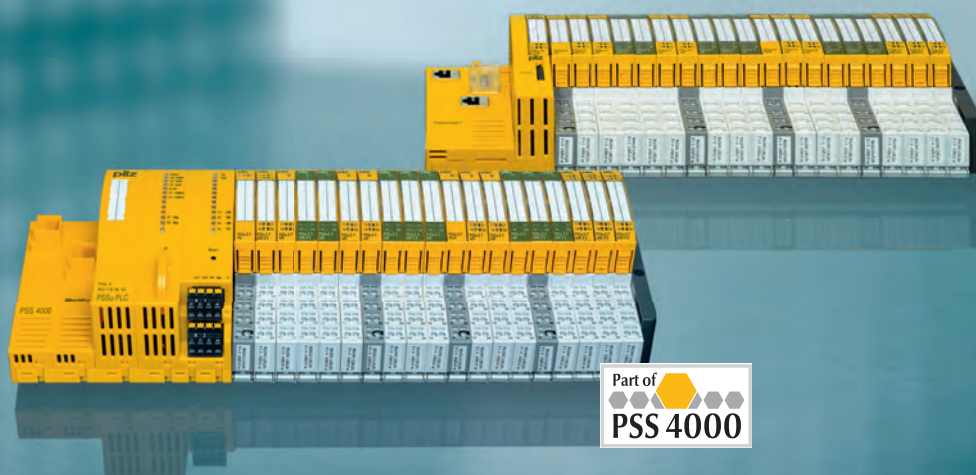




Part of
PSS 4000

Decentralised I/O system and control systems – PSSUniversal

pilz

Planning guide – for the control systems
and the input/output periphery PSSUniversal



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August 2011

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System description

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System description

Terminology: System environment A and B

1.1

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

The distinction is made between

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

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

PSSu in system environment A may be used in the

- ▶ Decentralised system PSSu I/O with SafetyBUS p
- ▶ Decentralised system PSSu I/O with ST fieldbuses such as CANopen, DeviceNet
- ▶ **Not** in the automation system PSS 4000

PSSu in system environment B may be used in the

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

System description

Terminology: System environment A and B

This chapter "System environment A basics" describes the PSSu system in system environment A.

System description

Glossary

1.1

- ▶ **Absolute encoder**
Encoder that provides an absolute value for each position. The absolute value corresponds directly to the position of the detected machine component
- ▶ **Base module**
Carrier unit for an electronic module; used to connect the field wiring
- ▶ **Base station**
PSSu module that exchanges data from the PSSu with a remote station via wireless signals or cable connection
- ▶ **Base system**
PSSu subsystem that is connected to the remote system, e.g. via wireless signals or cable connection
- ▶ **Certification**
Procedure by which a product's compliance with the applicable regulations and standards is tested by a notified body; proven compliance is confirmed through the issue of a certificate
- ▶ **Certification body**
Notified body in accordance with Article 14 of the Directive 2006/42/EC
Otherwise: Accredited institution, often a government body, which examines and confirms a product's compliance with applicable regulations and standards
- ▶ **CFM**
(Coexistence Frequency Management) Technology that prevents interference between InduraNET p and other wireless-based systems
- ▶ **Coated version**
The coated versions of the modules are suitable for use where there are increased environmental requirements on temperature and humidity
- ▶ **Cold start**
A PSSu system performs a restart when the module supply is applied
- ▶ **Compact module**
Combines the function unit (inputs or outputs) and connection levels in one housing
- ▶ **Competent person**
A person who, through training, experience and current professional activity, has acquired the necessary knowledge and authorisation to test, assess and handle devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology
- ▶ **C-rail**
Additional, available power rail
- ▶ **Derating diagram**
Dependency of the maximum permitted current on the ambient temperature
- ▶ **Diversely redundant**
A piece of information is processed more than once and in different ways
- ▶ **Download**
Download of data from the PC to the device
- ▶ **Electronic module**
Module that provides a function, e.g. input or output; plugged into the base module
- ▶ **Failsafe**
Abbreviation: FS
Safety-related, failsafe; a failsafe system switches to a safe condition in the event of an error
- ▶ **Fieldbus**
Standard bus system that transfers process data between various bus subscribers, e.g. DeviceNet, PROFIBUS
- ▶ **FIR filter**
Filter with finite impulse response
- ▶ **Gain**
Amplification factor; signed value, which is multiplied by the transferred value in the event of a correction
- ▶ **Gray code**
Display format of binary figures, in which adjacent figures differ in only one single bit
- ▶ **Grid width**
Base modules and electronic modules have a grid width of 12.6 mm or an integer multiple thereof
- ▶ **Head module**
Module that co-ordinates process data traffic via standard fieldbus systems or SafetyBUS p
- ▶ **IIR filter**
Filter with infinite impulse response
- ▶ **Incremental encoder**
Sensor for detecting linear or rotational positional changes; path, speed and direction can be determined by evaluating the number of pulses, pulse frequency and phase position
- ▶ **InduraNET p**
Wireless system from Pilz, suitable for industrial use
- ▶ **InduraNET p system**
Base station in conjunction with the corresponding remote stations
- ▶ **Input/output module**
Electronic module with input or output function and base module with terminals for connecting the inputs or outputs
- ▶ **Internal inputs/outputs**
These do not have any connection terminals; they are used for internal data transfer between the head module and the electronic module.
- ▶ **Inverted signals**
Each bit in a transmission is sent inverted on another line, i.e. "1" becomes "0" and "0" becomes "1".
- ▶ **Local enable principle**
ST section has write access to the FS section; FS outputs can be switched via the ST section
- ▶ **LSB**
Least significant bit
- ▶ **Mechanical coding**
Coding element on the electronic module, with its counterpart in the base module.
- ▶ **Module bus**
Bus to supply voltage to the modules and transfer data between the head module and electronic modules
- ▶ **Module supply**
Internal supply voltage for the head module and electronic modules
- ▶ **MSB**
Most significant bit
- ▶ **Offset**
Zero point compensation; constant, signed value, which is added to the transferred value in the event of a correction
- ▶ **Periphery supply**
Supply voltage for the sensors and actuators on input/output modules

