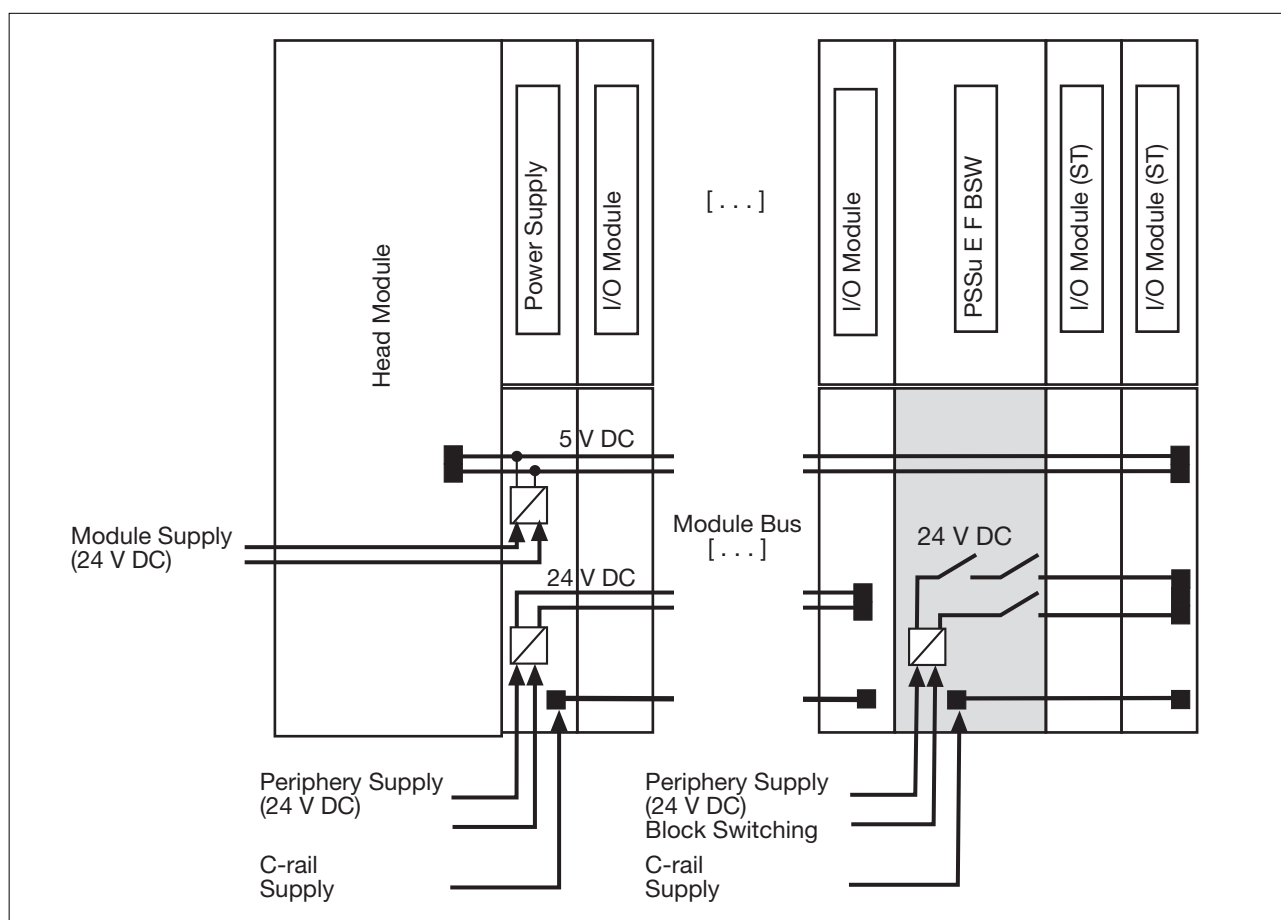
Electronic module	LED	LED status	Key
	Err	Off	Module is operating without error
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	24 V	Off	No supply voltage or error in the supply voltage for periphery supply
		Lights green	Supply voltage for periphery supply is error-free
	SW	Off	Periphery supply switched off
		Lights green	Periphery supply switched on

Supply voltage PSSu E F BSW

Base modules

- Terminal configuration
Supply module
 - To switch on/off the periphery
- supply to input/output blocks (block switching)
 - To interrupt the incoming (left-hand) periphery supply and C-rail supply
- To provide subsequent (right-hand) modules with the periphery supply and C-rail supply

Base module	Terminal configuration	
Screw terminals: PSSu BS 2/8S Cage clamp terminals: PSSu BS 2/8C	11: Not assigned 21: Not assigned 12-22: 0 V Periphery supply, interrupted to the left (12-22 linked internally) 13-23: +24 V Periphery supply, interrupted to the left (13-23 linked internally) 14-24: Infeed for C-rail supply, interrupted to the left (14-24 linked internally)	



Supply voltage PSSu E F BSW

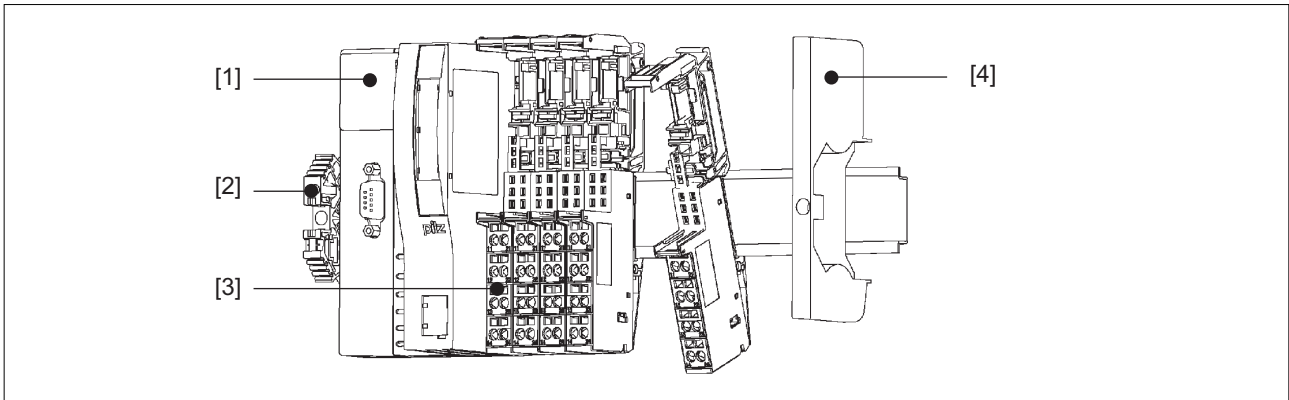
► Connection

Supply type	Connection
Supply to input/output blocks (block switching) with base module - PSSu BS 2/8S or - PSSu BS 2/8C	0 V DC +24 V DC Fuse 10 A Periphery Supply C-rail Supply Connect to the 0 V supply and earth this at a single point

Supply voltage PSSu E F BSW

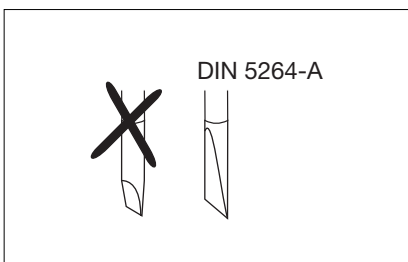
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



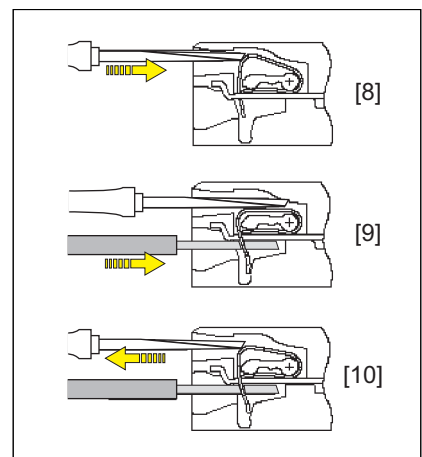
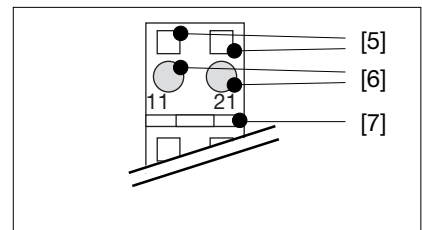
Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal [5].



Supply voltage PSSu E F BSW

Inserting an electronic module

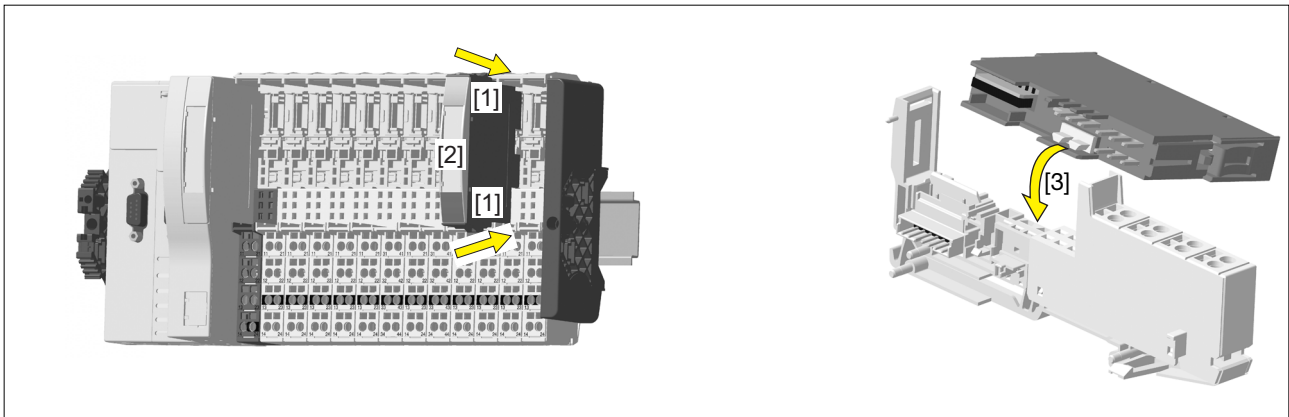
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

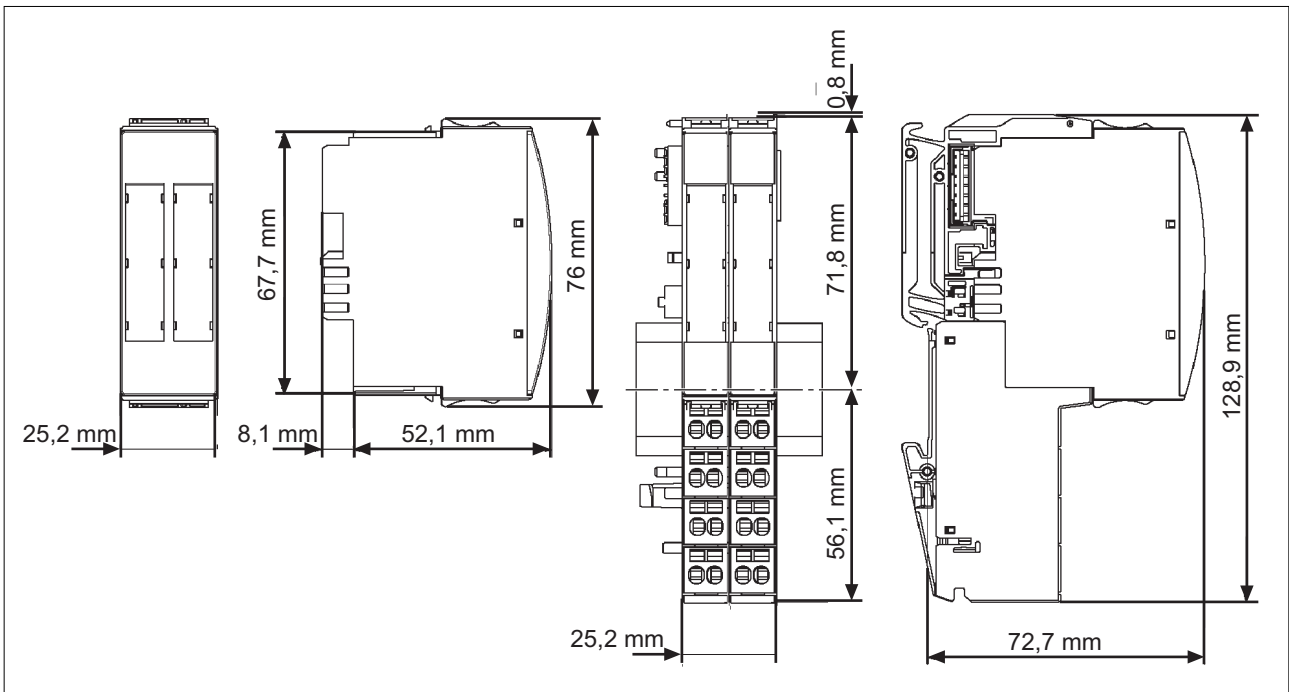
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Supply voltage

PSSu E F BSW

Technical details		PSSu E F BSW
Function		Block switching of the periphery supply for decentralised standard applications of the PSSu series
Application range		Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data		
Supply voltage		From module supply: +5 VDC
Current consumption		From module supply: Max. 220 mA
Periphery supply		+24 VDC
Load current, periphery supply		Max. 10 A
Max. switchable current at 25°C/60 °C		Max. 8 A/ max. 7 A
C-rail supply		PE, screening, 0 V or 24 VDC ... +24 DC
Total current on C-rail at 24 VDC, +25 °C/+60 °C		Max. 10 A/ max. 8 A
Periphery supply buffer in the case of a power supply failure		None
Contact fuse protection on the external blow-out fuse (VDE 0660)		10 A
Mechanical data		
Weight		
Electronic module		90 g
Base module with cage clamp terminals		
Base module with screw terminals		
Mechanical coding		Yellow, I
Plug in/out cycles		Max. 20
Environmental data		
Protection type (EN 60529, 02/00)		IP20
Ambient temperature (EN 60068-2-14, 11/99)		0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)		-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)		93 % r.h. at 40 °C
Condensation		Not permitted
Vibration (EN 60068-2-6, 04/95)		Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock		
EN 60068-2-27, 03/93		15g, 11 ms
EN 60068-2-29, 04/93		10g, 16 ms
EMC		EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

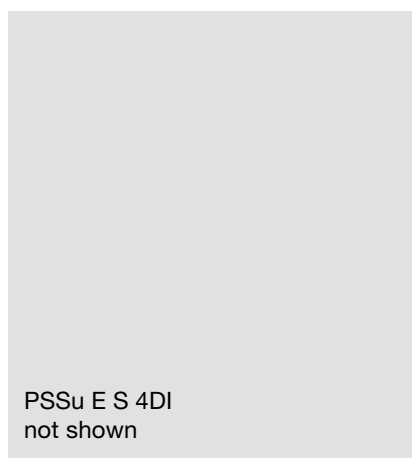
Supply voltage PSSu E F BSW

Order reference	
Description	Order no.
PSSu E F BSW (Electronic module)	312 230
PSSu BS 2/8S (Base module with C-rail with screw terminals)	312 656
PSSu BS 2/8C (Base module with C-rail with cage clamp terminals)	312 657
Order reference for accessories	
Description	
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Supply voltage PSSu E F BSW

Notes

Digital input/output PSSu E S 4DI



Electronic module to detect 24 VDC digital input signals. Suitable for non-safety-related functions.

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ 4 digital inputs
- ▶ 2 outputs, with constant voltage of + 24 VDC (Periphery supply)
- ▶ LED indicators for:
 - Switch status of each input
 - Module error
- ▶ Communication via
 - Standard bus system
- ▶ Details of the base modules that can be used are available under "Terminal configuration" and "Order reference"

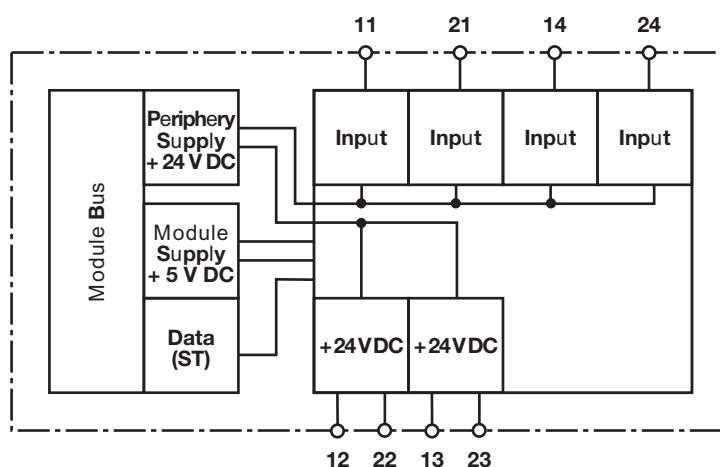
Properties

- ▶ When the module supply is interrupted, the electronics are buffered for 20 ms, provided the PSSu E F PS1 is used to supply the system.
- ▶ Limited diagnostic capabilities

Module description

The module may be used with input devices for non-safety-related functions.

Block diagram



Digital input/output PSSu E S 4DI

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Periphery supply (24 VDC)
The supply for the periphery (input devices) is galvanically isolated from the module supply. It is fed from the module bus to terminals on the base module (connection level 2 and 3).
The periphery supply is not switchable and has no current limitation.
- ▶ Inputs
 - Short circuit-proof
 - The inputs have input filters.
 - The head module signals the input status to the relevant controller via the bus system.

Signal detection at the inputs

To guarantee that a signal at an input ("0" signal or "1" signal) is detected, it must be present for a certain time period.

If a signal ("0" signal or "1" signal) does not exceed the pulse suppression time, it is ignored. The pulse suppression time depends on the standard bus system.

Digital input/output PSSu E S 4DI

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err)
 - Input status (see table below)
- ▶ Error reaction:
The error reaction is determined by the standard bus system.

System configuration

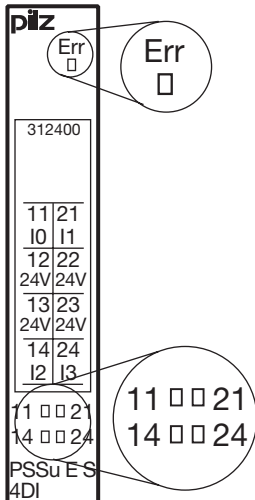
The system is configured using Pilz configuration software and via the standard bus system.

Addressing the inputs

The inputs are addressed via the standard bus system.

Wiring

- ▶ Signals may be connected using unscreened cables.
- ▶ Current limitation is required (e.g. fuse) when the input devices are supplied (periphery supply) via the terminals on connection level 2 and 3.

Electronic module	LED	LED status	Key
	Err	Off	Module is operating without error
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	11	Off	I0 = 0 signal (0 V)
		Lights green	I0 = 1 signal (min. 10 V)
	14	Off	I1 = 0 signal (0 V)
		Lights green	I1 = 1 signal (min. 10 V)
	21	Off	I2 = 0 signal (0 V)
		Lights green	I2 = 1 signal (min. 10 V)
	24	Off	I3 = 0 signal (0 V)
		Lights green	I3 = 1 signal (min. 10 V)

Digital input/output PSSu E S 4DI

Base modules

► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S Cage clamp terminals: PSSu BP 1/8C	Without C-rail: 11: I0 Input 1 21: I1 Input 2 12-22: 24 V + 24 V output (Periphery supply (12-22 linked internally)) 13-23: 24 V + 24 V output (Periphery supply (13-23 linked internally)) 14: I2 Input 3 24: I3 Input 4	

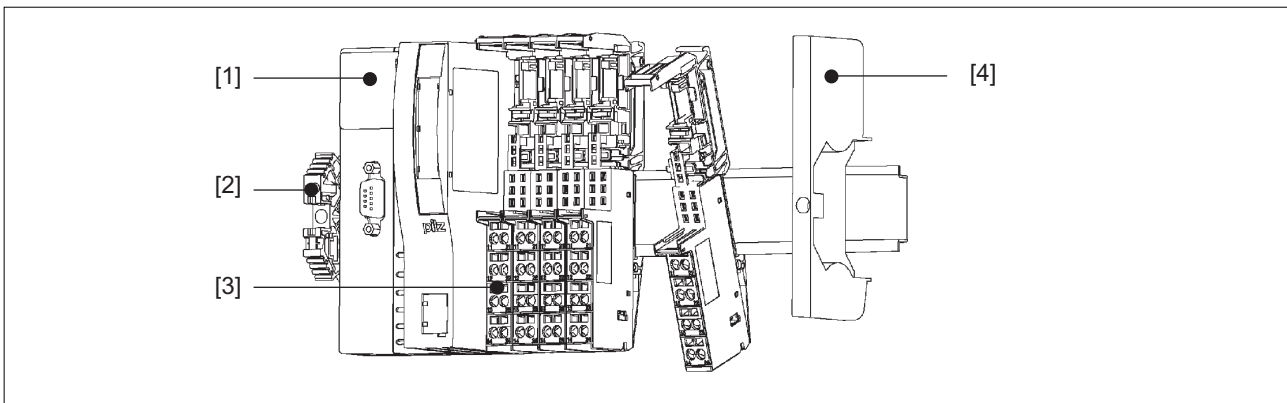
► Connection

Input circuit	Single-channel input device PSSu BP 1/8S PSSu BP 1/8C
Supplying the input devices via the module's periphery supply	

Digital input/output PSSu E S 4DI

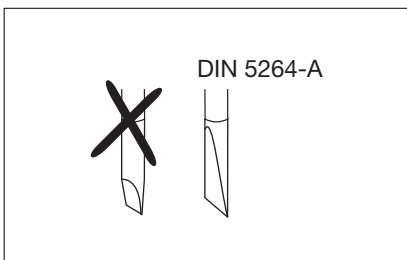
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers with this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].

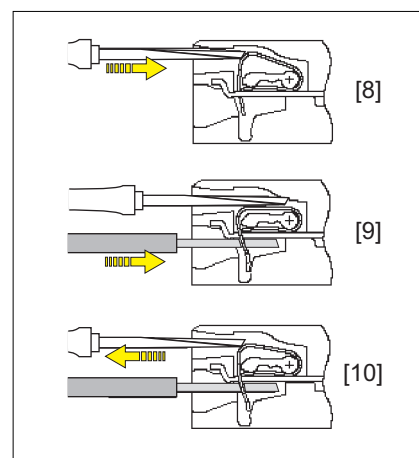
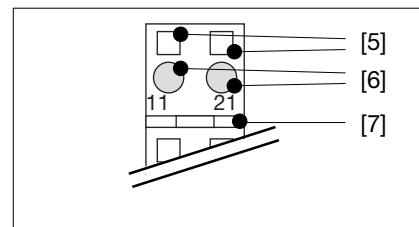


Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)
- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal.