System description

Glossary

- ▶ **PSSuniversal**
Abbreviation: PSSu; also: PSSu system; modular, programmable system for controlling plant and machinery
- ▶ **Processing time**
The time a module requires internally for processing signal changes
- ▶ **Reaction time**
Time it takes for a bus telegram to be finalised or for some other reaction from the head module to take place once a signal has changed at an input, or the time it takes the signal at an output to change once a bus telegram has been received
- ▶ **Redundant antenna**
Two offset antennas in one housing, which can compensate for local quenching, e.g. in mobile applications
- ▶ **Remote station**
First module in a remote system, which exchanges data with the PSSu base station via wireless signals or cable connection
- ▶ **Remote system**
PSSu subsystem that is connected to the base system, e.g. via wireless signals or cable connection
- ▶ **Resolution**
Number of bits for the display of a numerical value
- ▶ **Safe condition**
Condition in which power is removed from the safety circuits
- ▶ **Scaling**
Setting for offset and gain on analogue modules
- ▶ **Sign and magnitude representation**
Display format of binary figures for positive and negative values. The MSB is the sign bit.
- ▶ **Single-pole, referenced to earth**
Property of an earth (0 V) switching output; also: single ended
- ▶ **SSI**
Abbreviation for synchronous serial interface; interface for absolute encoder, used in the drive technology sector to transmit positional data
- ▶ **Standard**
Abbreviation: ST
Not safety-related, in contrast to failsafe.
- ▶ **Standard bus system**
Non-safety-related bus system, e.g. DeviceNet or PROFIBUS, in contrast to SafetyBUS p or SafetyNET p from Pilz
- ▶ **Status byte**
Certain modules use the status byte to transfer information about their status to the head module
- ▶ **Supply module**
Consists of an electronic module and a base module; also: Supply voltage module
- ▶ **System**
A number of modules combined to form a functional unit
- ▶ **System environment A**
For use in
 - Decentralised system PSSu I/O with SafetyBUS p
 - Decentralised system PSSu I/O with ST fieldbuses such as CANopen, DeviceNet
 - Not for use in the automation system PSS 4000
- ▶ **System environment B**
For use in the automation system PSS 4000, e.g. with
 - Decentralised system PSSu I/O with SafetyNET p
 - Control system PSSu PLC
 - Control system PSSu multi
- ▶ **Test pulse**
Test pulse signal which is wired to an input in order to detect wiring errors in that input. These errors may be: open circuit, short circuit to 24 VDC or 0 V or shorts between two inputs.
- ▶ **Two's complement**
Display format of binary figures for positive and negative values. To form a negative figure, each bit of the positive figure is inverted and 1 is added
- ▶ **Dual-pole, differential**
Property of a positive (+24 V) switching and earth (0V) switching output

System description

Modular design

1.1

A PSSu system is a modular, programmable system for controlling plant and machinery. For PSSu systems there is a system software consisting of PSSuniversal Assistant, Configurator and Start-up. The system software provides support as you select, configure and commission components. A PSSu system consists of:

- ▶ One head module
- ▶ At least one supply voltage module
- ▶ Input/output modules for standard and failsafe applications
- ▶ End bracket to secure the system at the start
- ▶ Terminating plate with integrated bus terminating resistors and end bracket to secure the system at the end

Head module:

- ▶ Connects the sensor/actuator level for standard applications with standard fieldbus systems (e.g. PROFIBUS-DP)
- ▶ Connects the sensor/actuator level for failsafe applications with SafetyBUS p

- ▶ Co-ordinates the entire process data traffic

Supply voltage modules:

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

Input/output modules:

Input/output modules are available in different designs:

- ▶ Electronic module and base module
- ▶ Compact module

The input/output modules are available for a wide range of input/output functions.

Designs:

Electronic modules and base modules:

The electronic modules determine the function of the supply voltage or input/output module.

- ▶ Electronic modules
 - Are plugged into the base modules
 - Communicate with the head module via the module bus

The base modules are the carrier units for the electronic modules.