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]



Digital input/output PSSu E S 4DI

Inserting an electronic module

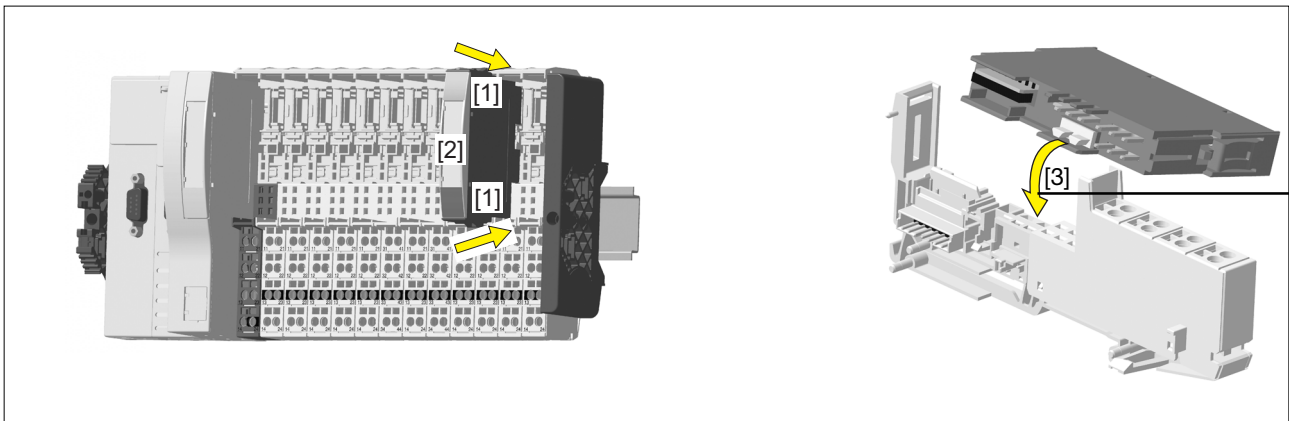
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

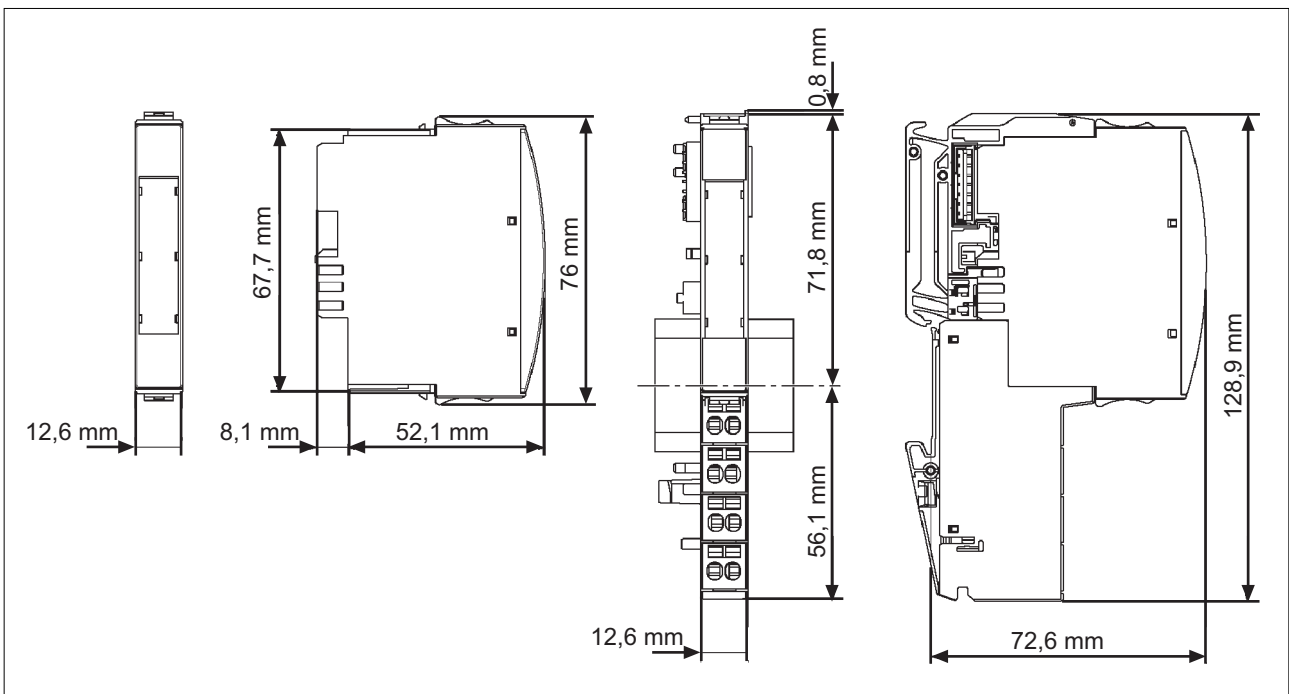
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Digital input/output

PSSu E S 4DI

Technical details	PSSu E S 4DI
Function	Compact programmable safety system for decentralised applications
Application range	Standard applications
Electrical data	
Supply voltage	From module supply: 5 VDC
Current consumption	From module supply: ≤ 25 mA
Integral on-board inputs	
Number	4
Signal level at "0"	-3 ... +5 VDC
Signal level at "1"	+15 ... +30 VDC
Input current	2.5 ... 8 mA
Pulse suppression	< 3 ms
Status indicator	LED
Mechanical data	
Weight	
Electronic module	35 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Dark grey, A
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock (EN 60068-2-27, 03/93)	15g, 11 ms
Continuous shock (EN 60068-2-29, 04/93)	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Digital input/output PSSu E S 4DI

Order reference	
Description	Order no.
PSSu E S 4DI (Electronic module)	312 400
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
Order reference for accessories	Order no.
Description	
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Digital input/output PSSu E S 4DO 0.5

PSSu E S 4DO 0.5
not shown

Electronic module to output 24 VDC digital output signals. Suitable for non-safety-related functions.

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ 4 single-pole digital outputs
 - Positive-switching
 - Current load capacity per output: max. 0.5 A
 - Short circuit-proof
 - Overload-proof
- ▶ LED indicators for:
 - Switch status of each output
 - Module error
- ▶ Communication via
 - Standard bus system
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference".

Properties

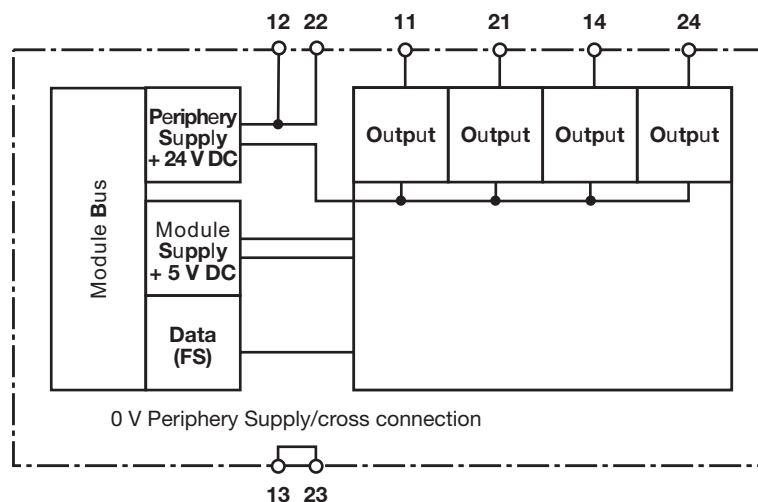
- ▶ When the module supply is interrupted, the electronics are buffered for 20 ms, provided the PSSu E F PS1 is used to supply the system.
- ▶ Limited diagnostic capabilities

Module description

The module may be used for non-safety-related switching of

- ▶ Resistive loads with max. 0.5 A per output
- ▶ Inductive loads with max. 0.5 A per output

Block diagram



Digital input/output PSSu E S 4DO 0.5

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Periphery supply (24 VDC)
The supply to the outputs is galvanically isolated from the module supply.
- ▶ “0” signal (0 V) at the output:
 - Output is high impedance
 - No current to the load
- ▶ “1” signal (+24 V) at the output:
 - Output is low impedance
 - Current is supplied to the load

Digital input/output PSSu E S 4DO 0.5

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err)
 - Output status (see table below)
- ▶ Error reaction:
The error reaction is determined by the standard bus system.

System configuration

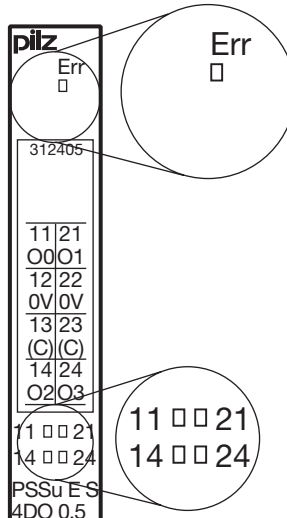
The system is configured using Pilz configuration software and via the standard bus system.

Addressing the outputs

The outputs are addressed via the standard bus system.

Wiring

- ▶ Actuators may be connected using unscreened cables.
- ▶ When switching inductive loads, suppression should not be used to protect the semiconductor outputs. If suppression cannot be avoided (e.g. on contactors with integral suppression), errors may occur, particularly with RC elements, depending on their capacitive share.

Electronic module	LED	LED status	Key
	Err	Off	Module is operating without error
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	11	Off	O0 = 0 signal (0 V)
		Lights green	O0 = 1 signal (min. 10 V)
	14	Off	O1 = 0 signal (0 V)
		Lights green	O1 = 1 signal (min. 10 V)
	21	Off	O2 = 0 signal (0 V)
		Lights green	O2 = 1 signal (min. 10 V)
	24	Off	O3 = 0 signal (0 V)
		Lights green	O3 = 1 signal (min. 10 V)

Digital input/output PSSu E S 4DO 0.5

Base modules

► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S Cage clamp terminals: PSSu BP 1/8C	Without C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: 0 V Periphery supply (13-23 linked internally) 14: O2 Output 3, single-pole 24: O3 Output 4, single-pole	
Screw terminals: PSSu BP-C 1/8S Cage clamp terminals: PSSu BP-C 1/8C	With C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: C-rail supply (13-23 linked internally) 14: O2 Output 3, single-pole 24: O3 Output 4, single-pole	

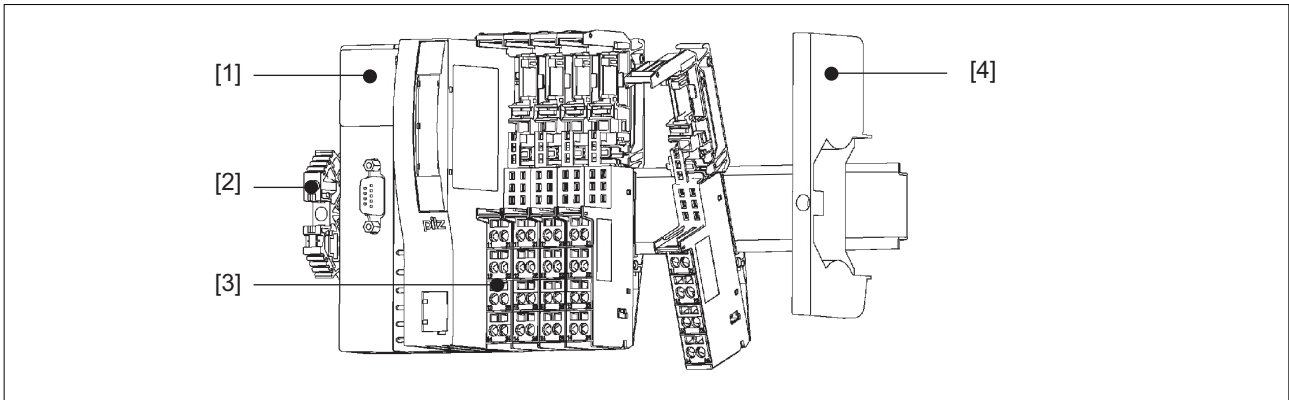
► Connection

Output circuit	Without C-rail PSSu BP 1/8S PSSu BP 1/8C	With C-rail PSSu BP 1/8S PSSu BP 1/8C
► Resistive load/capacitive load ► Single-channel actuator		

Digital input/output PSSu E S 4DO 0.5

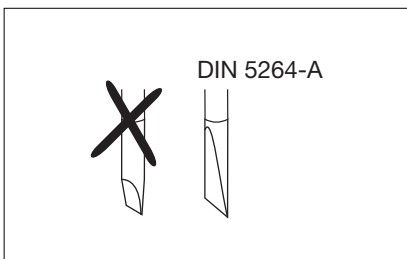
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



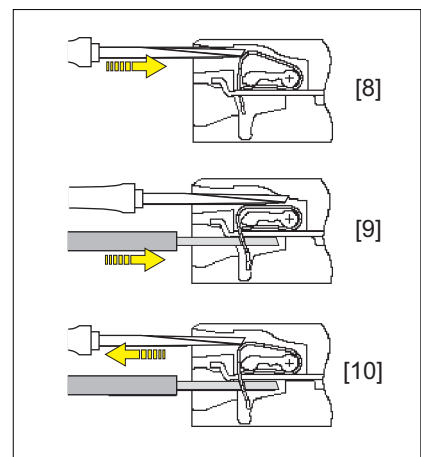
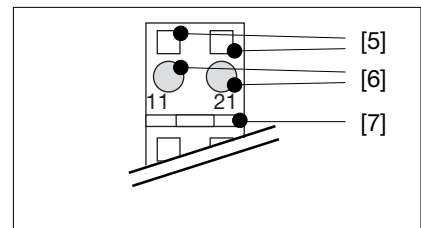
Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal [5].



Digital input/output PSSu E S 4DO 0.5

Inserting an electronic module

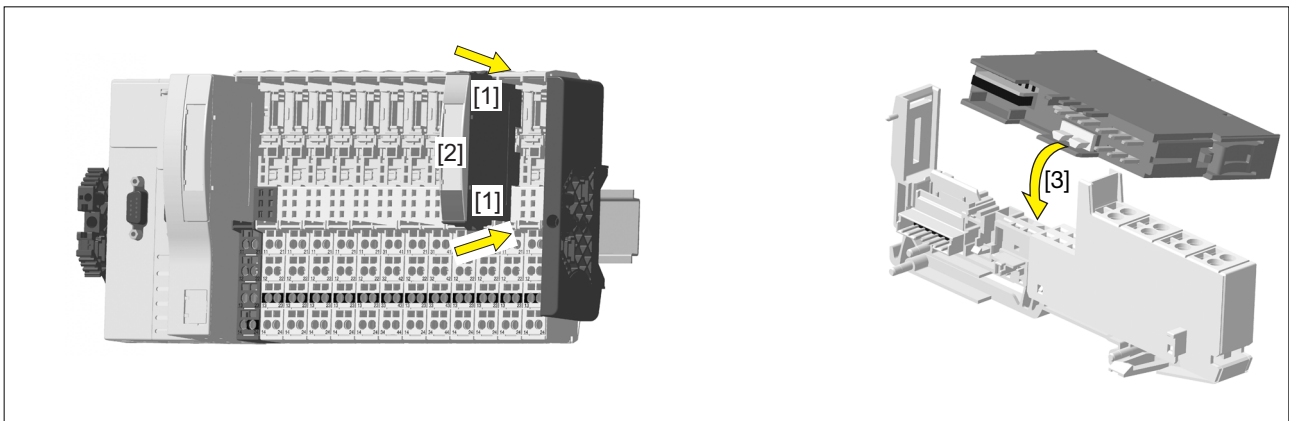
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

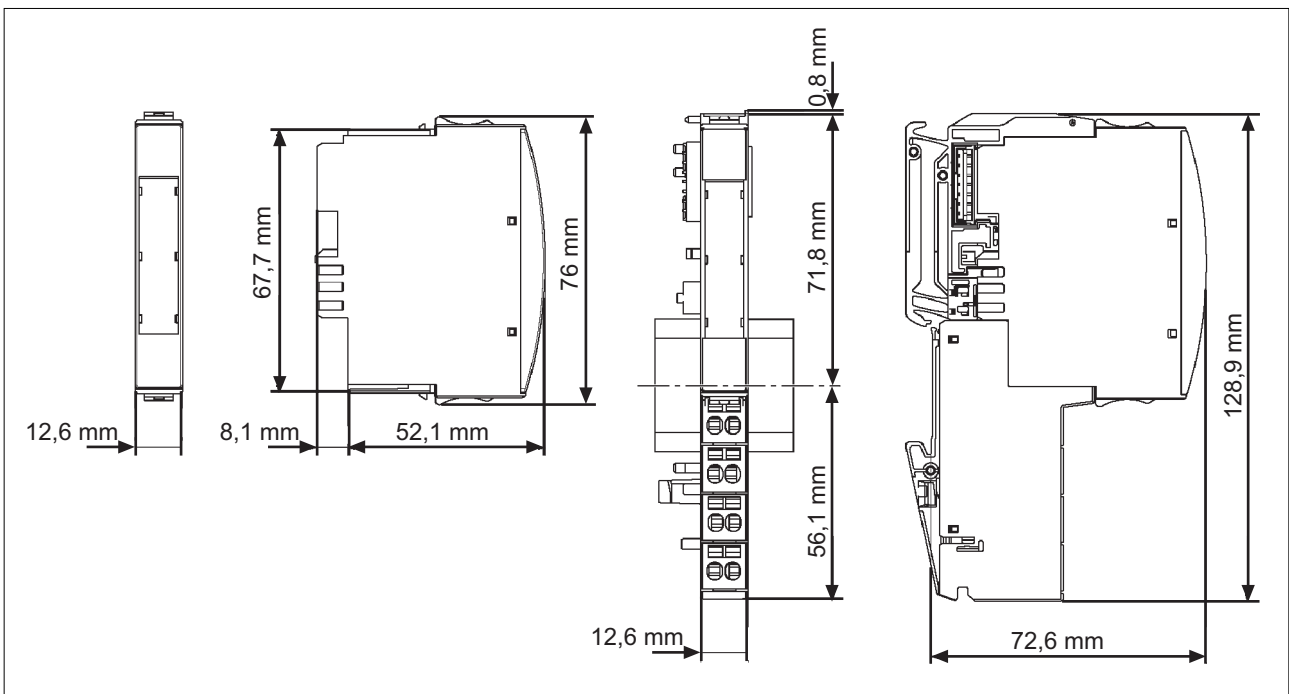
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Digital input/output PSSu E S 4DO 0.5

Technical details	PSSu E F 4DO 0.5
Function	Compact programmable safety system for decentralised applications
Application range	Standard applications
Electrical data	
Supply voltage	From module supply: 5 VDC
Current consumption	From module supply: ≤ 60 mA
Outputs – single-pole	
Number	4
Potential isolation	Yes (optocoupler)
Output current at “1”	0.5 A
Permitted range	0 ... 0.75 A
Short circuit protection	Electronic
Residual current at “0” signal	0 mA
Signal level at “0”	0 VDC
Signal level at “1”	U _B -0.2 VDC at 0.5 A
Status indicator	LED
Mechanical data	
Weight	
Electronic module	< 40 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Dark grey, B
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock	
EN 60068-2-27, 03/93	15g, 11 ms
EN 60068-2-29, 04/93	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Digital input/output

PSSu E S 4DO 0.5

Order reference	
Description	Order no.
PSSu E S 4DO 0.5 (Electronic module)	312 405
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 with screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Digital input/output PSSu E S 2DO 2

PSSu E S 2DO 2
not shown

Electronic module to output 24 VDC digital output signals. Suitable for non-safety-related functions.

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ 2 single-pole digital outputs
 - Positive-switching
 - Current load capacity per output: max. 2 A
 - Short circuit-proof
 - Overload-proof
- ▶ LED indicators for:
 - Switch status of each output
 - Module error
- ▶ Communication via
 - Standard bus system
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference".

Properties

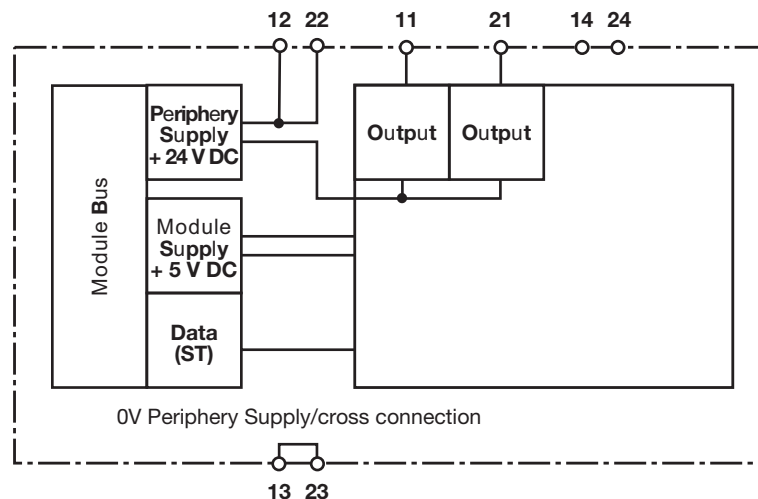
- ▶ When the module supply is interrupted, the electronics are buffered for 20 ms, provided the PSSu E F PS1 is used to supply the system.
- ▶ Limited diagnostic capabilities

Module description

The module may be used for non-safety-related switching of

- ▶ Resistive loads with max. 2 A per output
- ▶ Inductive loads with max. 2 A per output

Block diagram



Digital input/output PSSu E S 2DO 2

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Periphery supply (24 VDC)
The supply to the outputs is galvanically isolated from the module supply.
- ▶ “0” signal (0 V) at the output:
 - Output is high impedance
 - No current to the load
- ▶ “1” signal (+24 V) at the output:
 - Output is low impedance
 - Current is supplied to the load

Digital input/output PSSu E S 2DO 2

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err/FS1)
 - Output status (see table below)
- ▶ Error reaction:
The error reaction is determined by the standard bus system.

System configuration

The system is configured using Pilz configuration software and via the standard bus system.

Addressing the outputs

The inputs are addressed via the standard bus system.

Wiring

- ▶ Actuators may be connected using unscreened cables.
- ▶ When switching inductive loads, suppression should not be used to protect the semiconductor outputs. If suppression cannot be avoided (e.g. on contactors with integral suppression), errors may occur, particularly with RC elements, depending on their capacitive share.

Electronic module	LED	LED status	Key
	Err	Off	Module is operating without error, No FS enable for output O1
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	11	Off	O0 = 0 signal (0 V)
		Lights green	O0 = 1 signal (min. 10 V)
	14	Off	O1 = 0 signal (0 V)
		Lights green	O1 = 1 signal (min. 10 V)

Digital input/output PSSu E S 2DO 2

Base modules

► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S Cage clamp terminals: PSSu BP 1/8C	Without C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13: Not assigned 23: Not assigned 14: Not assigned 24: Not assigned	
Screw terminals: PSSu BP-C 1/8S Cage clamp terminals: PSSu BP-C 1/8C	With C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: C-rail supply (13-23 linked internally) 14: Not assigned 24: not connected	

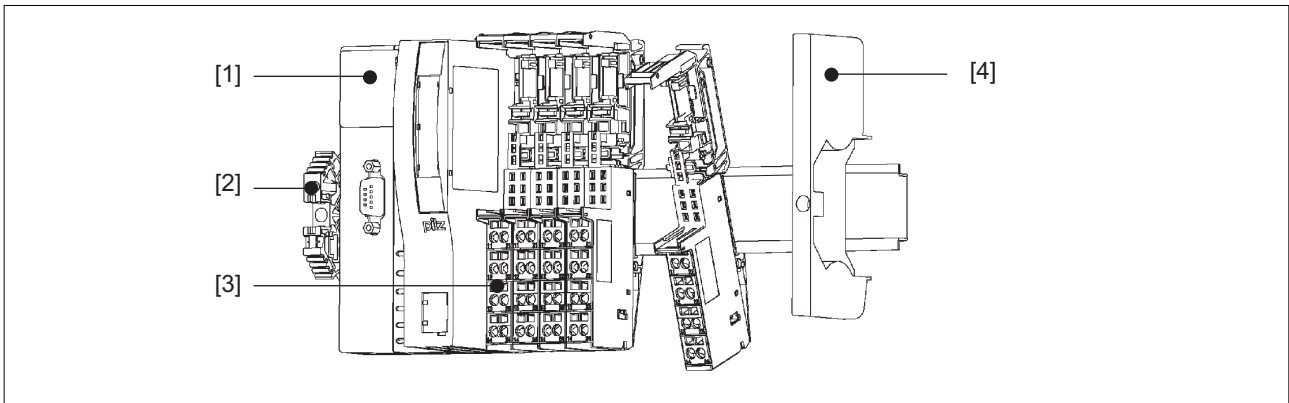
► Connection

Output circuit	Without C-rail PSSu BP 1/8S PSSu BP 1/8C	With C-rail PSSu BP-C 1/8S PSSu BP-C 1/8C
► Resistive load/capacitive load ► Single-channel actuator		

Digital input/output PSSu E S 2DO 2

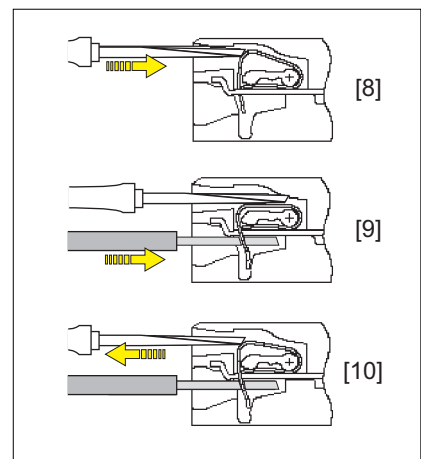
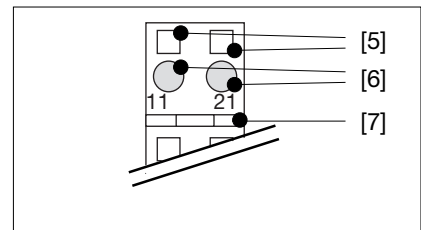
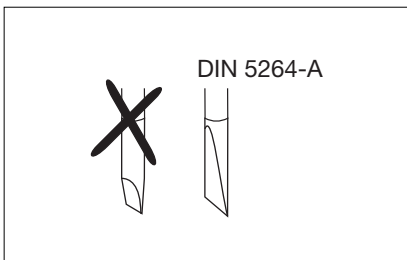
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
 - Insert a cross connector for signal duplication.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)
- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal [5].



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

Digital input/output PSSu E S 2DO 2

Inserting an electronic module

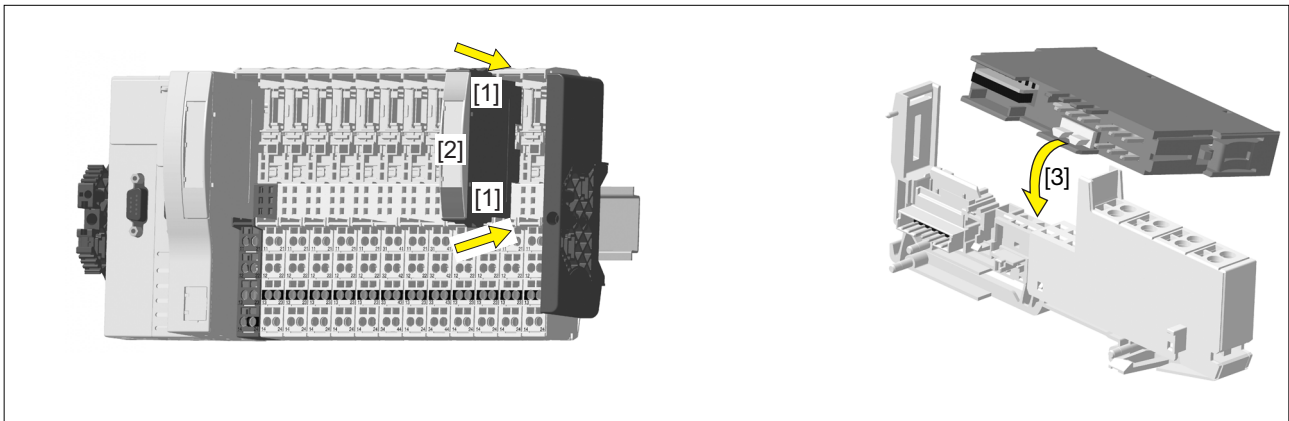
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

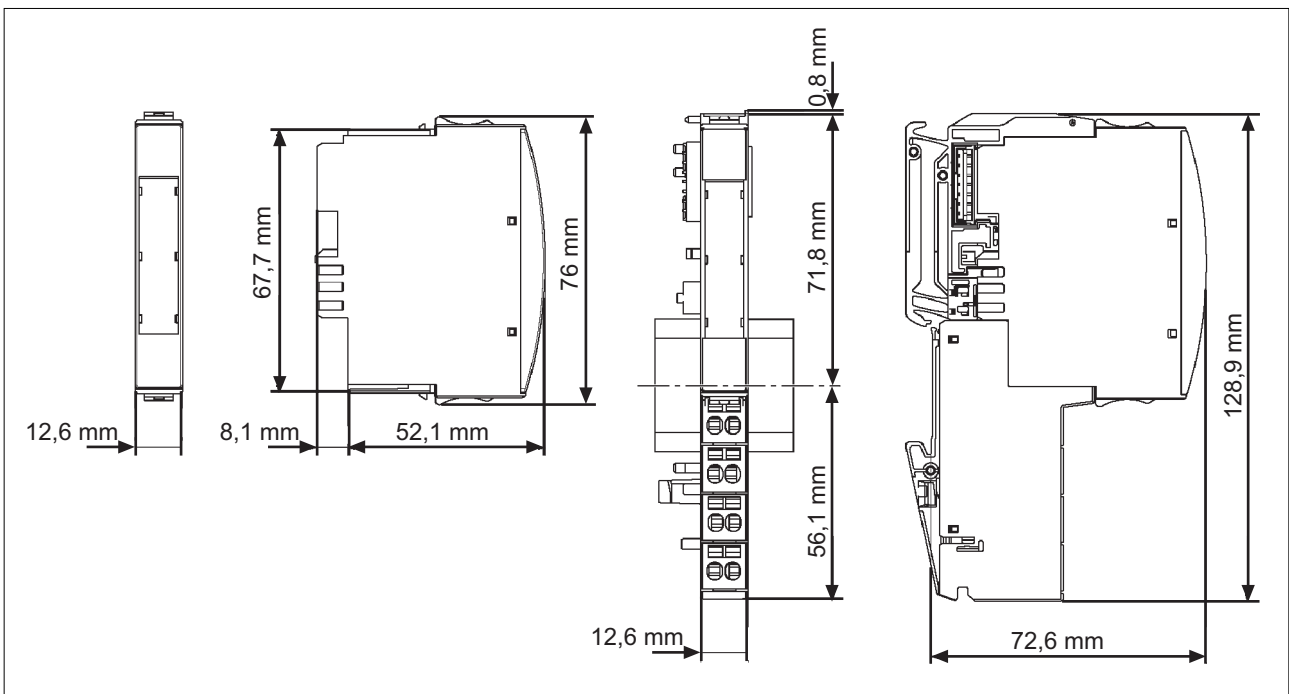
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Digital input/output PSSu E S 2DO 2

Technical details	PSSu E F 2DO 2
Function	Compact programmable safety system for decentralised applications
Application range	Standard applications
Electrical data	
Supply voltage	From module supply: 5 VDC
Current consumption	From module supply: ≤ 50 mA
Outputs – single-pole	
Number	2
Potential isolation	Yes (optocoupler)
Output current at “1”	2 A
Permitted range	0 ... 2.5 A
Short circuit protection	Electronic
Residual current at “0” signal	0 mA
Signal level at “0”	0 VDC
Signal level at “1”	U _B -0.2 VDC at 2 A
Status indicator	LED
Mechanical data	
Weight	
Electronic module	< 40 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Dark grey, C
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock	
EN 60068-2-27, 03/93	15g, 11 ms
EN 60068-2-29, 04/93	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Digital input/output PSSu E S 2DO 2

Order reference	
Description	Order no.
PSSu E S 2DO 2 (Electronic module)	312 410
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 with screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Digital input/output PSSu E F 4DI

PSSu E F 4DI
not shown

Electronic module to detect 24 VDC digital input signals. Suitable for safety-related functions.

Approvals

	PSSu E F 4DI
	In progress

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ 4 digital inputs
- ▶ 2 outputs, with the option to configure them as
 - 2 independent test pulse outputs that use different test pulses (periphery supply)
 - 2 outputs with constant voltage of + 24 VDC (periphery supply)
- ▶ LED indicators for:
 - Switch status of each input
 - Module error
- ▶ Communication via
 - SafetyBUS p
- ▶ Details of the base modules that can be used are available under "Terminal configuration" and "Order reference"

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides Type 1 inputs in accordance with IEC 61131-2. The module be used with

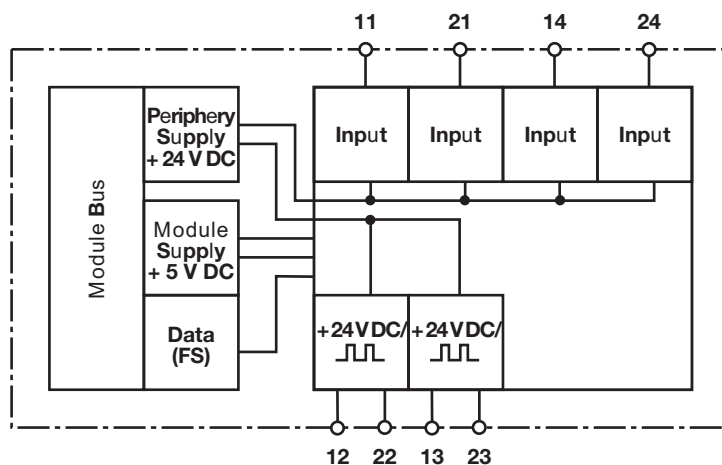
- ▶ E-STOP switches
- ▶ Safety gates

Safety features

The module meets the following safety requirements:

- ▶ When the module supply is interrupted, the electronics are buffered for 20 ms, provided the PSSu E F PS1 is used to supply the system.
- ▶ Buffer applies to
 - Input signals
 - Test pulse signals
- ▶ Diagnostic capabilities

Block diagram



Digital input/output PSSu E F 4DI

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Periphery supply (24 VDC)
The supply for the periphery (input devices) is galvanically isolated from the module supply. It is fed from the module bus to terminals on the base module (connection level 2 and 3). On this module, the periphery supply is available to supply the input devices or to provide test pulses for the input devices.
- ▶ Inputs
 - Inputs can be tested individually (test pulses) in order to exclude shorts across contacts and test the function.
 - Short circuit-proof
 - The inputs have input filters.
 - The head module signals the input status to the CPU on the controlling PSS via SafetyBUS p.
- ▶ Test pulse outputs
 - 2 test pulse outputs that use different test pulses (test pulse 0, test pulse 1)

- Test pulses can be switched on/off. Test pulses are switched off in the default setting. A constant + 24 VDC (periphery supply) is emitted when the test pulses are switched off.
- Properties
 - $U_{\text{Test Pulse}}$ corresponds approximately to $U_{\text{Periphery Supply}}$
 - Short circuit-proof
 - $f_{\text{Test Pulse}}$ ca. 3 Hz

Signal detection at the inputs

Signal detection ("0" signal or "1" signal) is guaranteed if the signal is present for longer than the time configured for the event timeout in the configurator for the PSS WIN-PRO system software. In this case, an event telegram is sent via SafetyBUS p.

If a signal ("0" signal or "1" signal) does not exceed the pulse suppression time (filter time) of 450 μs , it is guaranteed to be ignored. In this case, no event telegram is sent via SafetyBUS p.

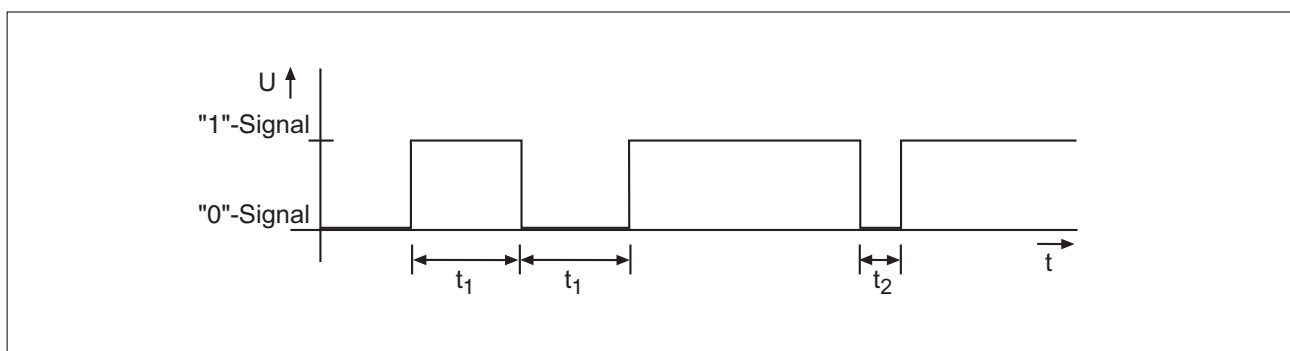
Signal change behaviour

If a signal at an input changes, the head module sends an event telegram. The module must then wait for a confirmation telegram (ACK) from the Master LD before it can send out a new event telegram. If another signal change occurs while the module is waiting for the confirmation telegram, the module's behaviour will depend on the configured signal change behaviour (PSS WIN-PRO).

Two behaviour modes can be configured:

- ▶ "Default":
The signal changes are not registered.
- ▶ "Fast":
Each signal change is temporarily stored in the head module, within a FIFO telegram buffer. If the confirmation telegram arrives, the head module will send an event telegram from the FIFO telegram buffer for each detected signal change, one after the other.

Timing diagram



t_1 : Pulse duration to guarantee signal detection for "1" signals or "0" signals (> Event Timeout)

t_2 : Max. pulse duration for pulse suppression with "1" signals or "0" signals (450 μs)

Digital input/output PSSu E F 4DI

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err)
 - Input status (see table below)
- ▶ The test pulses are read back for diagnostic purposes (not safety-related). For example, it is possible to detect whether the test pulse itself has a short circuit.
- ▶ SafetyBUS p error reaction:
If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

System configuration for SafetyBUS p

The system is configured using Pilz configuration software.

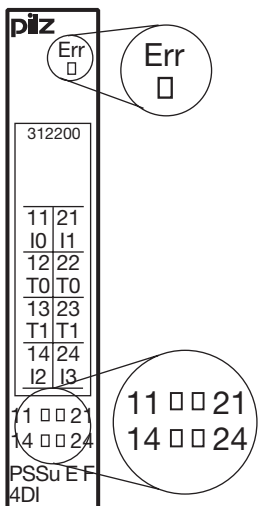
Addressing the inputs

The inputs are addressed using PSS WIN-PRO system software.

Wiring

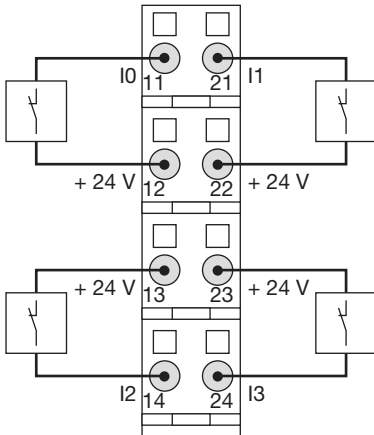
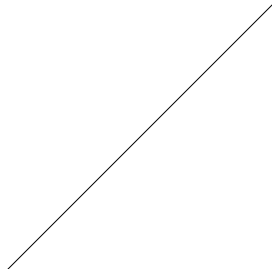
- ▶ Safety-related input signals must operate in accordance with the failsafe principle (on switching off).
- ▶ Appropriate wiring should be used to exclude short circuits in the external wiring between the test pulse output and the corresponding input.

- ▶ Appropriate wiring should be used to exclude short circuits in the external wiring between different inputs and to the "Supply" or "Periphery supply".
- ▶ With cable runs of greater than 200 m and a cable cross section of 1.5 mm², the operating system will not detect a short circuit to earth.
- ▶ With cable runs of greater than 300 m and a cable cross section of 2.5 mm², the operating system will not detect a short circuit to earth.
- ▶ In principle it is not possible to detect open circuits and earth faults
- ▶ Signals may be connected using unscreened cables.

Electronic module	LED	LED status	Key
	Err	Off Lights red	Module is operating without error Module error (e.g.: error at the inputs, error in programming mode, communication error)
	11	Off Lights green	I0 = 0 signal (0 V) I0 = 1 signal (min. 10 V)
	14	Off Lights green	I1 = 0 signal (0 V) I1 = 1 signal (min. 10 V)
	21	Off Lights green	I2 = 0 signal (0 V) I2 = 1 signal (min. 10 V)
	24	Off Lights green	I3 = 0 signal (0 V) I3 = 1 signal (min. 10 V)

- ▶ Terminal configuration

► Connection

Input circuit	Single-channel failsafe input device PSSu BP 1/8S PSSu BP 1/8C	Dual-channel failsafe input device PSSu BP 1/8S PSSu BP 1/8C
► Without test pulses (unchecked)		

Digital input/output PSSu E F 4DI

Input circuit	Single-channel failsafe input device PSSu BP 1/8S PSSu BP 1/8C	Dual-channel failsafe input device PSSu BP 1/8S PSSu BP 1/8C
▶ Without test pulses (unchecked) ▶ Input device with homogenous channels		
▶ Without test pulses (unchecked) ▶ Input device with diverse channels		
▶ With test pulses (checked)		

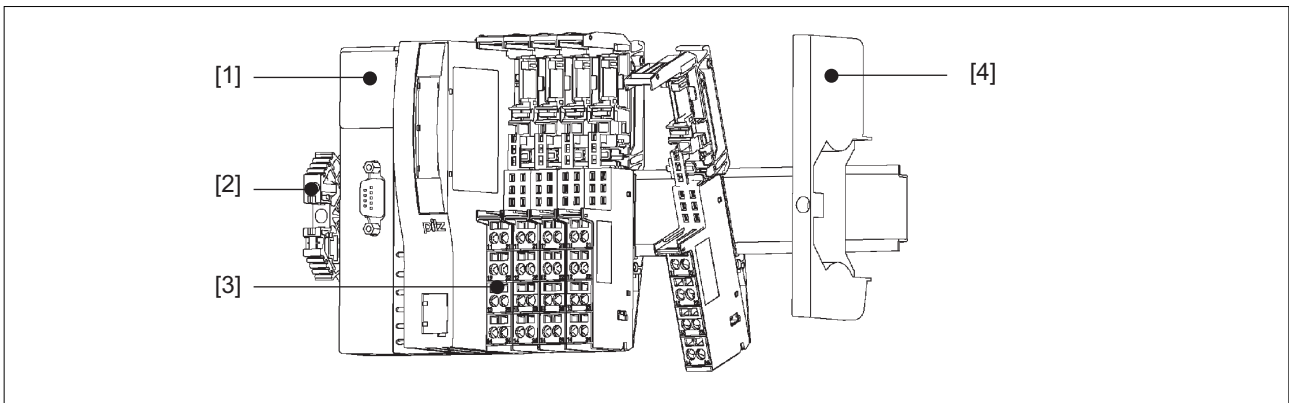
Digital input/output PSSu E F 4DI

Input circuit	Single-channel failsafe input device PSSu BP 1/8S PSSu BP 1/8C	Dual-channel failsafe input device PSSu BP 1/8S PSSu BP 1/8C
▶ With test pulses (checked) ▶ Input device with homogenous channels		
▶ With test pulses (checked) ▶ Input device with homogenous channels		
▶ With test pulses (checked) ▶ Input device with diverse channels		

Digital input/output PSSu E F 4DI

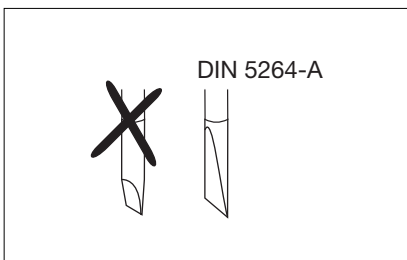
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
 - Insert a cross connector for signal duplication.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].