Base modules

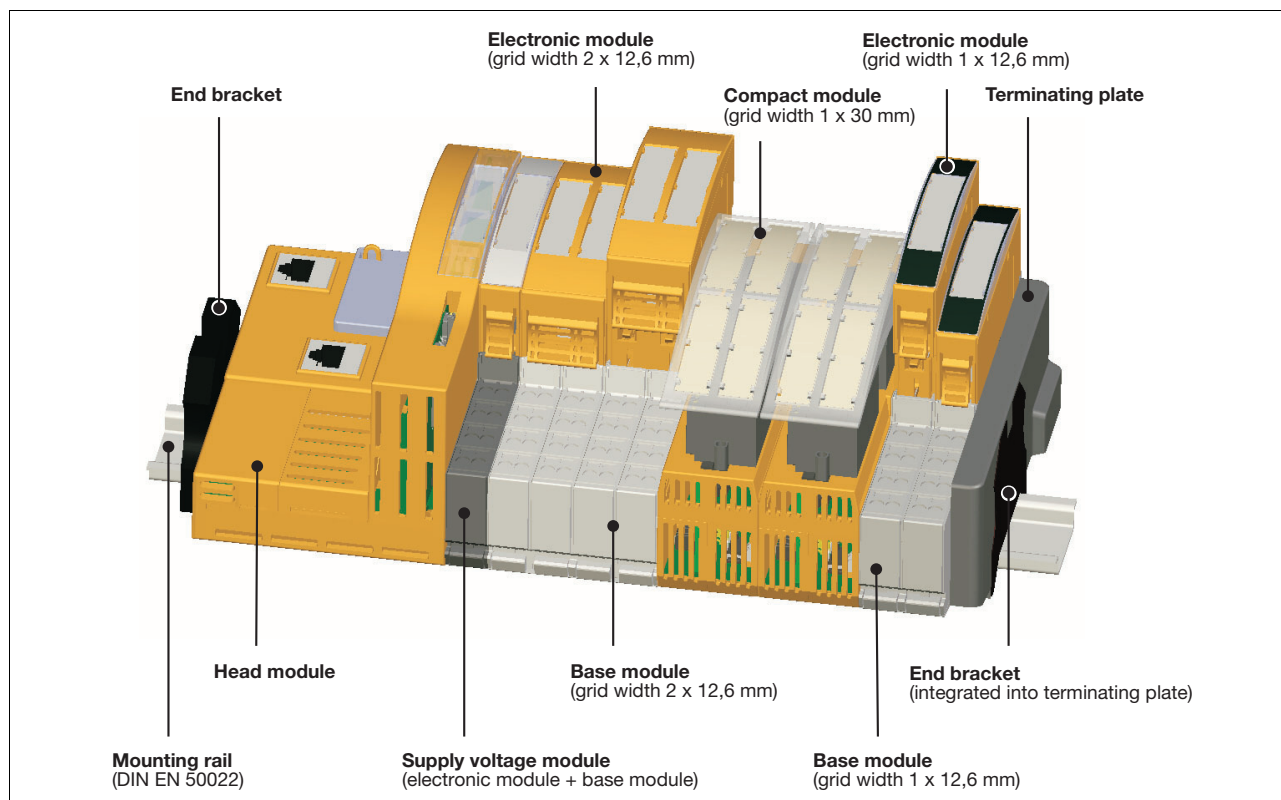
- Are used to connect the field wiring
- Are available with the following connection types:
 - Cage clamp terminals or screw terminals

Compact modules:

The compact modules combine the function unit (inputs and/or outputs) and connection levels in one housing. Wiring is via multi-pin connectors with spring-loaded terminals, which are plugged into the connector strips on the module.

Compact modules

- ▶ Do not need base modules
- ▶ Are used to connect the field wiring
- ▶ Communicate with the head module via the module bus



System description

Module descriptions

The module descriptions provide information on their function. The descriptions are made up of multi-level combinations of letters and numbers. All module names begin with **PSSu**. This is followed by:

- ▶ **H** for head modules
e. g.: PSSu **H** SB DP
- ▶ **E** for electronic modules, followed by:
 - **S** for standard module,
e.g.: PSSu **E S** 4DI
 - **F** for failsafe module,
e.g.: PSSu **E F** 4DI
- ▶ **K** for compact modules, followed by:
 - **S** for standard module,
e.g.: PSSu **K S** 16DI
 - **F** for failsafe module,
e.g.: PSSu **K F** 16DI
- ▶ **B** for base modules,
e.g.: PSSu **BP** 1/8S

Base modules	Basic function	Size	Connection type	Additional function
PSSu B...	PSSu BP... – Base module for periphery (input/output)	PSSu BP-C 1/8... – 1 x grid width, 8 connections	PSSu BP-C 1/8 C – Cage clamp terminals	PSSu BP 1/8S- J – Integrated cold junction compensation
	PSSu BP-C... – Base module for periphery with C-rail	PSSu BP-C 1/12... – 1 x grid width, 12 connections	PSSu BP-C 1/8 S – Screw terminals	
	PSSu BS... – Base module for power supply	PSSu BP-C 2/16... – 2 x grid width, 16 connections		
	PSSu BS-R... – Base module for refreshing the power supply	PSSu BP-C 2/8... – 2 x grid width, 8 connections		

Link modules have individual letter codes, depending on their application, e. g.:

- ▶ PSSu **WB** S IDN, PSSu **WR** S IDN
(for wireless communication with InduraNET p)
- ▶ PSSu **XB** F-T, PSSu **XR** F-T
(for cable-based subdivision)

The accessories of the PSSu systems are designated **PSSu A...**

PSSu modules are available which are suitable for use in applications with increased environmental requirements on temperature and humidity. These are called coated versions of PSSu modules. The functionality of the coated versions of PSSu modules is no different from that of uncoated modules. They are identified by a "**-T**" at the end of the product name, e.g.:

PSSu E F DI OZ 2-**T**.