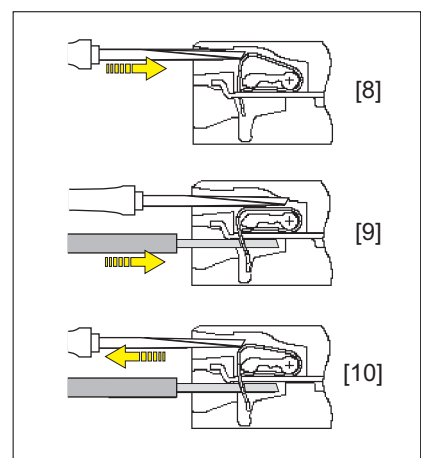
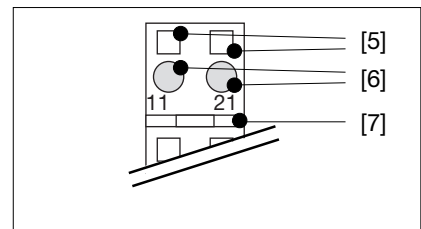


Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)
- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal.



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]



Digital input/output PSSu E F 4DI

Inserting an electronic module

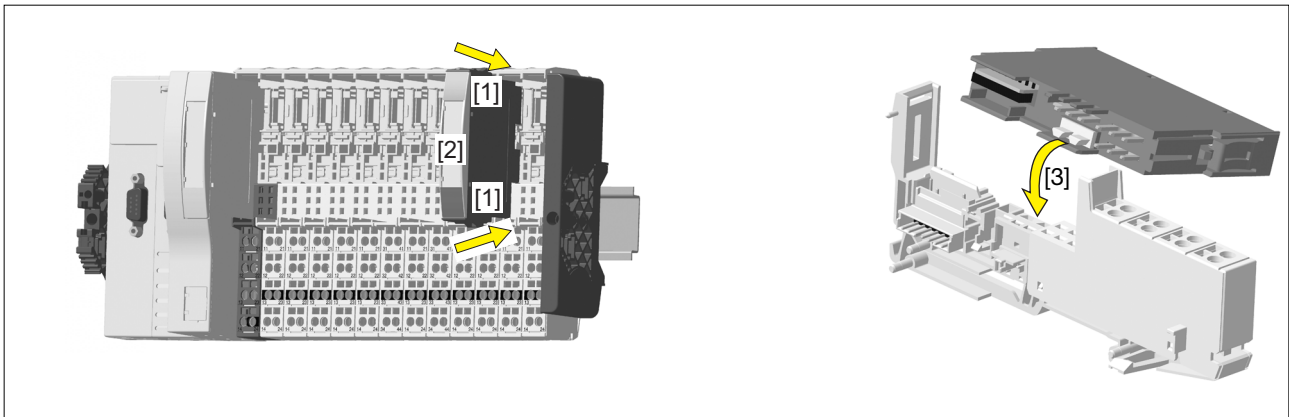
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

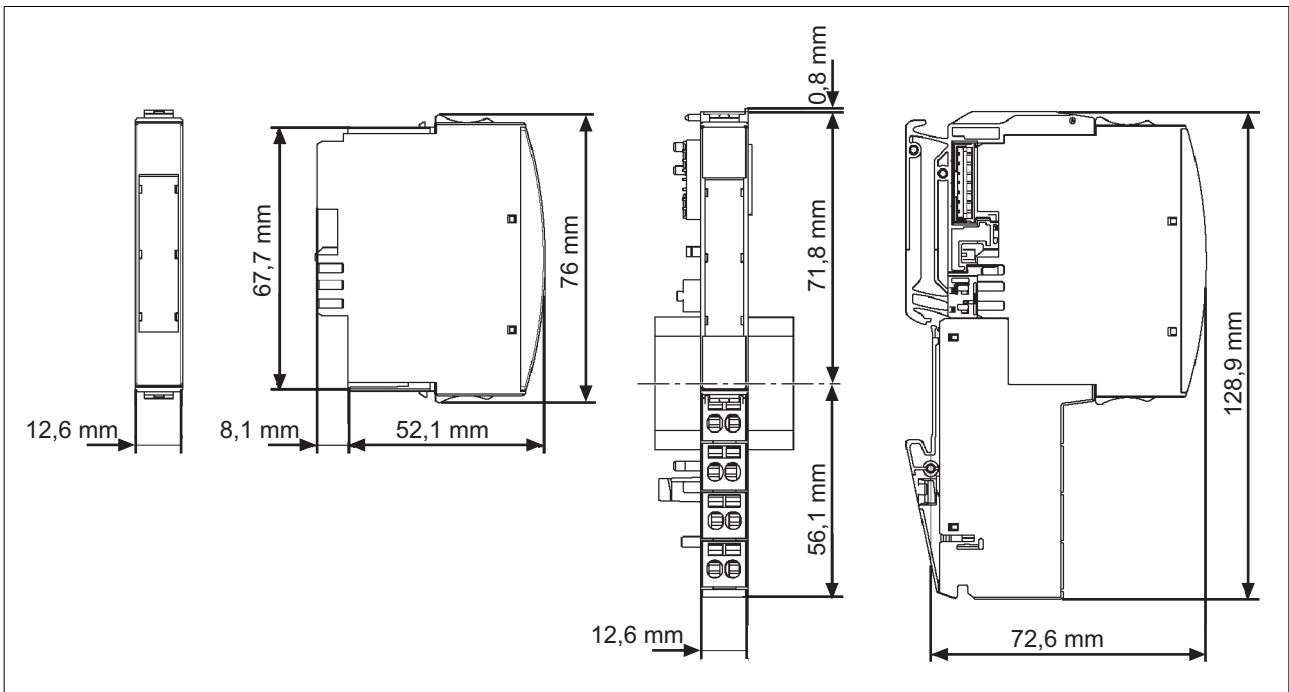
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Digital input/output PSSu E F 4DI

Technical details	PSSu E F 4DI
Function	Compact programmable safety system for decentralised applications
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data	
Supply voltage	From module supply: 5 VDC
Current consumption	From module supply: ≤ 30 mA
SafetyBUS p	
Connection	Via SafetyBUS p-compatible head module
Dedicated test pulse outputs	
Number	2
Supply	From module supply
Signal level at "1"	24 VDC
Output current at "1"	Max. 10 mA
Inputs	
Number	4
Signal level at "0"	-3 ... +5 VDC
Signal level at "1"	+15 ... +30 VDC
Input current	2.5 ... 8 mA
Pulse suppression	< 450 µs
Status indicator	LED
Mechanical data	
Weight	
Electronic module	35 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Yellow, D
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm

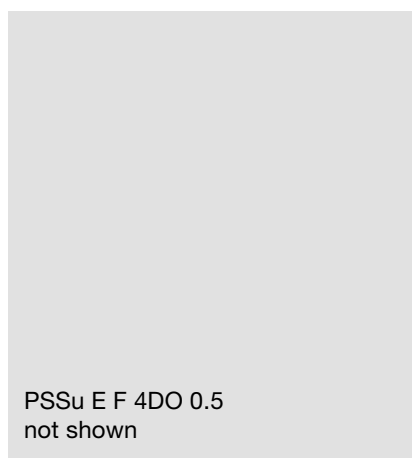
Digital input/output PSSu E F 4DI

Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock (EN 60068-2-27, 03/93)	15g, 11 ms
Continuous shock (EN 60068-2-29, 04/93)	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Order reference	
Description	Order no.
PSSu E F 4DI (Electronic module)	312 200
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

Order reference for accessories	Order no.
Description	
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Digital input/output PSSu E F 4DO 0.5



Electronic module to output 24 VDC digital output signals. Suitable for safety-related functions.

Approvals

PSSu E F 4DO 0.5
In progress

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ 4 single-pole digital outputs
 - Positive-switching
 - Current load capacity per output: max. 0.5 A
 - Short circuit-proof
 - Overload-proof
 - Free from feedback
- ▶ LED indicators for:
 - Switch status of each output
 - Module error
- ▶ Communication via
 - SafetyBUS p
 - Standard bus system with local enable principle
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference"

Safety features

The module meets the following safety requirements:

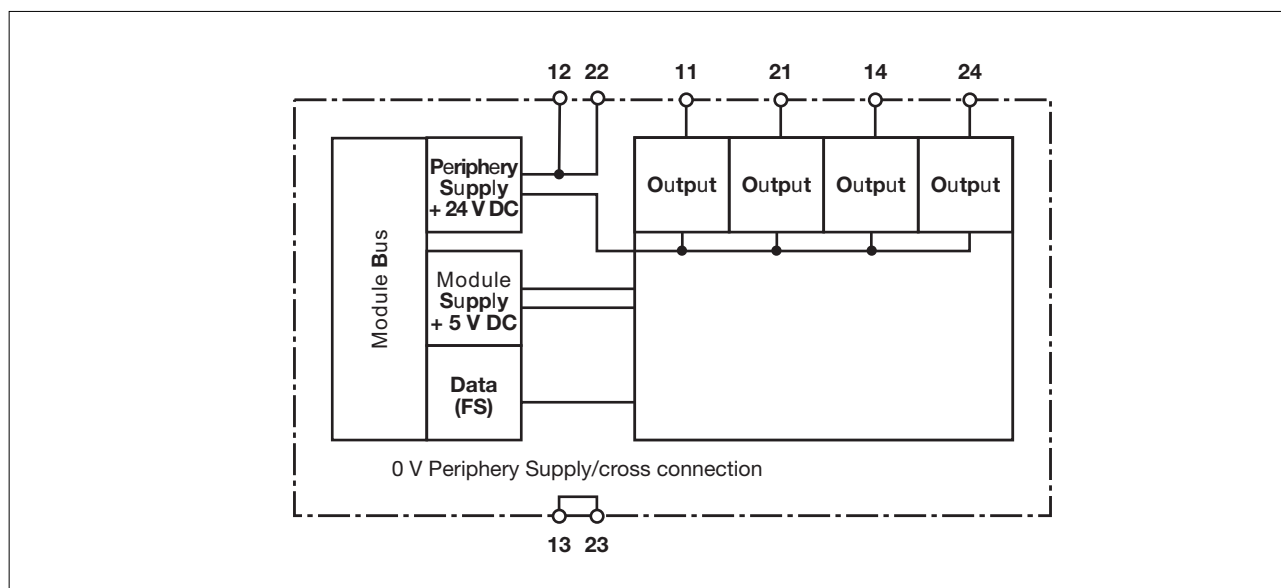
- ▶ Common second shutdown route
 - Outputs have a diverse structure
 - Second shutdown route is regularly tested
- ▶ Cyclical output test
- ▶ Regular check for shorts between the outputs
- ▶ Protection against over-temperature
- ▶ Diagnostic capabilities

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides outputs in accordance with IEC 61131-2. The module may be used to switch

- ▶ Resistive loads with max. 0.5 A per output
- ▶ Inductive loads with max. 0.5 A per output

Block diagram



Digital input/output PSSu E F 4DO 0.5

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Peripheral supply (24 VDC)
The supply to the outputs is galvanically isolated from the module supply.
- ▶ "0" signal (0 V) at the output:
 - Output is high impedance
 - No current to the load
- ▶ "1" signal (+24 V) at the output:
 - Output is low impedance
 - Current is supplied to the load
- ▶ Outputs
 - The outputs can be loaded with capacitance of up to 1 μ F without triggering an error reaction on shutdown.
 - Connecting higher capacitive loads will lead to an error (I/O-Group STOP).
 - The head module signals the output status to the CPU on the controlling PSS via SafetyBUS p.

Output test

Perform the output test for outputs (standard configuration, see PSS WIN-PRO system software):

- ▶ Outputs that are switched on are regularly switched off in order to check that the output circuitry can be switched.
 - Test pulses for outputs that are switched on: < 300 μ s
 - Outputs that are switched on are switched off for this length of time, depending on the load and cable runs. The load must not switch off because of the test.
 - ▶ Outputs that are switched off are regularly switched on in order to test the monitoring circuit (see section entitled "Timing diagram"). The load must not switch on because of the test.
- Excluding individual outputs from the output test:
- ▶ If a plant is particularly sensitive to the test pulses on the output test, individual outputs may be excluded from the output test.

- ▶ Testing an output when the output test is switched off:

- The correct switch status is checked
- An output's ability to switch cannot be detected until the next time the output is switched on/off.

Testing for shorts

- ▶ A test is regularly carried out to check for shorts between the outputs.
- ▶ Test repetition rate: < 300ms (single fault safety)

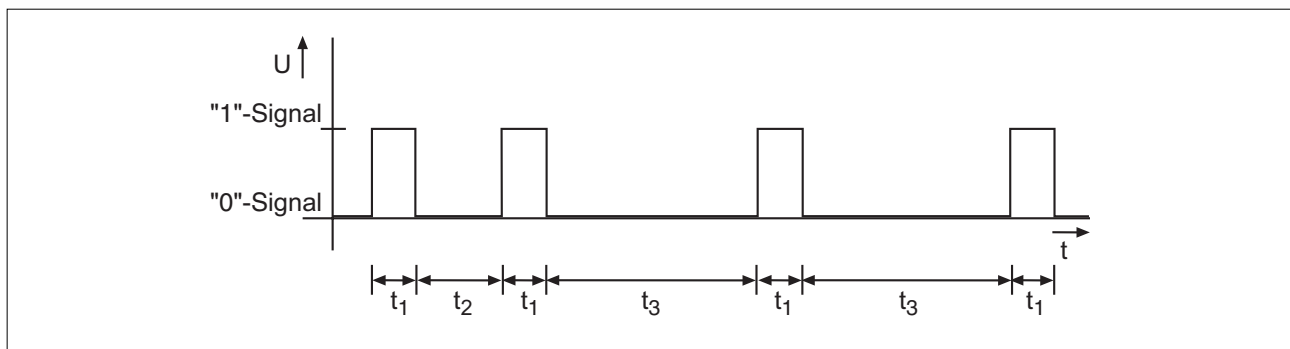
Testing the second shutdown route

The common second shutdown route for the outputs is tested as part of each cycle.

Function test during commissioning

During commissioning, an error must be simulated for each safety-related positive-switching output, i.e. the required error reaction must occur when an output has a short circuit to 24 V.

Timing diagram



t_1 : Pulse duration on power-up test (< 300 μ s)

t_2 : Repetition period

t_3 : Scan time for power-up test with a capacitive load (ca. 2 min.)

Digital input/output PSSu E F 4DO 0.5

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err)
 - An output's FS enable
 - Output status
 (see table below)
- ▶ SafetyBUS p error reaction:
If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

System configuration for SafetyBUS p

The system is configured using Pilz configuration software.

Addressing the inputs

The inputs are addressed using PSS WIN-PRO system software.

Wiring

- ▶ If short circuits occur between the cable from the output to the load and a 24 VDC supply line, (supply/periphery supply), it will no longer be possible to switch off the load. Possible remedies:
 - Use separate multicore cable for the 24 VDC
 - Use dual actuators
 - Use an additional shutdown device such as a main contactor
- ▶ Appropriate wiring should be used to exclude short circuits in the external wiring between the different outputs!

- ▶ With single-channel operation for applications up to **Category 3** in accordance with EN 954-1, 03/97: use a feedback loop!
- ▶ With single-channel operation for **Category 4** applications in accordance with EN 954-1, 03/97: connect two actuators connected in series within the load circuit to two different outputs!
- ▶ Actuators may be connected using unscreened cables.
- ▶ When switching inductive loads, suppression should not be used to protect the semiconductor outputs. If suppression cannot be avoided (e.g. on contactors with integral suppression), errors may occur, particularly with RC elements, depending on their capacitive share. The SafetyBUS p I/O-Group will switch to a safe condition.

Electronic module	LED	LED status	Key
	Err / FS1	Off	Module is operating without error, No FS enable for output O1
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
		Flashing yellow Lights yellow	<see "FS1">
	FS0	Off	No FS enable for O0
		Lights yellow	FS enable for O0
		Flashing yellow	Error in FL at O0
	FS1	Off	No FS enable for O1
		Lights yellow	FS enable for O1
		Flashing yellow	Error in FL at O1
	FS2	Off	No FS enable for O2
		Lights yellow	FS enable for O2
		Flashing yellow	Error in FL at O2
	FS3	Off	No FS enable for O3
		Lights yellow	FS enable for O3
		Flashing yellow	Error in FL at O3
	11	Off	O0 = 0 signal (0 V)
		Lights green	O0 = 1 signal (min. 10 V)
	14	Off	O1 = 0 signal (0 V)
		Lights green	O1 = 1 signal (min. 10 V)
	21	Off	O2 = 0 signal (0 V)
		Lights green	O2 = 1 signal (min. 10 V)
	24	Off	O3 = 0 signal (0 V)
		Lights green	O3 = 1 signal (min. 10 V)

Digital input/output PSSu E F 4DO 0.5

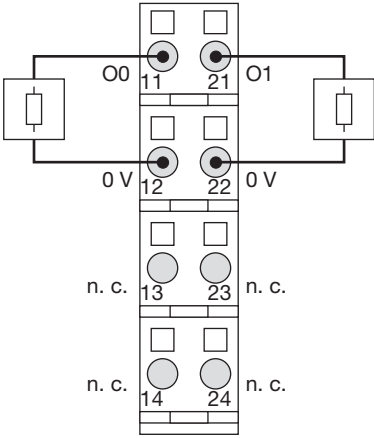
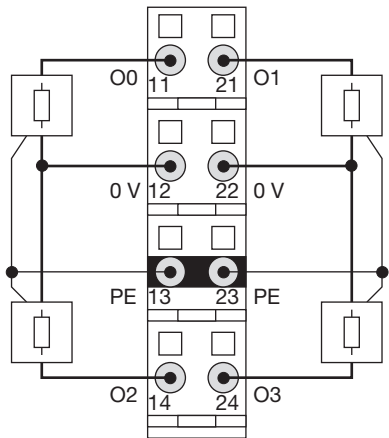
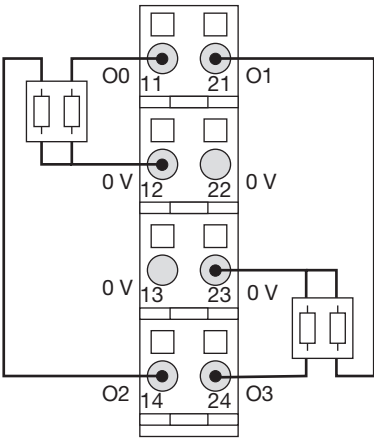
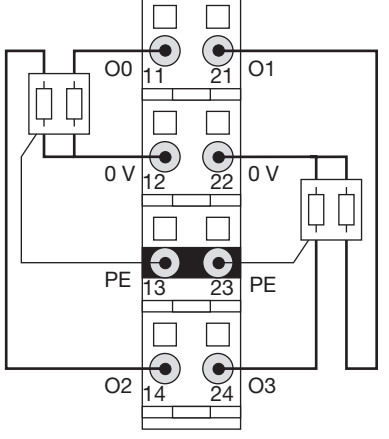
Base modules

► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S Cage clamp terminals: PSSu BP 1/8C	Without C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: 0 V Periphery supply (13-23 linked internally) 14: O2 Input 3, single-pole 24: O3 Input 4, single-pole	
Screw terminals: PSSu BP-C 1/8S Cage clamp terminals: PSSu BP-C 1/8C	With C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: C-rail supply (13-23 linked internally) 14: O2 Input 3, single-pole 24: O3 Input 4, single-pole	

Digital input/output PSSu E F 4DO 0.5

► Connection

Output circuit	Without C-rail PSSu BP 1/8S PSSu BP 1/8C	With C-rail PSSu BP-C 1/8S PSSu BP-C 1/8C
► Resistive load/capacitive load ► Single-channel actuator		
► Resistive load/capacitive load ► Dual-channel actuator		

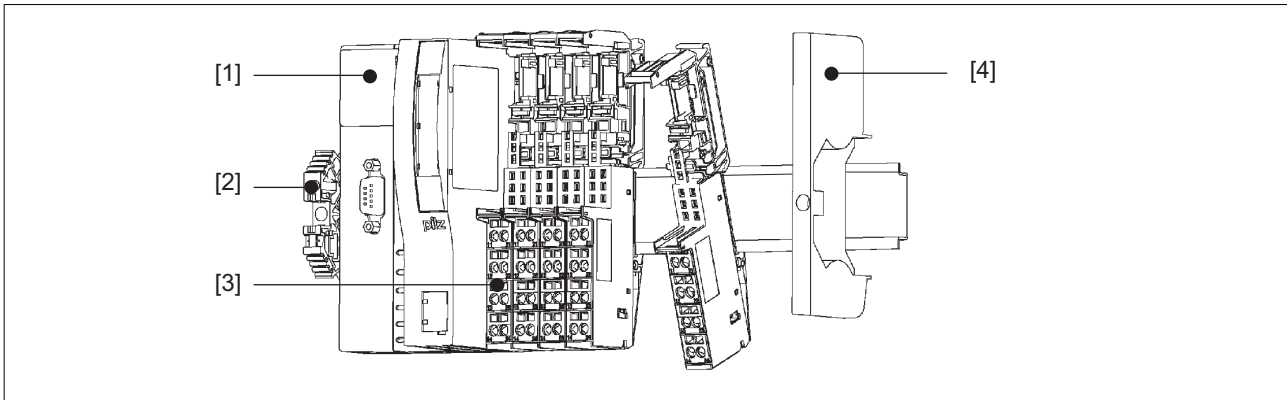
Digital input/output PSSu E F 4DO 0.5

Output circuit	Without C-rail PSSu BP 1/8S PSSu BP 1/8C	With C-rail PSSu BP-C 1/8S PSSu BP-C 1/8C
► Capacitive load ► Feedback loop (FL) To form a feedback loop you will need an input module with test pulses (see PSSu E F 4DI)		

Digital input/output PSSu E F 4DO 0.5

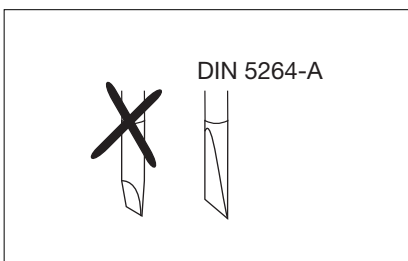
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers with this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].

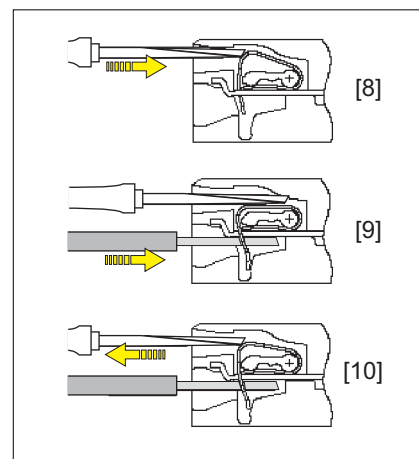
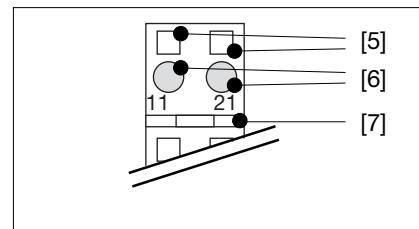


Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)
- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal [5].



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]



Digital input/output PSSu E F 4DO 0.5

Inserting an electronic module

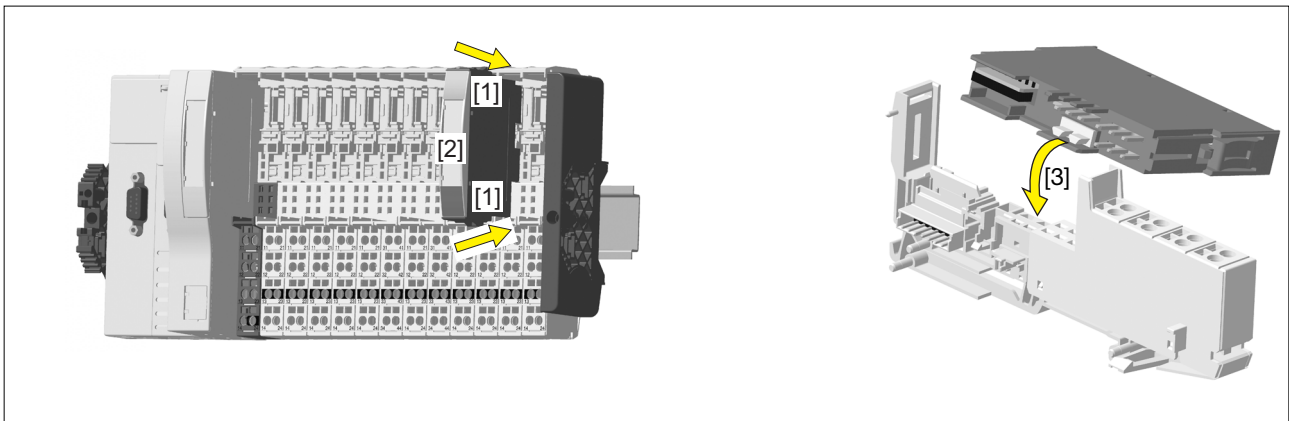
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

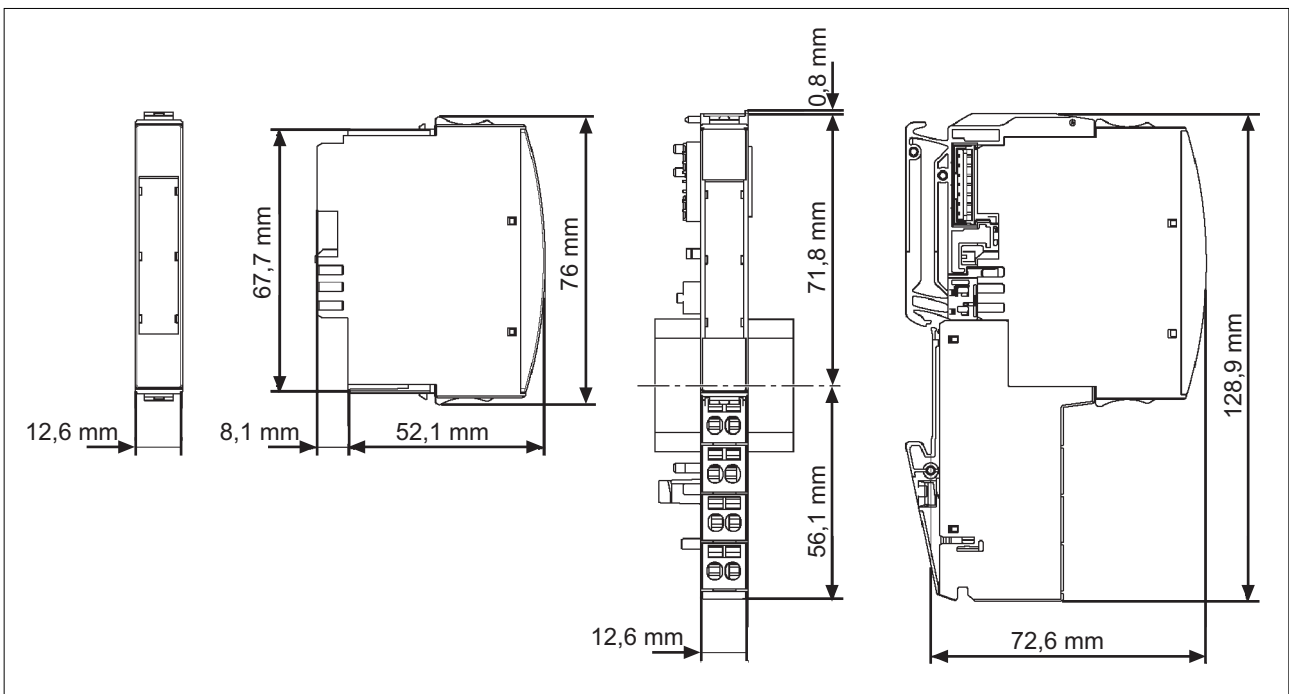
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

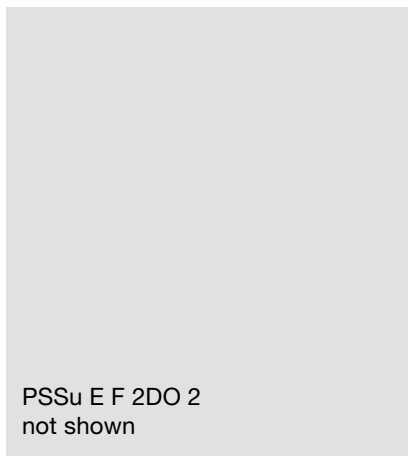
Digital input/output PSSu E F 4DO 0.5

Technical details		PSSu E F 4DO 0.5
Function	Compact programmable safety system for decentralised applications	
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98	
Electrical data		
Supply voltage	From module supply: 5 VDC	
Current consumption	From module supply: ≤ 75 mA	
SafetyBUS p		
Connection	Via SafetyBUS p-compatible head module	
Outputs – single-pole		
Number	4	
Potential isolation	Yes (optocoupler)	
Output current at “1”	0.5 A	
Permitted range	0 ... 0.75 A	
Short circuit protection	Electronic	
Residual current at “0” signal	0 mA	
Signal level at “0”	0 VDC	
Signal level at “1”	U _B -0.2 VDC at 0.5 A	
On time during self test	< 300 µs	
Off time during self test	< 300 µs	
Status indicator	LED	
Mechanical data		
Weight		
Electronic module	< 40 g	
Base module with cage clamp terminals	40 g	
Base module with screw terminals	50 g	
Mechanical coding	Yellow, E	
Plug in/out cycles		
Electronic module	Max. 20	
Base module	Max. 20	
Max. cross section of external conductors with screw terminals		
Flexible with crimp connectors	0.5 ... 1.5 mm²	
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm²	
Max. cross section of external conductors with cage clamp terminals		
Flexible with crimp connectors	0.5 ... 1.5 mm²	
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm²	
Torque setting with screw terminals	0.8 Nm	

Digital input/output PSSu E F 4DO 0.5

Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock EN 60068-2-27, 03/93 EN 60068-2-29, 04/93	15g, 11 ms 10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02
Order reference for accessories	
Description	Order no.
PSSu E F 4DO 0.5 (Electronic module)	312 210
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 with screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Digital input/output PSSu E F 2DO 2



Electronic module to output 24 VDC digital output signals. Suitable for safety-related functions.

Approvals

	PSSu E F 2DO2
	In progress

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ 2 single-pole digital outputs
 - Positive-switching
 - Current load capacity per output: max. 2 A
 - Short circuit-proof
 - Overload-proof
 - Free from feedback
- ▶ LED indicators for:
 - Switch status of each output
 - Module error
- ▶ Communication via
 - SafetyBUS p
 - Standard bus system with local enable principle
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference"

Safety features

The module meets the following safety requirements:

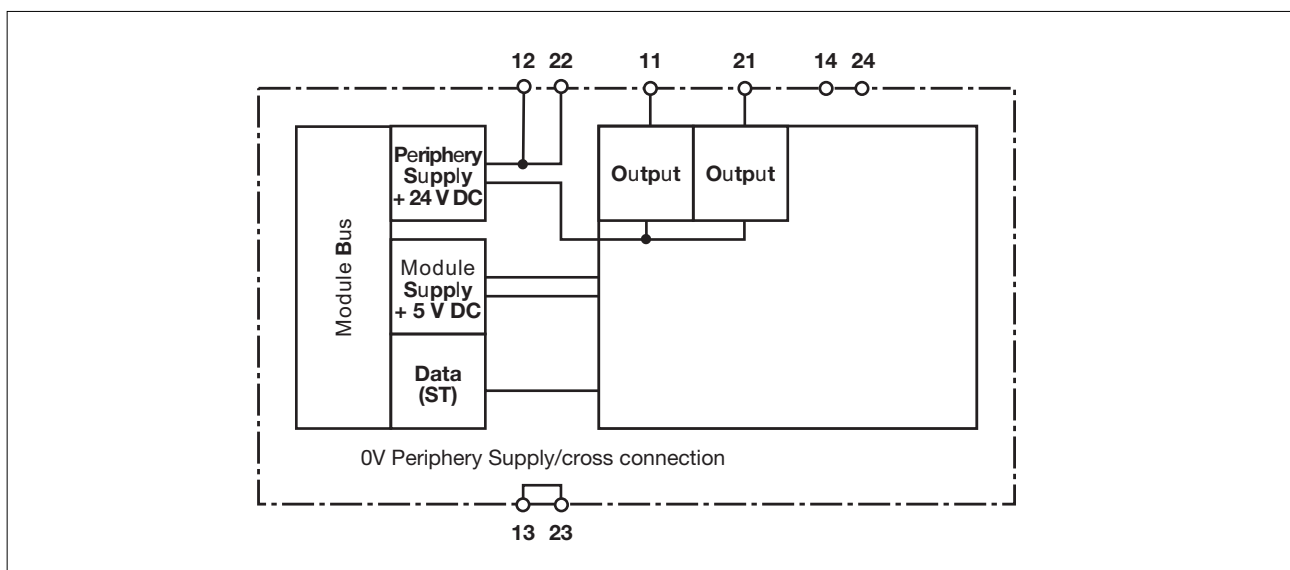
- ▶ Common second shutdown route
 - Outputs have a diverse structure
 - Second shutdown route is regularly tested
- ▶ Cyclical output test
- ▶ Regular check for shorts between the outputs
- ▶ Protection against over-temperature
- ▶ Diagnostic capabilities

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides outputs in accordance with IEC 61131-2. The module may be used to switch

- ▶ Resistive loads with max. 2 A per output
- ▶ Inductive loads with max. 2 A per output

Block diagram



Digital input/output PSSu E F 2DO 2

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Peripheral supply (24 VDC)
The supply to the outputs is galvanically isolated from the module supply.
- ▶ "0" signal (0 V) at the output:
 - Output is high impedance
 - No current to the load
- ▶ "1" signal (+24 V) at the output:
 - Output is low impedance
 - Current is supplied to the load
- ▶ Outputs
 - The outputs can be loaded with capacitance of up to 1 μ F without triggering an error reaction on shutdown.
 - Connecting higher capacitive loads will lead to an error (I/O-Group STOP).
 - The head module signals the output status to the CPU on the controlling PSS via SafetyBUS p.

Output test

Perform the output test for outputs (standard configuration, see PSS WIN-PRO system software):

- ▶ Outputs that are switched on are regularly switched off in order to check that the output circuitry can be switched.
 - Test pulses for outputs that are switched on: < 300 μ s
 - Outputs that are switched on are switched off for this length of time, depending on the load and cable runs. The load must not switch off because of the test.
 - ▶ Outputs that are switched off are regularly switched on in order to test the monitoring circuit (see section entitled "Timing diagram"). The load must not switch on because of the test.
- Excluding individual outputs from the output test:
- ▶ If a plant is particularly sensitive to the test pulses on the output test, individual outputs may be excluded from the output test.

- ▶ Testing an output when the output test is switched off:

- The correct switch status is checked.
- An output's ability to switch cannot be detected until the next time the output is switched on/off.

Testing for shorts

- ▶ A test is regularly carried out to check for shorts between the outputs.
- ▶ Test repetition rate: < 300ms (single fault safety)

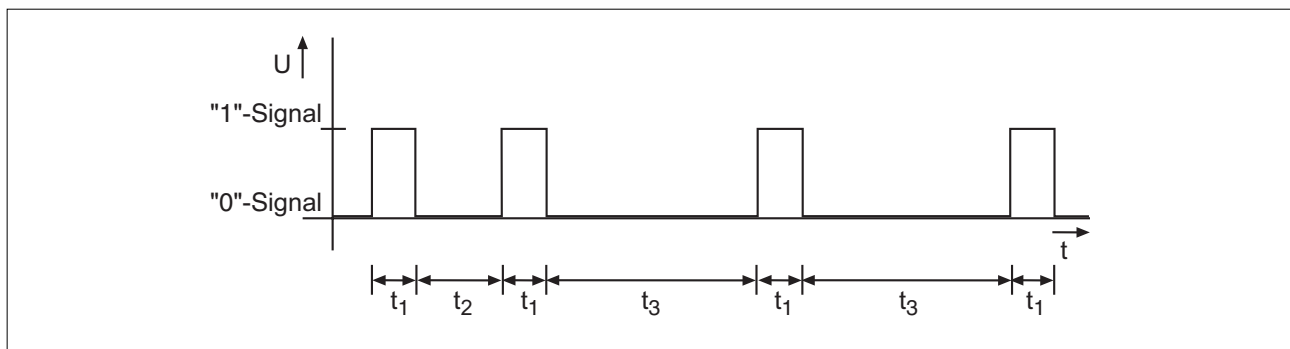
Testing the second shutdown route

The common second shutdown route for the outputs is tested as part of each cycle.

Function test during commissioning

During commissioning, an error must be simulated for each safety-related positive-switching output, i.e. the required error reaction must occur when an output has a short circuit to 24 V.

Timing diagram



t_1 : Pulse duration on power-up test (< 300 μ s)

t_2 : Repetition period

t_3 : Scan time for power-up test with a capacitive load (ca. 2 min.)

Digital input/output PSSu E F 2DO 2

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err/FS1)
 - An output's FS enable
 - Output status
 (see table below)
- ▶ SafetyBUS p error reaction:
If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

System configuration for SafetyBUS p

The system is configured using Pilz configuration software.

Addressing the outputs

The outputs are addressed using PSS WIN-PRO system software or through communication via the local enable principle.

Wiring

- ▶ If short circuits occur between the cable from the output to the load and a 24 VDC supply line (supply/periphery supply), it will no longer be possible to switch off the load. Possible remedies:
 - Use separate multicore cable for the 24 VDC
 - Use dual actuators
 - Use an additional shutdown device such as a main contactor
- ▶ Appropriate wiring should be used to exclude short circuits in the external wiring between the different outputs!

- ▶ With single-channel operation for applications up to **Category 3** in accordance with EN 954-1, 03/97: use a feedback loop!
- ▶ With single-channel operation for **Category 4** applications in accordance with EN 954-1, 03/97: connect two actuators connected in series within the load circuit to two different outputs!
- ▶ Actuators may be connected using unscreened cables.
- ▶ When switching inductive loads, suppression should not be used to protect the semiconductor outputs. If suppression cannot be avoided (e.g. on contactors with integral suppression), errors may occur, particularly with RC elements, depending on their capacitive share. The SafetyBUS p I/O-Group will switch to a safe condition.

Electronic module	LED	LED status	Key
	Err / FS1	Off	Module is operating without error, No FS enable for output O1
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
		Flashing yellow	<see "FS1">
		Lights yellow	
	FS0	Off	No FS enable for O0
		Lights yellow	FS enable for O0
		Flashing yellow	Error in FL at O0
	FS1	Off	No FS enable for O1
		Lights yellow	FS enable for O1
		Flashing yellow	Error in FL at O1
	11	Off	O0 = 0 signal (0 V)
		Lights green	O0 = 1 signal (min. 10 V)
	14	Off	O1 = 0 signal (0 V)
		Lights green	O1 = 1 signal (min. 10 V)

Digital input/output PSSu E F 2DO 2

Base modules

► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S Cage clamp terminals: PSSu BP 1/8C	Without C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13: Not assigned 23: Not assigned 14: Not assigned 24: Not assigned	
Screw terminals: PSSu BP-C 1/8S Cage clamp terminals: PSSu BP-C 1/8C	With C-rail: 11: O0 Output 1, single-pole 21: O1 Output 2, single-pole 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: C-rail supply (13-23 linked internally) 14: Not assigned 24: not connected	

Digital input/output PSSu E F 2DO 2

► Connection

Output circuit	Without C-rail PSSu BP 1/8S PSSu BP 1/8C	With C-rail PSSu BP-C 1/8S PSSu BP-C 1/8C
► Resistive load/capacitive load ► Single-channel actuator		
► Resistive load/capacitive load ► Dual-channel actuator		

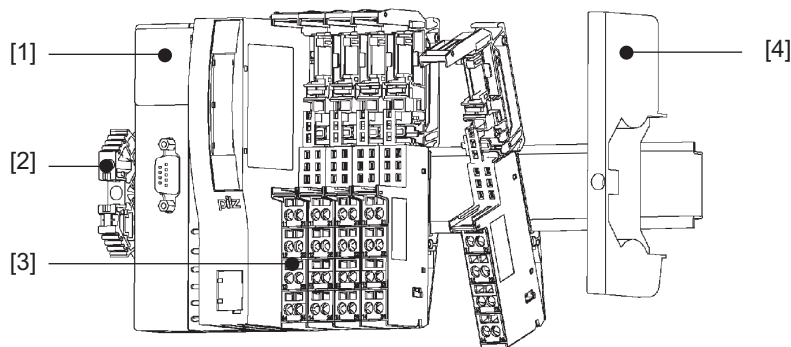
Digital input/output PSSu E F 2DO 2

Output circuit	Without C-rail PSSu BP 1/8S PSSu BP 1/8C	With C-rail PSSu BP-C 1/8S PSSu BP-C 1/8C
► Capacitive load ► Feedback loop (FL) To form a feedback loop you will need an input module with test pulses (see PSSu E F 4DI)		

Digital input/output PSSu E F 2DO 2

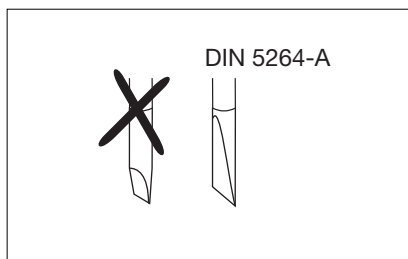
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].

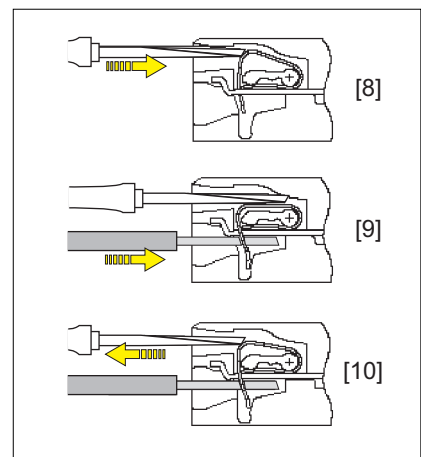
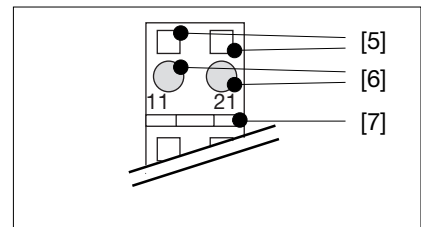


Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)
- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal [5].