In the following text, the designation "PSSu E F DI OZ 2(-**T**)", with "**-T**" in brackets, is used when the information specifically refers to both modules. In function descriptions and diagrams, "PSSu E F DI OZ 2" is used to represent both modules.

System description

Module bus

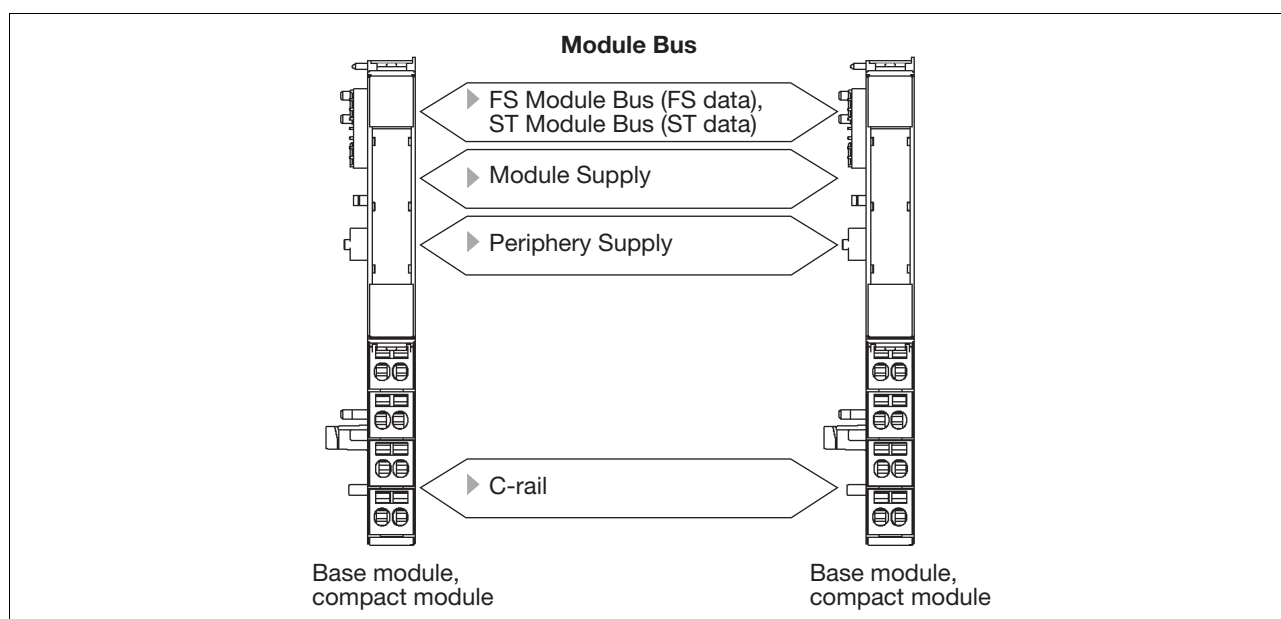
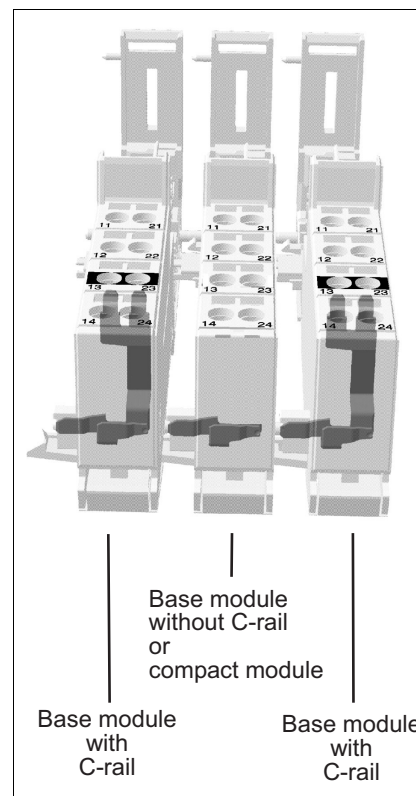
1.1

The module bus supplies the modules of a PSSu system with voltage and transfers data between the head module and the electronic/compact modules. The module bus is formed by arranging the base modules/compact modules together and connecting them via a mechanical latch. The module bus is structured as follows:

- ▶ Data bus
 - two separate bus systems for fail-safe data (FS module bus) and standard data (ST module bus).
- ▶ Supply voltage for:
 - Module supply
 - The module supply is the internal supply voltage for the head module and electronic modules.
 - Periphery Supply
 - The periphery supply supplies 24 VDC to the sensors and actuators on digital input/outputs on electronic modules. On compact modules, the supply for the inputs is generated from the periphery supply; the supply for the outputs must be fed to the module terminals. The connection on

the module bus can be disconnected in order to form supply groups.

- ▶ C-rail ("cross connection")
 - The C-rail is an additional, free power rail. Access to the C-rail is available via base modules that contain the letter "-C" in their description (e.g. PSSu BP-C 1/8 S, PSSu BP-C 1/8 C).
 - The C-rail supply must belong to the same circuit as the other base module connections. Connecting PE to the C-rail provides a simple form of shield. On the compact modules, the C-rail is only looped through and is not available at the terminals.



System description

Maximum system expansion

The system software provides support in assembling a PSSu system. It checks the system limits as the data is entered. Once the system is assembled, the system software can be used to generate a requirement list, which you can use for system documentation and for an order form.

The expansion of a PSSu system is limited by the following values

- ▶ Number of modules
- ▶ Number of failsafe modules
- ▶ Number of failsafe inputs/outputs
- ▶ Number of standard inputs/outputs
- ▶ Current load of module bus

The number of PSSu systems may also be limited by the fieldbus that is used or by a network (e.g. number of SafetyBUS p subscribers in a SafetyBUS p network).

The system limits are listed and explained below.

System limits: SafetyBUS p and standard bus systems

SafetyBUS p

If the PSSu system is used as a bus subscriber within a SafetyBUS p network, the system limits of SafetyBUS p must be taken into account.

A maximum of 64 bus subscribers can be addressed within a SafetyBUS p network (device address 32 ... 95 for SafetyBUS p 0 or 132 ... 195 for SafetyBUS p 1). The specifications of the "SafetyBUS p Installation Manual" and "SafetyBUS p System Description" apply for a PSSu system.

Possible addresses for the PSSu system within a SafetyBUS p network:

Bus subscriber within the SBp network	Device address (per PSSu system)	Input addresses SafetyBUS p	Output addresses SafetyBUS p
1 in SBp 0	32	E32.00 ... E32.31	A32.00 ... A32.31
...			
64 in SBp 0	95	E95.00 ... E95.31	A95.00 ... A95.31
1 in SBp 1	132	E132.00 ... E132.31	A132.00 ... A132.31
...			
64 in SBp 1	195	E195.00 ... E195.31	A195.00 ... A195.31

Standard bus systems

If the PSSu system is used as a bus subscriber within a standard bus system, the system limits of that standard bus system must be taken into account.

System description

Maximum system expansion

1.1

System limits: Number of modules and number of inputs/outputs on a PSSu system

- ▶ Absolute number of modules per PSSu system
Internally, a PSSu system can address a maximum of **64 modules**. The head module and passive junction modules (e.g. PSSu E PD, PSSu E PD1) are not counted. The following modules should be taken into account for the absolute number of modules:
 - Supply voltage modules (identifier: PSSu E F PS...)
 - Standard modules (identifier: PSSu E S..., PSSu K S...)

- Failsafe modules (identifier: PSSu E F..., PSSu K F...)
- ▶ A PSSu system can have a maximum of **32 FS modules**. The following system limits also apply:
 - A maximum of 16 modules of type PSSu E F DI OZ 2 may be used.
 - A maximum of 24 modules of type PSSu E F BSW may be used.
- ▶ Maximum number of FS input/output bits per PSSu system:
In each PSSu system it is possible to address via SafetyBUS p a maximum of:
 - **32 FS input bits**
 - **32 FS output bits**

- Please also note the number of FS input/output bits per module.
- ▶ Maximum number of ST input/output bits per PSSu system:
A PSSu system may have a maximum of **240 ST input bits and 240 ST output bits**. This system limit applies irrespective of the fieldbus. Please also note the number of ST input/output bits per module. The following system limits also apply:
 - A maximum of 6 modules of type PSSu E S RS232 may be used.
 - A maximum of 6 modules of type PSSu E S RS485 may be used.

Overview of the modules' bit requirement

The table overleaf contains the modules' bit requirement. The bit requirement is illustrated in accordance with the address assignment in the process

image (ST-PIL/PIO, FS-PIL/PIO). There are configurations for various modules that impact the address and bit requirement. The table overleaf uses the same identifier for these configuration options as is used in a device description file.

Please note:

The table only shows a selection of the available modules. Module-specific information on the bit requirement and address assignment in the process image can be found in the module's operating manual.

Module	Configuration	ST-PIL	ST-PIO	FS-PIL	FS-PIO	Notes
PSSu E S PD-D	---	---	---	---	---	---
	S	8	---	---	---	1 status byte (module status)
PSSu E F PS	---	---	---	---	---	---
	R	8	---	---	---	1 status byte (system status) Configuration only possible on the first module after the head module
PSSu E F PS1	---	-	---	---	---	---
	R	8	---	---	---	1 status byte (system status) Configuration only possible on the first module after the head module
PSSu E F PS-P	---	---	---	---	---	---
PSSu E F BSW	---	---	---	---	1	---
	R	1	---	---	1	ST read access
PSSu E S 4DI	---	4	---	---	---	---
PSSu E S 4DI-D	---	4	---	---	---	4 bits
	S	12	---	---	---	4 bits + 1 status byte
PSSu E S 2DO 2	---	---	2	---	---	---
PSSu E S 2DO 2-D	---	---	2	---	---	2 bits
	S	8	2	---	---	2 bits (ST-PIO) + 1 status byte (ST-PIL)
PSSu E S 4DO 0.5	---	---	4	---	---	---
PSSu E S 4DO 0.5-D	---	---	4	---	---	4 bits
	S	8	4	---	---	4 bits (ST-PIO) + 1 status byte (ST-PIL)