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]



Digital input/output PSSu E F 2DO 2

Inserting an electronic module

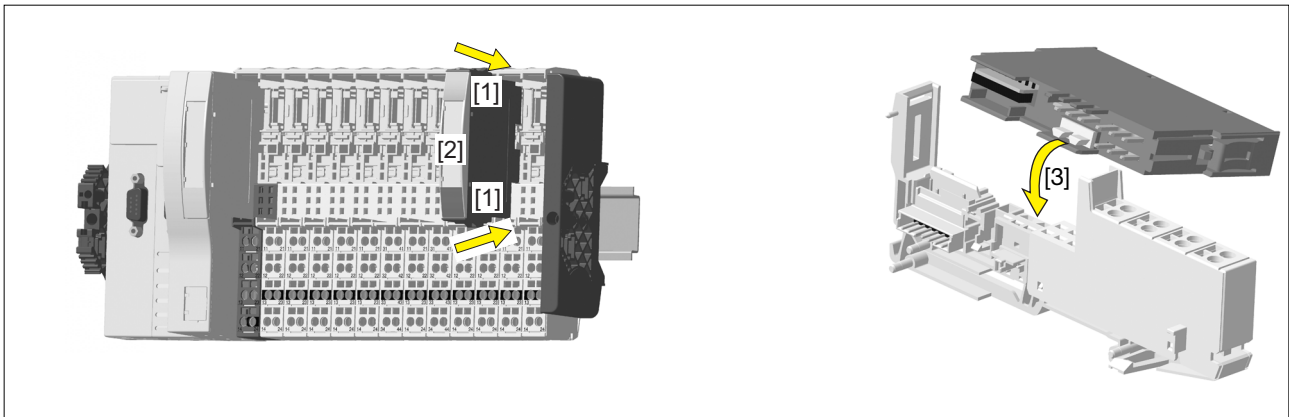
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

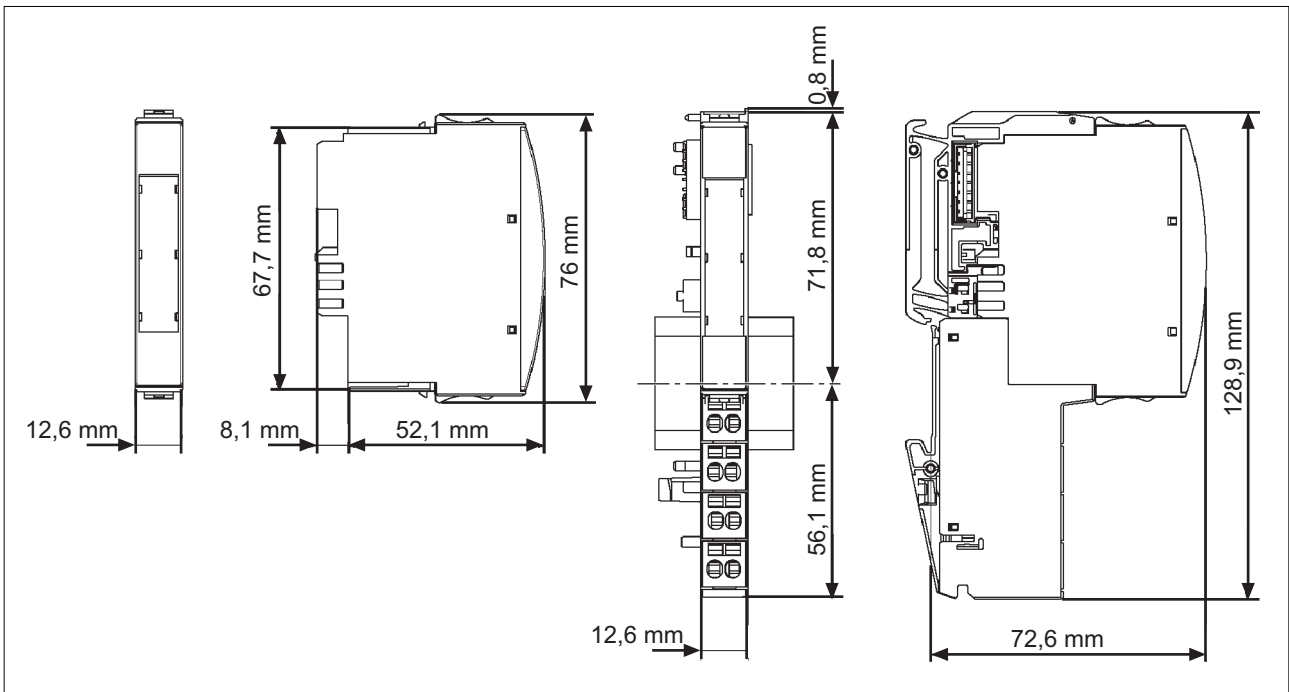
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

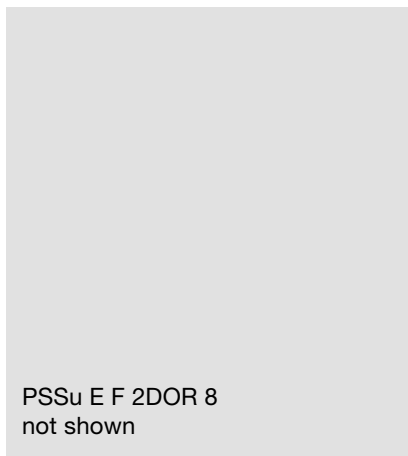
Digital input/output PSSu E F 2DO 2

Technical details	PSSu E F 2DO 2
Function	Compact programmable safety system for decentralised applications
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data	
Supply voltage	From module supply: 5 VDC
Current consumption	From module supply: ≤ 55 mA
SafetyBUS p	
Connection	Via SafetyBUS p-compatible head module
Outputs – single-pole	
Number	2
Potential isolation	Yes (optocoupler)
Output current at “1”	2 A
Permitted range	0 ... 2.5 A
Short circuit protection	Electronic
Residual current at “0” signal	0 mA
Signal level at “0”	0 VDC
Signal level at “1”	U _B -0.2 VDC at 2 A
On time during self test	< 300 µs
Off time during self test	< 300 µs
Status indicator	LED
Mechanical data	
Weight	
Electronic module	< 40 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Yellow, F
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm

Digital input/output PSSu E F 2DO 2

Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock EN 60068-2-27, 03/93 EN 60068-2-29, 04/93	15g, 11 ms 10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02
Order reference	
Description	Order no.
PSSu E F 2DO 2 (Electronic module)	312 215
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 with screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
Order reference for accessories	Order no.
Description	
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Digital input/output PSSu E F 2DOR 8



Electronic module with relay output circuits and positive-guided contacts. Suitable for safety-related functions.

Approvals

	PSSu E F 2DOR 8
	In progress

Module features

- ▶ Housing width: 25.2 mm (2 x grid width)
- ▶ 2 isolated N/O contacts (relay contacts)
 - Current load capacity per output: max. 8 A
- ▶ LED indicators for:
 - Switch status of each output
 - Module error
- ▶ Communication via
 - SafetyBUS p
 - Standard bus system with local enable principle
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference"

Module description

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides outputs in accordance with IEC 61131-2. If one relay contact is used on its own, it will meet Category 2 in accordance with EN 954-1. If both relay contacts are connected in series, they will meet Category 4 in accordance with EN 954-1.

The module may be used to switch

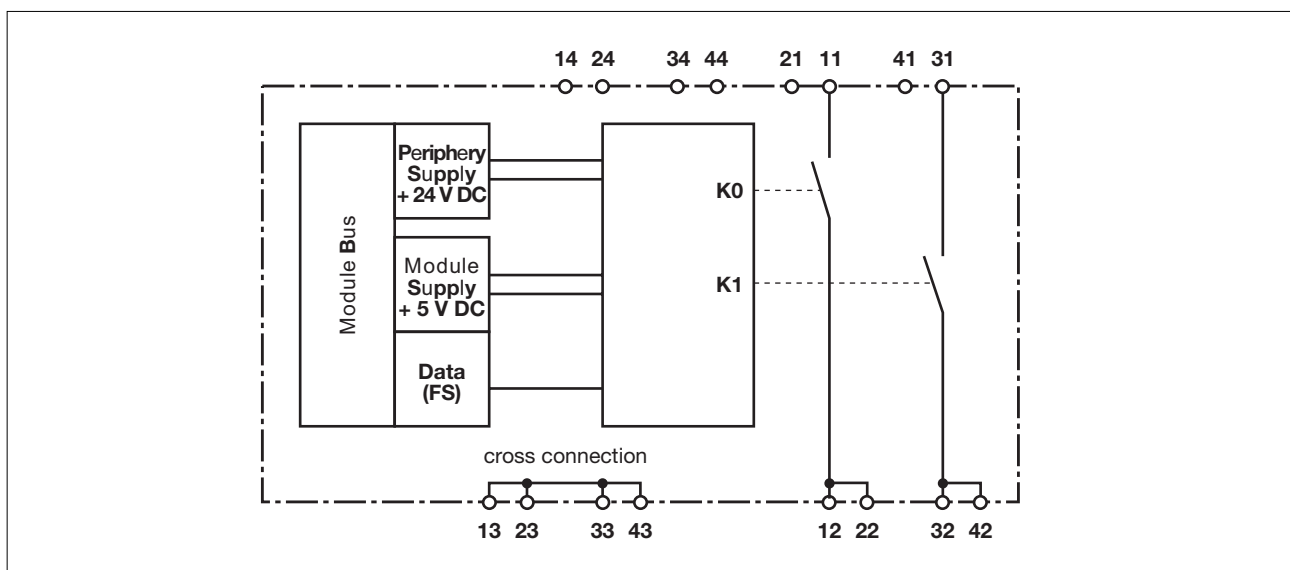
- ▶ Resistive and inductive loads with max. 8 A per output
- ▶ Max. inrush current: 30 A for max. 20 ms
- ▶ Switching capability see technical details

Safety features

The module meets the following safety requirements:

- ▶ 1 positive-guided relay contact per output
- ▶ Safe isolation between both relay contacts with 5.5 mm/6KV
- ▶ Safe isolation between both relay contacts and the 24 V periphery supply in accordance with DIN VDE 0110 overvoltage category 2 in a protected industrial network
- ▶ Protection against over-temperature

Block diagram

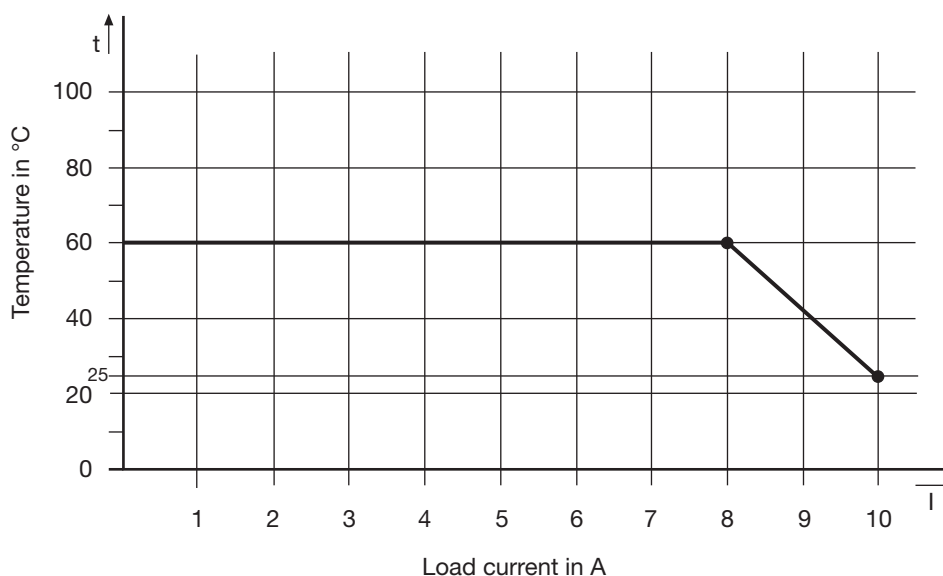


Digital input/output PSSu E F 2DOR 8

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Periphery supply (24 VDC)
The supply to the outputs is galvanically isolated from the module supply.
- ▶ Resistive loads
see technical details
- ▶ Inductive loads
see technical details
- ▶ The relationship between the switchable load current and the operating temperature is illustrated in the derating curve below (see graph). The operating point should be on or below the characteristic curve.

Derating curve



Digital input/output PSSu E F 2DOR 8

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err)
 - An output's FS enable
 - Output status (see table below)
- ▶ SafetyBUS p error reaction:
If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

System configuration

The system is configured using Pilz configuration software.

Addressing the outputs

The outputs are addressed using Pilz PSS WIN-PRO system software.

Wiring

- ▶ If short circuits occur between the cable from the output to the load and a 24 VDC supply line (supply/periphery supply), it will no longer be possible to switch off the load. Possible remedies:
 - Use separate multicore cable for the 24 VDC
 - Use dual actuators
 - Use an additional shutdown device such as a main contactor
- ▶ Appropriate wiring should be used to exclude short circuits in the external wiring between the different outputs!
- ▶ With single-channel operation for applications up to **Category 3** in accordance with EN 954-1: use a feedback loop!
- ▶ With single-channel operation for **Category 4** applications in accordance with EN 954-1: connect two actuators connected in series to two different outputs!

- ▶ Actuators may be connected using unscreened cables.

NOTICE

- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- ▶ Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads

Electronic module	LED	LED status	Key
	Err	Off	Module is operating without error
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	FS0	Off	No FS enable for O0
		Lights yellow	FS enable for O0
		Flashing yellow	Error in FL at O0
	FS1	Off	No FS enable for O1
		Lights yellow	FS enable for O1
		Flashing yellow	Error in FL at O1
	11	Lights green	O0 = Contact 11-12/22 closed
		Off	O0 = Contact 11-12/22 closed
	31	Lights green	O1 = Contact 31-32/42 closed
		Off	O1 = Contact 31-32/42 open

Digital input/output PSSu E F 2DOR 8

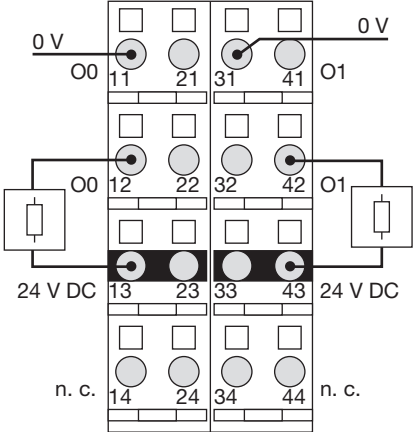
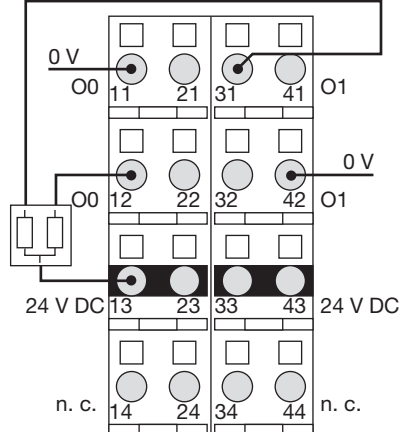
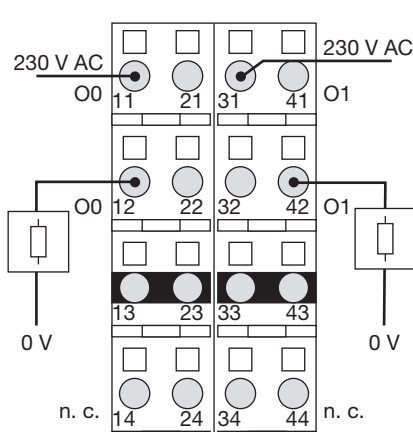
Base modules

► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP-C 2/16S Cage clamp terminals: PSSu BP-C 2/16C	With C-rail: 11: O0 Output 1 Relay contact 1 21: Not assigned 12-22: O0 Output 1, Relay contact 2 13-23-33-43: C-rail supply (13-23-33-43 linked internally) 14: Not assigned 24: Not assigned 31: O1 Output 2 Relay contact 1 41: Not assigned 32-42: O1 Output 2, Relay contact 2 34: Not assigned 44: Not assigned	

Digital input/output PSSu E F 2DOR 8

► Connection

Output circuit	Without C-rail PSSu BP 2/16S PSSu BP 2/16C	With C-rail PSSu BP-C 2/16S PSSu BP-C 2/16C
► Resistive/capacitive/inductive load ► Single-channel actuator ► Switches 24 VDC (fed via C-rail)	/	
► Resistive/capacitive/inductive load ► Dual-channel actuator ► Switches 24 VDC (fed via C-rail)	/	
► Resistive/capacitive/inductive load ► Switches 230 VAC	/	

Digital input/output PSSu E F 2DOR 8

Output circuit	Without C-rail PSSu BP 8S PSSu BP 8C	With C-rail PSSu BP-C 2/16S PSSu BP-C 2/16C
► Capacitive load with feedback loop (FL) ► Single-channel actuator ► Switches 24 VDC (fed via C-rail) To form a feedback loop you will need an input module with test pulses (see PSSu E F 4DI)		PSSu E F 2DOR 8 PSSu E F 4DI

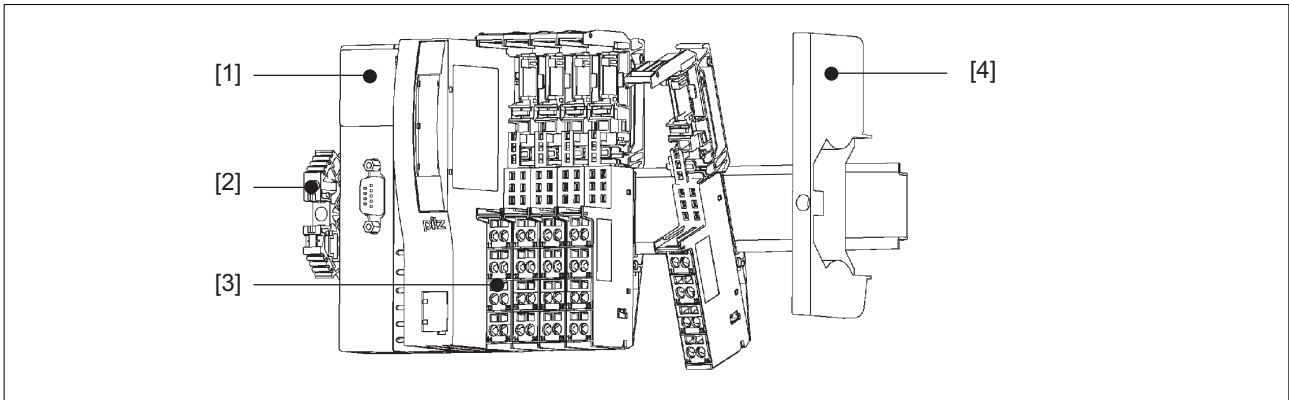
Digital input/output PSSu E F 2DOR 8

Output circuit	Without C-rail PSSu BP 8S PSSu BP 8C	With C-rail PSSu BP-C 2/16S PSSu BP-C 2/16C
▶ Capacitive load with feedback loop (FL) ▶ Dual-channel actuator ▶ Switches 24 VDC (fed via C-rail) To form a feedback loop you will need an input module with test pulses (see PSSu E F 4DI)		PSSu E F 2DOR 8 PSSu E F 4DI

Digital input/output PSSu E F 2DOR 8

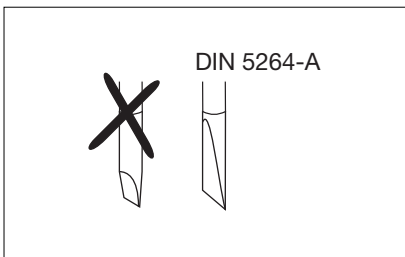
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



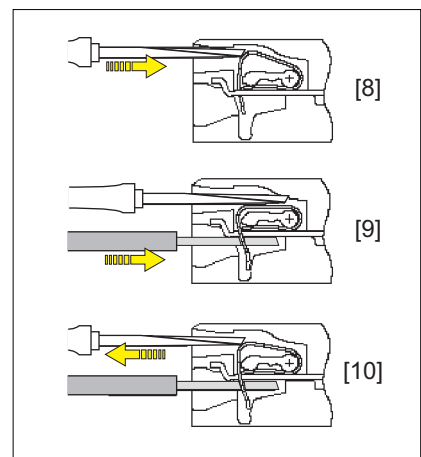
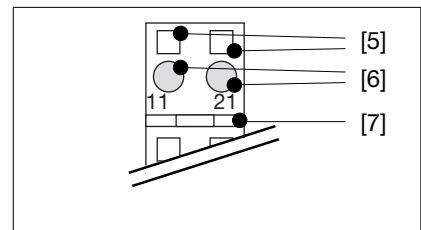
Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal [5].



Digital input/output PSSu E F 2DOR 8

Inserting an electronic module

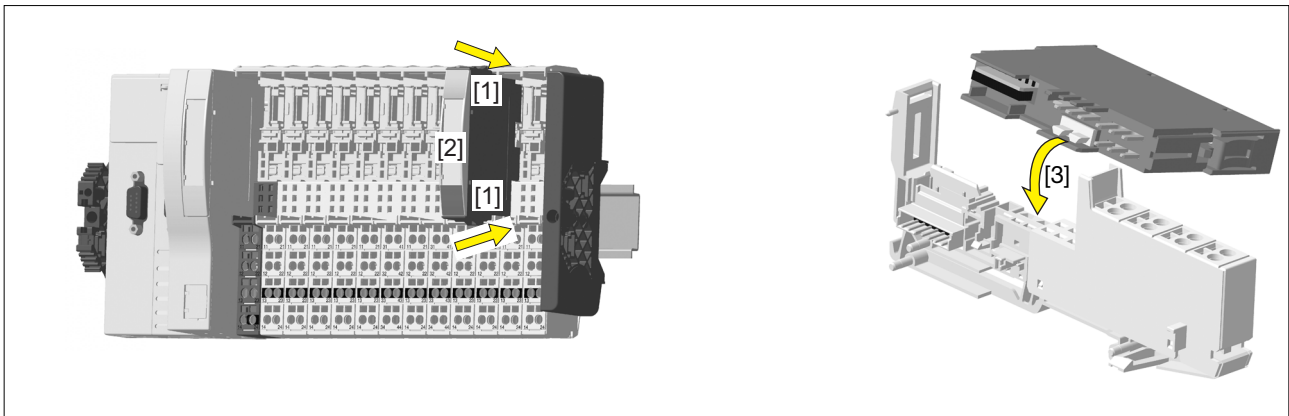
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

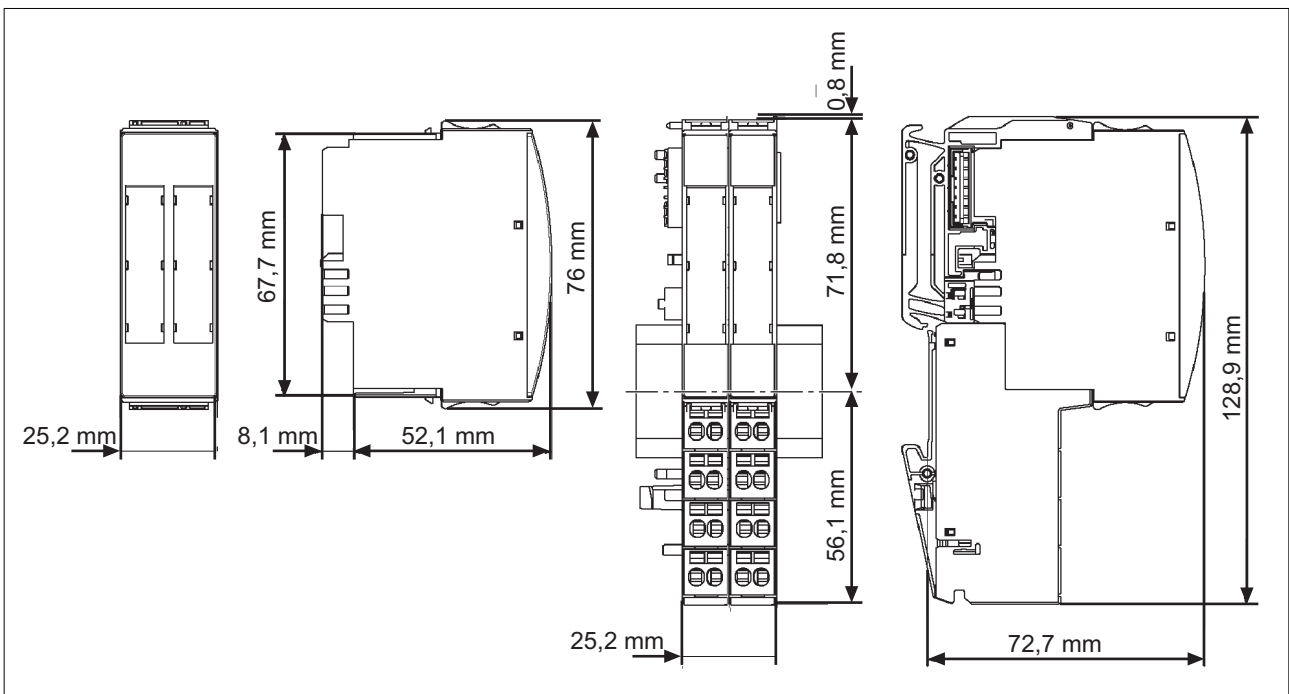
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Digital input/output PSSu E F 2DOR 8