System description

Maximum system expansion

Module	Configuration	ST-PIL	ST-PIO	FS-PIL	FS-PIO	Notes
PSSu E S 2DOR 2	---	---	2	---	---	---
PSSu E S 2DOR 10	---	---	2	---	---	---
PSSu K S 16DI	---	16	---	---	---	---
PSSu K S 16DO 0.5	---	---	16	---	---	---
PSSu K S 8DI 8DO 0.5	---	8	8	---	---	---
PSSu E F 4DI	---	---	---	4	---	---
	R	4	---	4	---	ST read access
PSSu E F 2DO 2	---	---	---	---	2	---
	R	2	---	---	2	ST read access
	&	2	2	---	2	ST read/write access (local enable principle)
PSSu E F 4DO 0.5	---	---	---	---	4	---
	R	4	---	---	4	ST read access
	&	4	4	---	4	ST read/write access (local enable principle)
PSSu E F 2DOR 8	-	-	---	---	2	---
	R	2	---	---	2	ST read access
	&	2	2	---	2	ST read/write access (local enable principle)
PSSu E F DI OZ 2	---	---	---	2	1	Input I0:
	R	3	---	2	1	Connection terminal
	&	3	1	2	1	Input I1: Open circuit detection R: ST read access &: ST read/write access (local enable principle)
PSSu E S 2AI I se	---	32	---	---	---	2 x 2 bytes
	S	16	---	---	---	2 status bytes
	X	48	---	---	---	2 x 2 bytes + 2 status bytes
PSSu E S 2AI U	---	32	---	---	---	2 x 2 bytes
	S	16	---	---	---	2 status bytes
	X	48	---	---	---	2 x 2 Bytes + 2 status bytes
PSSu E S 4AI U	---	64	---	---	---	4 x 2 bytes
	S	32	---	---	---	4 status bytes
	X	96	---	---	---	4 x 2 bytes + 4 status bytes
PSSu E S 2AI RTD	---	32	---	---	---	2 x 2 bytes
	X	48	---	---	---	2 x 2 Bytes + 2 status bytes
PSSu E S 2AI TC	---	32	---	---	---	2 x 2 bytes
	X	48	---	---	---	2 x 2 Bytes + 2 status bytes
PSSu E S 2AO I	---	---	32	---	---	2 x 2 bytes
PSSu E S 2AO U	---	---	32	---	---	2 x 2 bytes
PSSu E S 4AO U	---	---	64	---	---	4 x 2 bytes
PSSu E S ABS SSI	---	40	---	---	---	4 bytes + 1 status byte

System description

Maximum system expansion

Module	Configuration	ST-PIL	ST-PIO	FS-PIL	FS-PIO	Notes
PSSu E S INC	---	72	40	---	---	ST-PIL: 4 bytes counter data + 4 bytes latch value/period length + 1 status byte ST-PIO: 4 bytes (default) counter status + 1 control byte
PSSu E S INC 24V se	---	72	72	---	---	ST-PIL: 4 bytes counter data + 4 bytes latch value/period length + 1 status byte ST-PIO: 4 bytes (default) counter status + 4 bytes limit value + 1 control byte
PSSu E S RS232	---	80	80	---	---	ST-PIL: 2 status bytes + 8 bytes receive data ST-PIO: 2 control bytes + 8 bytes send data
PSSu E S RS485	---	80	80	---	---	ST-PIL: 2 status bytes + 8 bytes receive data ST-PIO: 2 control bytes + 8 bytes send data
PSSu XB-F	---	---	---	---	---	---
PSSu XR-F	---	---	---	---	---	---
PSSu WB S IDN	---	---	---	---	---	---
PSSu WR S IDN	---	---	---	---	---	---
PDP67 WR S 8DI 8DO 0.5 IDN	---	8	8	---	---	---
PSSu E AI SHT1	---	---	---	---	---	---
PSSu E PD	---	---	---	---	---	---
PSSu E PD1	---	---	---	---	---	---
PSSu E PS-P 5V	---	---	---	---	---	---
PSSu E PS P +/- 10V	---	---	---	---	---	---
PSSu E PS P +/- 15V	---	---	---	---	---	---

System description

Maximum system expansion

Maximum current load capacity on the supply voltage modules

System supply	Max. current load
Module supply when supplied via - PSSu E F PS(-T)	1.5 A
Module supply when supplied via - PSSu E F PS1(-T)	2 A
Periphery supply	10 A
C-rail	10 A

▶ Module supply

The module supply's current load is the total current consumption resulting from the electronic modules and compact modules. If the total current consumption is higher than the supply module's current load capacity, the module supply must be refreshed with an additional supply module (see modules' technical details). The system software takes this into account.

▶ Periphery supply

Maximum current load: 10 A
The current load of the periphery supply is the sum of the current consumption of the sensors and actuators supplied via the input/output modules. If the current load is higher, the periphery supply must be refreshed with an additional supply module to prevent overload. Please refer to the derating diagram.

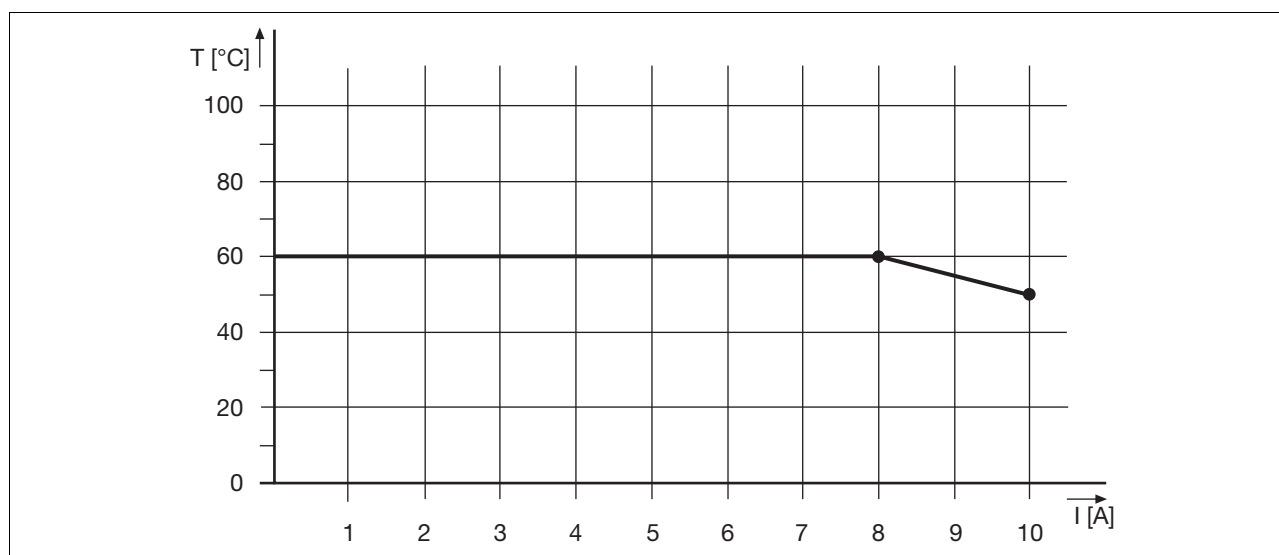
▶ C-rail

Maximum current load: 10 A
If the current load is higher, the C-rail must use a different supply to prevent overload. Please refer to the derating diagram.

Maximum current load capacity based on temperature

The maximum current load capacity of the module bus with regard to the periphery supply and C-rail can only be achieved if the max. permitted ambient temperature is adhered to.

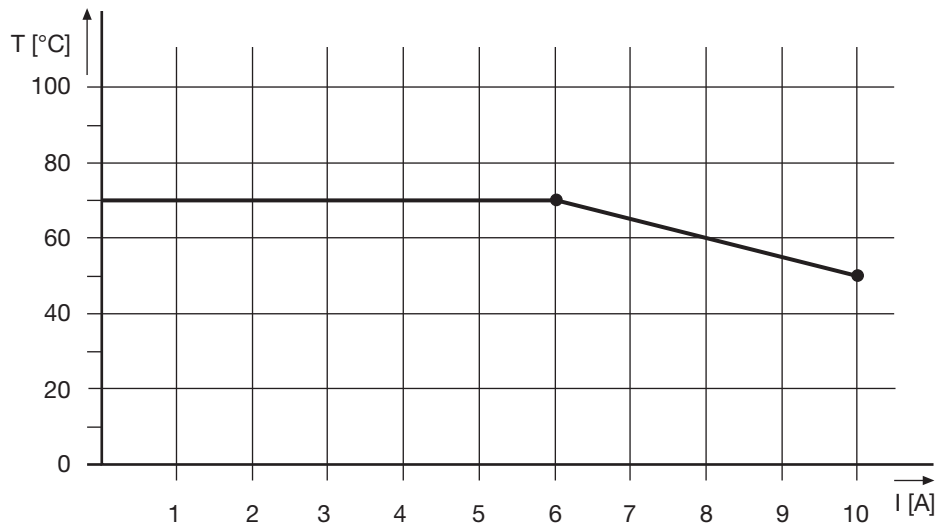
Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



System description

Maximum system expansion

Coated version: Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



System description

Diagnostics

Opportunities for diagnostics

The PSSu system provides many options for diagnostics, fault detection and communication with other control systems. The diagnostics of a PSSu system can be performed via

- ▶ The LEDs on the electronic/compact modules and head module,
- ▶ The local USB port on the head module,
- ▶ A PSS connected via SafetyBUS p,
- ▶ Standard fieldbus functions,
- ▶ PVIS expanded diagnostics.

Both FS modules and ST modules can be diagnosed via a standard fieldbus or via SafetyBUS p.

For visualisation we recommend PMLvisu/PMlopen type devices plus

expanded diagnostics with the PVIS OPC Server.

Error stack

Certain events lead to an entry in the head module's error stack. An event is signalled once only and is not repeated cyclically. Entries in the error stack can be evaluated for diagnostic purposes. If the PSSuniversal system is connected to SafetyBUS p, many events will trigger a telegram, depending on the configuration. The entries in the head module's error stack are graded according to their priority.