Technical details	PSSu E F 2DOR 8
Function	Compact programmable safety system for decentralised applications
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data	
Supply voltage	From module supply: 5 VDC
Current consumption	From module supply: 70 mA
SafetyBUS p	
Connection	Via SafetyBUS p-compatible head module
Outputs – single-pole	
Output contacts	2 safety contacts, N/O, AgCuNi + 0.2 µm gold plated
Potential isolation	Yes (optocoupler)
Switching capability in accordance with EN 60947-4-1, 07/92 (cos φ = 1 or with spark suppression)	AC1: 250 V/0.01 ... 8 A/max. 2000 VA DC1: 24 V/0.01 ... 8 A/max 192 W DC1: 250 V/0.01 ... 0.3 A/max. 75 W AC15: 230 V/3 A AC15/B300: 120 V/3 A; 240 V/1.5 A DC13: 24 V/5.0 A (at 0.1 operations/s) DC13: 24 V/1.5 A (at 1 operations/s) DC13/R300: 125 V/0.22 A; 250 V/0.1 A
EN 60947-5-1, 07/92	
Reaction time (excl. program run time)	10 ... 25 ms
Release time (excl. program run time)	8 ... 15 ms
Switching frequency with no load	Max. 1200 per min.
Switching frequency at max. current	Max. 15 per min.
Mechanical life	ca. 10 ⁷ operations
Electrical life	10 ⁵ operations (at 4 A/230 V/cos φ = 1)
Contact resistance (when new)	< 50 mOhm
Status indicator	One LED per output
Total load capacity at +60 °C	2 x 8 A per module
Permitted range at + 20 °C to + 60 °C (see derating curve)	8 A ... 10 A
Contact fuse protection on external blow-out fuse	10 A quick/6 A slow

Digital input/output PSSu E F 2DOR 8

Mechanical data	
Weight	
Electronic module	90 g
Base module with cage clamp terminals	40 g
Base module with screw terminals	50 g
Mechanical coding	Yellow, H
Plug in/out cycles	
Electronic module	Max. 20
Base module	Max. 20
Max. cross section of external conductors with screw terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²
Max. cross section of external conductors with cage clamp terminals	
Flexible with crimp connectors	0.5 ... 1.5 mm ²
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²
Torque setting with screw terminals	0.8 Nm
Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock	
EN 60068-2-27, 03/93	15g, 11 ms
EN 60068-2-29, 04/93	10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Digital input/output PSSu E F 2DOR 8

Order reference	
Description	Order no.
PSSu E F 2DOR 8 (Electronic module)	312 225
PSSu BP-C 2/16S (Base module with C-rail with screw terminals)	312 630
PSSu BP-C 2/16C (Base module with C-rail with cage clamp terminals)	312 631
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Digital input/output PSSu E F DI OZ 2

PSSu E F DI OZ 2
not shown

Electronic module to output 24 VDC digital output signals with feedback loop monitoring and test pulses. Suitable for safety-related functions.

Approvals

	PSSu E F DI OZ 2
	In progress

Module features

- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ 1 dual-pole digital output
 - Current load capacity: max. 2 A
 - Switches to 24 V (O+) and 0 V (O-), function is tested
 - Short circuit-proof
 - Overload-proof
 - Free from feedback
- ▶ 1 digital input, preferably used to form a feedback loop (FL)
- ▶ 1 output, with the option to configure it as
 - A test pulse output
 - An output with a constant voltage of + 24 VDC
- ▶ LED indicators for:
 - Switch status of each input/output
 - Module error
- ▶ Communication via
 - SafetyBUS p
 - Standard bus system with local enable principle (outputs only)
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference".

The module meets the requirements of EN IEC 61508 and EN 954-1 Category 4. It provides a dual-pole output plus an input in accordance with IEC 61131-2.

The dual-pole output may be used to switch

- ▶ Resistive loads of max. 2 A
- ▶ Inductive loads with max. 2 A (without suppression)
- ▶ Capacitive loads of max. 2 A
- ▶ E-STOP switches

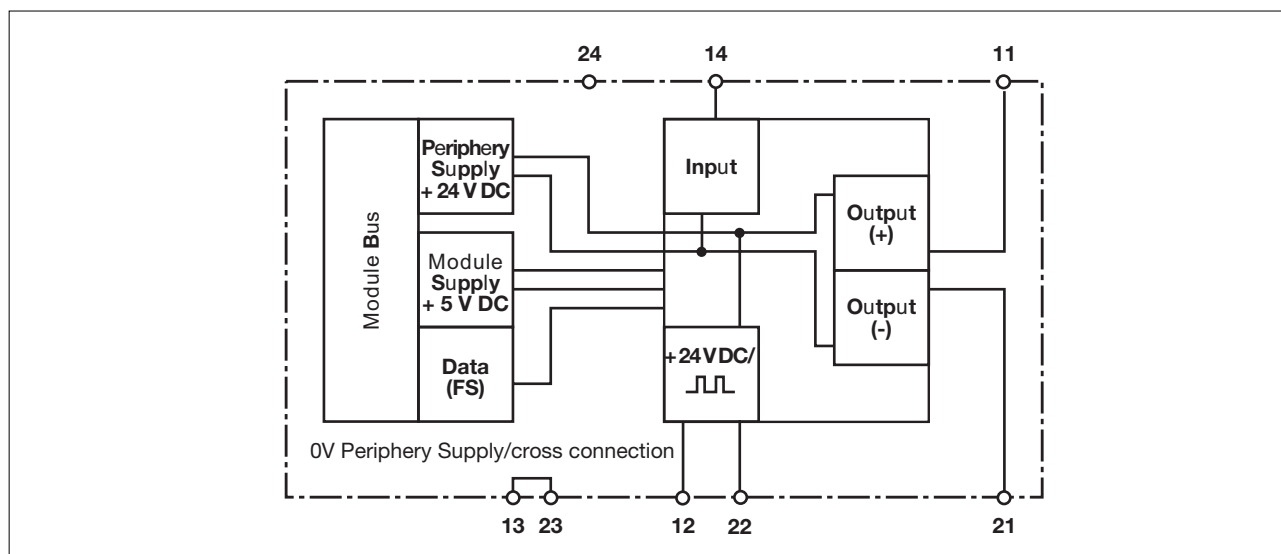
The input may be used as

- ▶ A separate input
- ▶ An FL input for the output load

The test pulse output may be used to supply a test pulse to the input.

Module description

Block diagram



Digital input/output PSSu E F DI OZ 2

Safety features

The module meets the following safety requirements:

- ▶ When the module supply is interrupted, the electronics are buffered for 20 ms, provided the PSSu E F PS1 is used to supply the system.
- ▶ Buffer applies to
 - Input signals
 - Test pulse signals
- ▶ Common second shutdown route
 - Outputs have a diverse structure
 - Second shutdown route is regularly tested
- ▶ Cyclical output test
- ▶ Protection against over-temperature
- ▶ Diagnostic capabilities

Function description

- ▶ Module supply (5 VDC)
The electronics are supplied via the module bus.
- ▶ Periphery supply (24 VDC)
The supply to the outputs is galvanically isolated from the module supply.
- ▶ "0" signal (0 V) at the output:
 - Output is high impedance
 - No current to the load
- ▶ "1" signal (+24 V) at the output:
 - Output is low impedance
 - Current is supplied to the load
- ▶ Output
 - Load detection
 - No current to the load in the off state
 - Galvanically isolated from the internal electronic supply
 - Cannot be used as a single-pole output
 - Open circuit detection (can be configured in the head module)
 - The output can be loaded with capacitance of up to 1 µF without triggering an error reaction on shutdown.

- Connecting higher capacitive loads will lead to an error (SafetyBUS p I/O-Group will STOP).
- ▶ Input
 - Short circuit-proof
 - The input has an input filter.
 - The head module signals the input status to the CPU on the controlling PSS via SafetyBUS p.
- ▶ Test pulse output
 - Test pulses can be switched on/off. Test pulses are switched off in the default setting. A constant + 24 VDC (periphery supply) is emitted when the test pulses are switched off.
 - Properties
 - $U_{\text{Test Pulse}}$ corresponds approximately to $U_{\text{Periphery Supply}}$
 - Short circuit-proof
 - $f_{\text{Test Pulse}}$ ca. 3 Hz

Output test

Perform the output test for outputs (standard configuration, see PSS WIN-PRO system software):

- ▶ Outputs that are switched on are regularly switched off in order to check that the output circuitry can be switched.
 - Test pulses for outputs that are switched on: < 300 µs
 - Outputs that are switched on are switched off for this length of time, depending on the load and cable runs. The load must not switch off because of the test.
- ▶ Outputs that are switched off are regularly switched on in order to test the monitoring circuit (see section entitled "Timing Diagram"). The load must not switch on because of the test.

Excluding individual outputs from the output test:

- ▶ If a plant is particularly sensitive to the test pulses on the output test, individual outputs may be excluded from the output test.
- ▶ Testing an output when the output test is switched off:
 - The correct switch status is checked
 - An output's ability to switch cannot be detected until the next time the output is switched on/off.

Testing for shorts

- ▶ A test is regularly carried out to check for shorts between the outputs.
- ▶ Test repetition rate: < 300ms (single fault safety)

Testing the second shutdown route

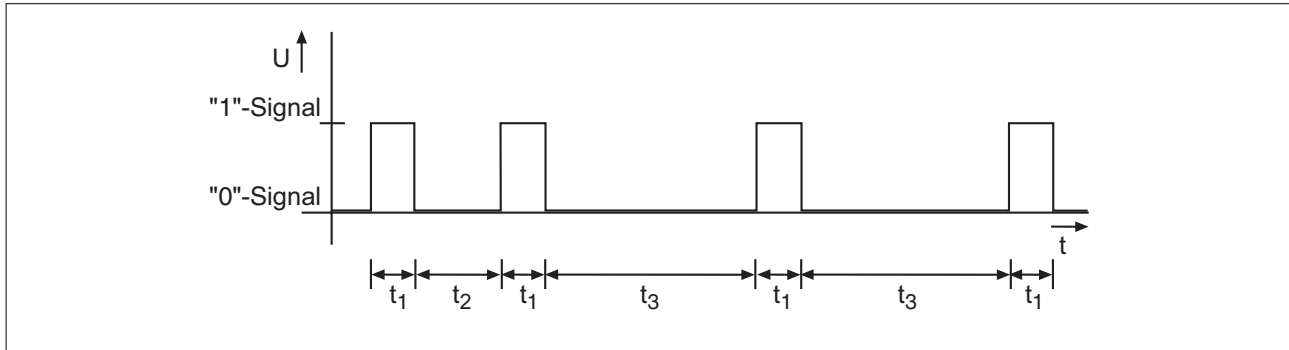
The common second shutdown route for the outputs is tested as part of each cycle.

Function test during commissioning

During commissioning, an error must be simulated for each safety-related positive-switching output, i.e. the required error reaction must occur when an output has a short circuit to 24 V.

Digital input/output PSSu E F DI OZ 2

Timing diagram



t_1 : Pulse duration on power-up test ($< 300 \mu s$)

t_2 : Repetition period

t_3 : Scan time for power-up test with a capacitive load (ca. 2 min.)

Digital input/output PSSu E F DI OZ 2

Module diagnostics

- ▶ The module has various LEDs to display
 - Module errors (Err)
 - An output's FS enable (FS0)
 - Input/output status (see table below)
- ▶ SafetyBUS p error reaction:
If an error occurs, all the outputs in the affected I/O-Group are shut down safely and the I/O-Group switches to a STOP condition. The error is entered in the head module's error buffer.

System configuration for SafetyBUS p

The system is configured using Pilz configuration software.

Addressing the inputs

The inputs are addressed using PSS SW WIN-PRO system software.

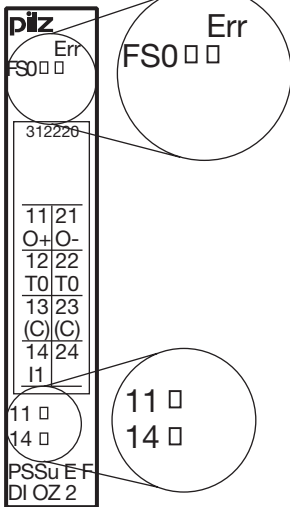
Addressing the output

The output is addressed using PSS WIN-PRO system software or through communication via the local enable principle. Dual-pole outputs are addressed via the address of the positive-switching output (O+).

Wiring

- ▶ If short circuits occur between the cable from the output to the load and a 24 VDC supply line (supply/periphery supply), it will no longer be possible to switch off the load. Possible remedies:
 - Use separate multicore cable for the 24 VDC
 - Use dual actuators
 - Use an additional shutdown device such as a main contactor
- ▶ Appropriate wiring should be used to exclude short circuits in the external wiring between the different outputs!

- ▶ With single-channel operation for applications up to **Category 3** in accordance with EN 954-1: use a feedback loop!
- ▶ With single-channel operation for **Category 4** applications in accordance with EN 954-1: connect two actuators connected in series to two different outputs!
- ▶ Actuators may be connected using unscreened cables.
- ▶ When switching inductive loads, suppression should not be used to protect the semiconductor outputs. If suppression cannot be avoided (e.g. on contactors with integral suppression), errors may occur, particularly with RC elements, depending on their capacitive share. The SafetyBUS p I/O-Group will switch to a safe condition.

Electronic module	LED	LED status	Key
	Err	Off	Module is operating without error
		Lights red	Module error (e.g.: error at the inputs, error in programming mode, communication error)
	FS0	Off	No FS enable for the dual-pole output
		Lights yellow	FS enable for the dual-pole output
		Flashing yellow	Error in FL
	11	Off	(O+)- (O-) is disabled
		Lights green	(O+)- (O-) is enabled
	14	Off	I1 = 0 signal (0 V)
		Lights green	I1 = 1 signal (min. 10 V)

Digital input/output PSSu E F DI OZ 2

Base modules

► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S Cage clamp terminals: PSSu BP 1/8C	Without C-rail: 11: 0+ Dual-pole output Positive-switching 21: 0- Dual-pole output Negative-switching 12-22: T0 Test pulse output 1 or + 24 V output (parameters can be set) (12-22 linked internally) 13: Not assigned 23: Not assigned 14: IO Input 1 24: Not assigned	
Screw terminals: PSSu BP-C 1/8S Cage clamp terminals: PSSu BP-C 1/8C	With C-rail: 11: 0+ Dual-pole output Positive-switching 21: 0- Dual-pole output Negative-switching 12-22: T0 Test pulse output 1 or + 24 V output (parameters can be set) (12-22 linked internally) 13-23: C-rail supply (13-23 linked internally) 14: IO Input 1 24: Not assigned	

Digital input/output PSSu E F DI OZ 2

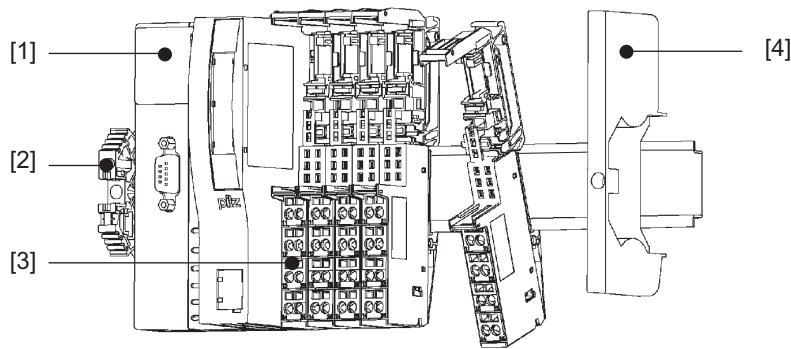
► Connection

Output circuit and input circuit	Without C-rail PSSu BP 1/8S PSSu BP 1/8C	With C-rail PSSu BP-C 1/8S PSSu BP-C 1/8C
Output circuit ► Resistive/capacitive/inductive load ► Single-channel actuator Input circuit ► Single-channel, failsafe input device ► With test pulses (checked)		
Output circuit ► Inductive load ► Single-channel actuator with feedback loop (FL) Input circuit ► Feedback loop for the output circuit ► With test pulses (checked)		

Digital input/output PSSu E F DI OZ 2

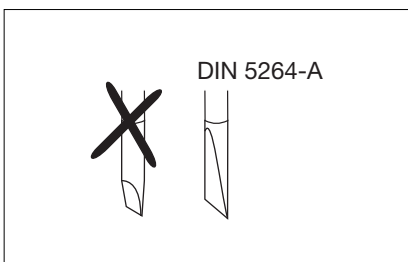
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].



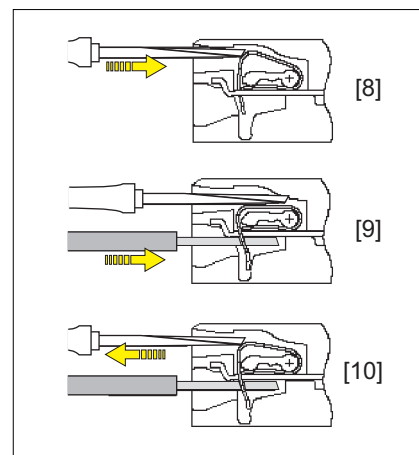
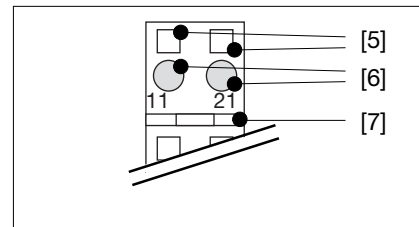
Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal.



Digital input/output PSSu E F DI OZ 2

Inserting an electronic module

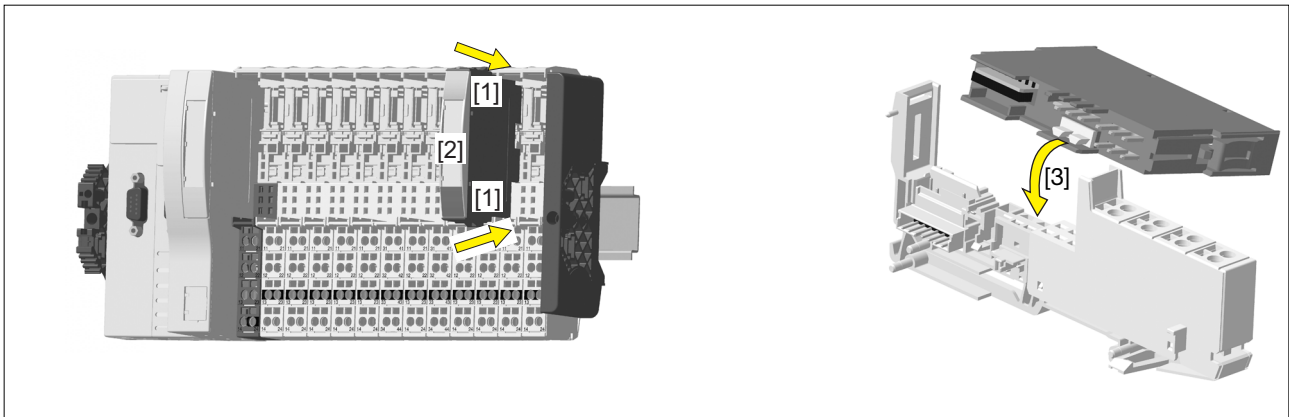
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

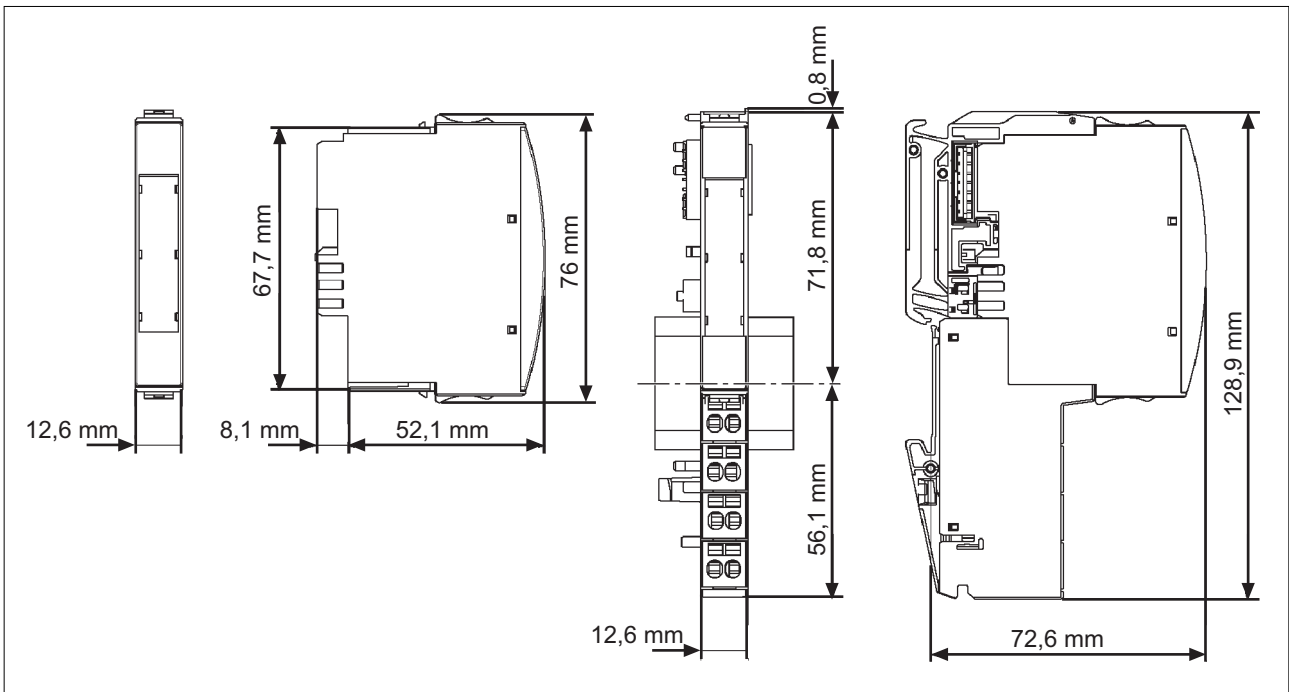
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

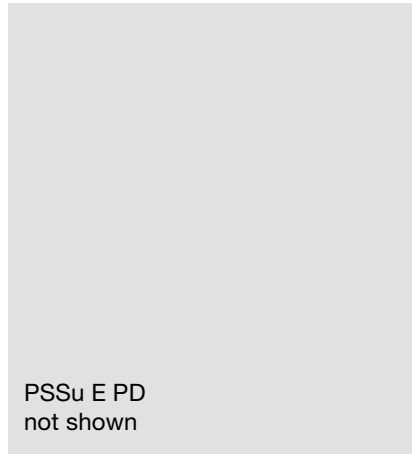
Digital input/output PSSu E F DI OZ 2

Technical details		PSSu E F DI OZ 2
Function	Compact programmable safety system for decentralised applications	
Application range	Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98	
Electrical data		
Supply voltage	From module supply: 5 VDC	
Current consumption	From module supply: ≤ 35 mA	
SafetyBUS p		
Connection	Via SafetyBUS p-compatible head module	
Output, dual-pole		
Number of outputs	1	
Potential isolation	Yes (optocoupler)	
Output current at “1” signal	2 A	
Permitted range	0 ... 2 A	
Short circuit protection	Electronic	
Limitation of inductive switch-off at the load	-U _B	
Output signal level		
“1” signal (high) and 2.5 A load:		
- Output O+	U _B -0.2 VDC at 2 A	
- Output O-	0 V	
“0” signal (low):		
- Output O+ and O-	U _B /2	
Output switch delay	50 µs	
Off time during self test	≤ 300 µs	
Dedicated test pulse outputs		
Number	1	
Supply	From module supply	
Signal level at “1”	24 VDC	
Output current at “1”	Max. 10 mA	
Inputs		
Number	1	
Signal level at “0”	-3 ... +5 VDC	
Signal level at “1”	+15 ... +30 VDC	
Input current	2.5 ... 8 mA	
Pulse suppression	< 450 µs	
Status indicator	LED	
Mechanical data		
Weight		
Electronic module	< 40 g	
Base module with cage clamp terminals	40 g	
Base module with screw terminals	50 g	
Mechanical coding	Yellow, G	
Plug in/out cycles		
Electronic module	Max. 20	
Base module	Max. 20	
Max. cross section of external conductors with screw terminals		
Flexible with crimp connectors	0.5 ... 1.5 mm ²	
Flexible or rigid without crimp connectors	0.5 ... 2.5 mm ²	
Max. cross section of external conductors with cage clamp terminals		
Flexible with crimp connectors	0.5 ... 1.5 mm ²	
Flexible or rigid without crimp connectors	0.5 ... 1.5 mm ²	
Torque setting with screw terminals	0.8 Nm	

Digital input/output PSSu E F DI OZ 2

Environmental data	
Protection type (EN 60529, 02/00)	IP20
Ambient temperature (EN 60068-2-14, 11/99)	0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)	-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)	93 % r.h. at 40 °C
Condensation	Not permitted
Vibration (EN 60068-2-6, 04/95)	Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock EN 60068-2-27, 03/93 EN 60068-2-29, 04/93	15g, 11 ms 10g, 16 ms
EMC	EN 61000-6-2, 08/02 EN 61000-6-4, 08/02
Order reference	
Description	Order no.
PSSu E F DI OZ 2 (Electronic module)	312 220
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 with screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
Order reference for accessories	Order no.
Description	
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Voltage distribution PSSu E PD



Module features

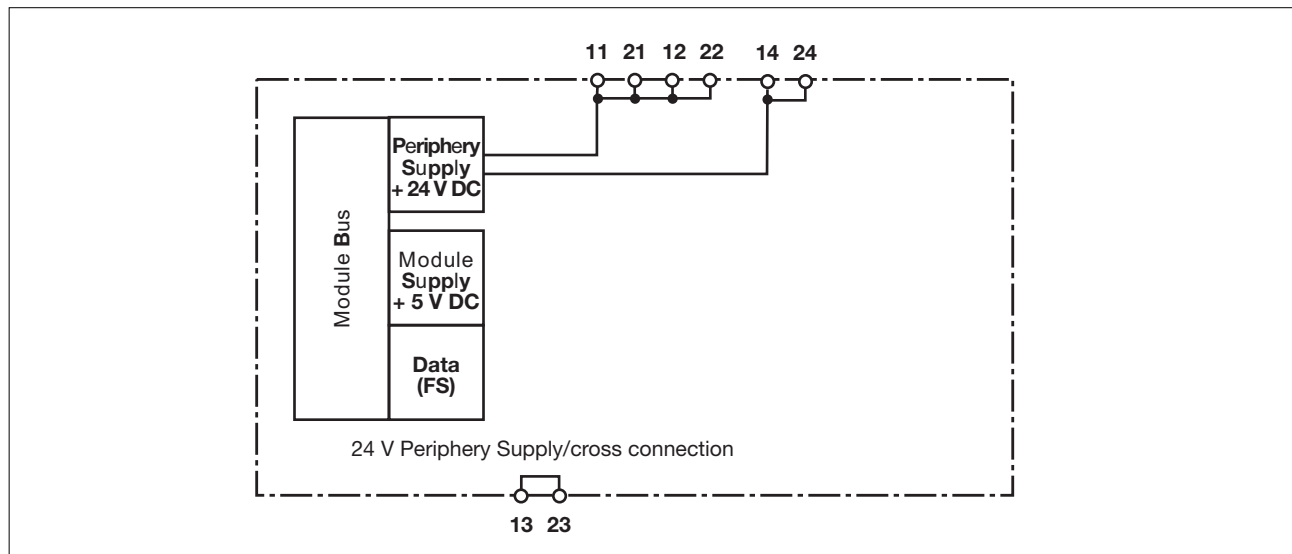
- ▶ Housing width: 12.6 mm (1 x grid width)
- ▶ Extracts the periphery supply (24 VDC, 0 V) from the module bus
- ▶ Details of the base modules that can be used are available under "Base modules" and "Order reference".

Module description

The module may be used as a distribution terminal block, to provide additional periphery supply connections for I/O modules.

Passive distribution terminal block for periphery supply.

Block diagram



Voltage distribution PSSu E PD

Function description

The module routes the periphery supply from the module bus to terminals on the base module.

- ▶ Module is used as a passive distribution terminal block for the periphery supply (24 VDC).
- ▶ Provides the periphery with the periphery supply

Supply voltage

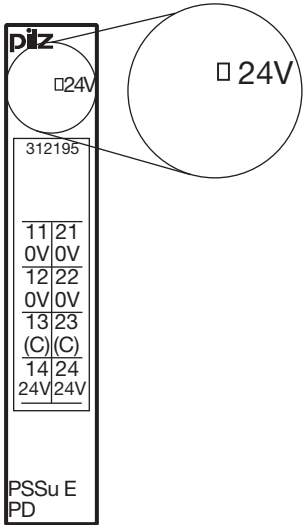
- ▶ On the module bus, the load current of max. 10 A must not be exceeded for the the periphery supply.
- ▶ The load current of max. 10 A must not be exceeded on the C-rail.

Wiring

- ▶ Minimum range for cable cross sections on connection terminals in mm², in accordance with EN 61131-2, 07/00:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

Module diagnostics

- ▶ The module has an LED to display the status of the
 - Periphery supply ("24 V") (see table)

Electronic module	LED	LED status	Key
 312195 11 21 0V 0V 12 22 0V 0V 13 23 (C) (C) 14 24 24V 24V PSSu E PD	24 V	Off	No supply voltage or error in the supply voltage for periphery supply
		Lights green	Supply voltage for periphery supply is error-free

Voltage distribution PSSu E PD

Base modules

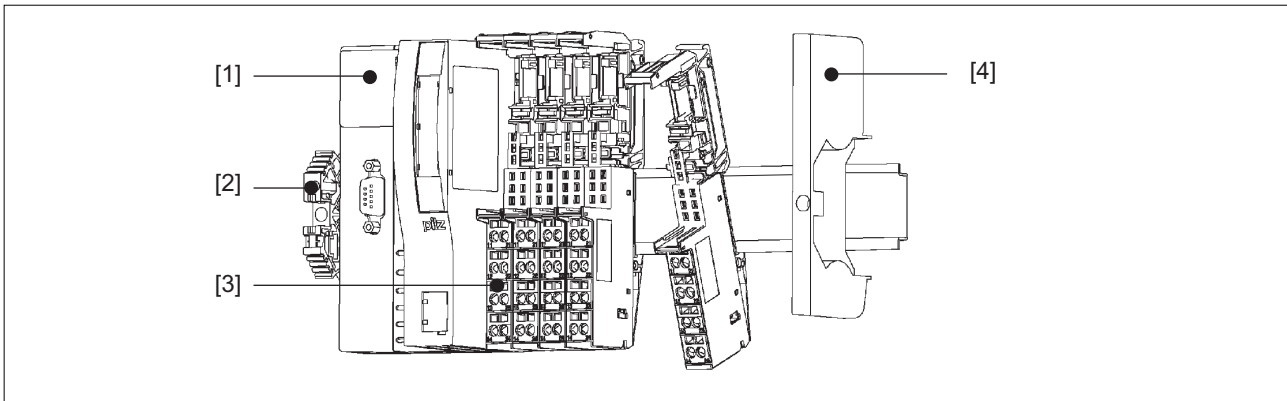
► Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S Cage clamp terminals: PSSu BP 1/8C	Without C-rail: 11-21: 0 V Periphery supply (11-21 linked internally) 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: +24 V Periphery supply (13-23 linked internally) 14-24: +24 V Periphery supply (14-24 linked internally)	
Screw terminals: PSSu BP-C 1/8S Cage clamp terminals: PSSu BP-C 1/8C	With C-rail: 11-21: 0 V Periphery supply (11-21 linked internally) 12-22: 0 V Periphery supply (12-22 linked internally) 13-23: C-rail supply (13-23 linked internally) 14-24: + 24 V Periphery supply (14-24 linked internally)	

Voltage distribution PSSu E PD

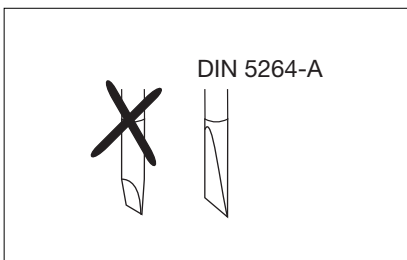
Installation

- ▶ Horizontal installation is preferable!
Vertical installation is possible, but involves restrictions in terms of temperature and vibration resistance.
- ▶ The head module and supply voltage module must already be installed.
- ▶ Attach the base module to the DIN rail to the right of the supply voltage module [1] and click into position on the rail [2].
- ▶ Slide the base module to the left until you hear it click into the last base module to be installed [3].
- ▶ If necessary:
 - Label the connection levels with coloured markers. To do this, push the markers into the recess below the fixing holes.
- ▶ Secure the final module on the mounting rail with the appropriate fixing bracket [4].

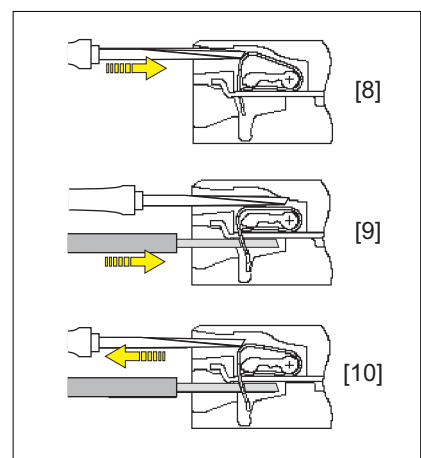
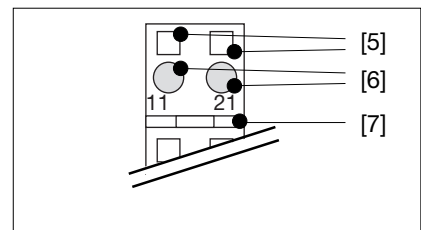


Wiring the module

- ▶ Refer also to the sections entitled "Wiring" and "Base modules"
- ▶ Use a flat blade screwdriver (DIN 5264-A)



- ▶ Base module with **cage clamp terminals**:
 - Insert the screwdriver [8] into the square opening [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go [9]
 - Pull out the screwdriver [10]
- ▶ Base module with **screw terminals**:
 - Use a screwdriver to open the screw on the screw terminal [5]
 - Insert the stripped cable into the round fixing hole [6], as far as it will go
 - Use a screwdriver to tighten up the screw on the screw terminal.



- ▶ Strip the wire back 8 mm
- ▶ Actuators may be connected using unscreened cables.
- ▶ If necessary, label the connection level with a colour marker [7]

Voltage distribution PSSu E PD

Inserting an electronic module

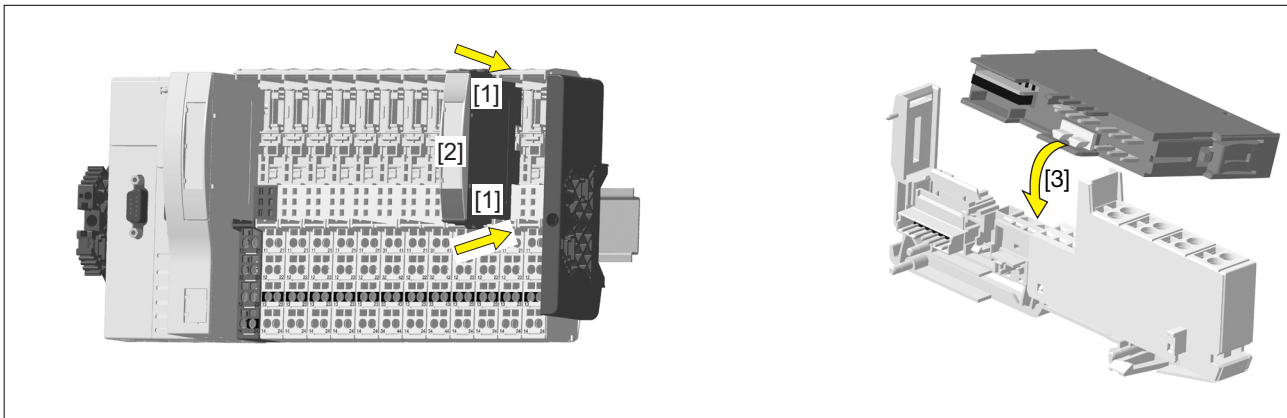
NOTICE

Ensure that a correct contact is made. A correct contact can no longer be guaranteed when modules have been inserted and removed more than 20 times.

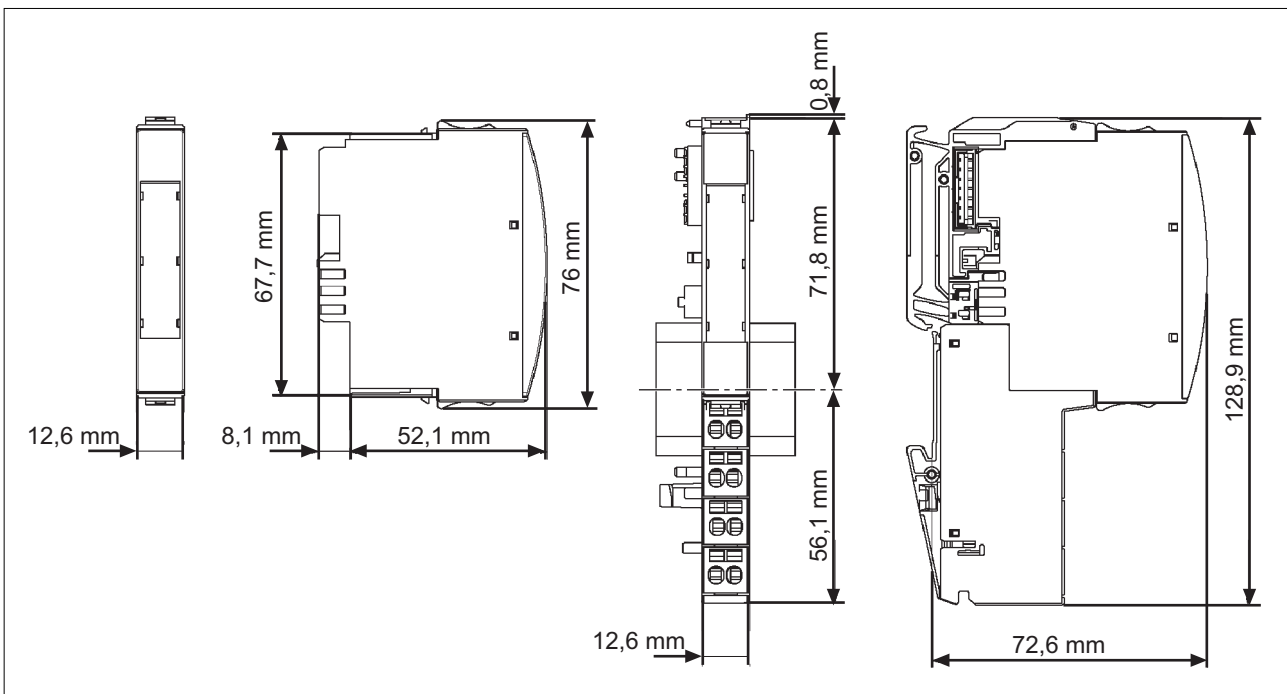
- ▶ Electronic modules should preferably be inserted on to base modules that are already installed and wired.
- ▶ The electronic module must audibly lock into position [1].
- ▶ Label the electronic module using the labelling strips [2].

INFORMATION

The first time an electronic module is inserted on to a base module, the base module is protected from plugging errors via a mechanical coding element [3].



Dimensions



Using this data sheet

This data sheet is only intended for use during configuration.

NOTICE

Please refer to the operating manual during commissioning and operation.

Voltage distribution

PSSu E PD

Technical details		PSSu E PD
Function		Passive distribution terminal block (periphery supply) for decentralised applications of the PSSu series
Application range		Failsafe applications conforming to EN 954-1, 03/97, DIN V 19 250, 05/94, DIN VDE 0116, 09/97, EN IEC 61508, 12/98
Electrical data		
Distributor for periphery supply		+18 VDC ... +30 VDC
Current consumption		
Load supply		None
Load current, periphery supply at < +50 °C		Max. 10 A
C-rail supply		None
Total current on C-rail at +24 VDC, +25 °C/+60 °C		Max. 10 A/ max. 8 A
Load current at the terminals		No limit
Mechanical data		
Weight		
Electronic module		< 40 g
Base module with cage clamp terminals		40 g
Base module with screw terminals		50 g
Mechanical coding		Light grey, A
Plug in/out cycles		
Electronic module		Max. 20
Base module		Max. 20
Max. cross section of external conductors with screw terminals		
Flexible with crimp connectors		0.5 ... 1.5 mm²
Flexible or rigid without crimp connectors		0.5 ... 2.5 mm²
Max. cross section of external conductors with cage clamp terminals		
Flexible with crimp connectors		0.5 ... 1.5 mm²
Flexible or rigid without crimp connectors		0.5 ... 1.5 mm²
Torque setting with screw terminals		0.8 Nm
Environmental data		
Protection type (EN 60529, 02/00)		IP20
Ambient temperature (EN 60068-2-14, 11/99)		0 ... +60 °C
Storage temperature (EN 60068-2-1/-2, 07/94)		-25 ... +70 °C
Climatic suitability (EN 60068-2-78, 10/01)		93 % r.h. at 40 °C
Condensation		Not permitted
Vibration (EN 60068-2-6, 04/95)		Frequency range: 10 ... 57 Hz Amplitude: 0.075 mm Frequency range: 57 ... 150 Hz Acceleration: 1g
Shock (EN 60068-2-27, 03/93)		15g, 11 ms
Continuous shock (EN 60068-2-29, 04/93)		10g, 16 ms
EMC		EN 61000-6-2, 08/02 EN 61000-6-4, 08/02

Voltage distribution

PSSu E PD

Order reference	
Description	Order no.
PSSu E PD	312 195
(Electronic module)	
PSSu BP 1/8S	312 600
(Base module without C-rail with screw terminals)	
PSSu BP 1/8C	312 601
(Base module without C-rail with cage clamp terminals)	
PSSu BP-C 1/8S	312 610
(Base module with C-rail with screw terminals)	
PSSu BP-C 1/8C	312 611
(Base module with C-rail with cage clamp terminals)	
Order reference for accessories	
Description	Order no.
Operating manual in German	In progress
Operating manual in English	In progress
Operating manual in French	In progress
Operating manual in Spanish	In progress
Operating manual in Italian	In progress
Operating manual in Dutch	In progress

Voltage distribution

PSSu E PD

Notes

Order reference Module overview

Electronic modules with base
modules (cage clamp terminals)

		Base modules				Order no.			
Electronic modules									
Supply voltage									
PSSu E F PS	312 190							◆	◆
PSSu E F PS1	312 191								◆ ◆
PSSu E F PS-P	312 185							◆	
PSSu E F BSW	312 230								◆
Digital input/output (standard)									
PSSu E S 4DI	312 400		◆						
PSSu E S 4DO 0.5	312 405		◆	◆					
PSSu E S 2DO 2	312 410		◆	◆					
Digital input/output (failsafe)									
PSSu E F 4DI	312 200		◆						
PSSu E F 4DO 0.5	312 210		◆	◆					
PSSu E F 2DO 2	312 215		◆	◆					
PSSu E F 2DOR 8	312 225				◆				
PSSu E F DI OZ 2	312 220		◆	◆					
Voltage distribution									
PSSu E PD	312 195		◆	◆					