How a PSSu system reacts to events and how the error stack entries are forwarded will depend on the head mod-

ule, the configuration, the connected bus systems and the user programs. The entry in the error stack corresponds to the format used with SafetyBUS p subscribers.

Diagnostic data

The available diagnostic data will depend on the modules you are using. Different errors are detected depending on the electronic module (see operating instructions for the relevant module). Besides the error data, electronic/compact modules can also send messages about their status to the head module.

The table below lists some typical PSSu messages.

Module error	Statement	Remedy
Start-up error	Error as the PSSu system starts up	Change faulty module
Configuration error	Incorrect module type configured	The configured hardware registry does not match the actual hardware registry
FS communication error	Error during FS communication	Change faulty module
ST communication error	Error during ST communication	Change faulty module
Bus termination error	There is no terminating plate or there is a bad contact with the module bus	Install a terminating plate with integrated end bracket or insert the base modules together correctly
Temperature error: too warm ⁽¹⁾	Ambient temperature too high: Error stack entry	Ensure there is sufficient ventilation in the control cabinet or prevent overload
Temperature error: too hot ⁽¹⁾	Ambient temperature too high: Reset the module and stop the affected I/O-Groups (SafetyBUS p)	Ensure there is sufficient ventilation in the control cabinet or prevent overload
Output error	Error during cyclical output test for short circuit. Possible causes: Short circuit, or output defective	Rectify the short circuit or change the faulty module
Test pulse error	Possible causes: Short circuit between a test pulse and a supply voltage, or a defective module	Rectify the short circuit or change the faulty module
Relay control error	Error during cyclical monitoring test of the relay coils	Change faulty relay module
Relay error	A relay position is faulty; possible cause: Defective relay contact	Change faulty relay module
Block switching output error	Error during cyclical monitoring test of the relay contacts; possible external cause: Voltages being fed back to the relay contacts	Check the supply voltage and the wiring
Error in the feedback loop	FS input detects an error in the feedback loop or FS input is defective	Check FS input, check the configuration of the feedback loop, check the signals, or check the wiring and contacts

System description

Diagnostics

1.1

Module error	Statement	Remedy
Error in the local enable principle	FS output has reacted incorrectly or unexpectedly	Check the configuration of the FS output, or check the fieldbus signals in the FS and ST section
Input error	Error during the cyclical input test; possible cause: Input defective	Change faulty module
Overload/short circuit	Load on output too high	Rectify overload or short circuit
Overload of the supply voltage for encoder	Supply voltage for encoder overloaded or short-circuited	Rectify overload or short circuit
Overvoltage error	A system voltage or infeed is too high	Stabilise the supply or change the faulty supply voltage module
Undervoltage error	A system voltage or infeed is too low	Stabilise the supply or change the faulty supply voltage module
Error in the overvoltage protection diodes	Overvoltage protection diodes are defective	Change faulty supply voltage module
Timeout error on the output	No data has been received for the output from the module bus for longer than 50 ms.	Check ST communication or configuration
Polarity error	Polarity of the periphery supply	Correct the polarity
Error in the periphery supply	Lower voltage limit exceeded on the periphery supply	Ensure there is a sufficient supply

(¹) There are two levels of overtemperature.

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

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

System description

Safety

Application area of a PSSu system

A PSSu system is designed for use in an industrial environment as follows.

- ▶ Safety-related applications in the FS section, including connection to safe bus systems
- ▶ Non-safety-related applications in the standard section, including connection to standard bus systems.

Before using a PSSu system in safety-related applications it is necessary to perform a safety assessment in accordance with the Machinery Directive.

In principle, PSSu systems can be used in any situation where the result of the risk assessment indicates they may be used. However, they are primarily suitable for use in machine safety circuits in which a safe condition is brought about by the removal of power.

Examples:

- ▶ Presses
- ▶ Transfer lines
- ▶ Tank storage facilities
- ▶ E-STOP functions
- ▶ Burner control systems
- ▶ Cable cars/traction operations
- ▶ Stage technology
- ▶ Process engineering

The following is deemed improper use in particular:

- ▶ Any component, technical or electrical modification to a product
- ▶ Use of a product outside the areas described in the product documentation
- ▶ Use outside the documented technical details.

Achieving a safety class

Please note: To achieve the corresponding category or safety class, the whole system including all safety-related components (parts, devices, user program etc.) must be included in the assessment. For this reason, Pilz cannot accept liability for the correct classification into a category or requirement class.

Safety PSSu system

The PSSu system is divided into a failsafe and standard section. Only the failsafe section may process safety-related functions.

The failsafe section of the PSSu system is designed to be diversely redundant. Diversely redundant means that information is processed more than once and in different ways, e.g. using several, different processors. All input and output signals are processed in separate channels. Each channel compares the result with its neighbours. The input and output signals are only valid if all three channels reach the same result.

As with the hardware, the software also has a failsafe and standard section.

The failsafe and standard programs use separate hardware resources (memory, modules etc.). The standard section operates without feedback, in other words it is only able to read the failsafe resources, such as failsafe inputs/outputs, unless the user specifically programs access. During configuration and user programming, it is important to ensure that this high level of safety is not compromised by errors and lack of attention.

Safety of the overall plant

The failsafe section of the PSSu system guarantees functional safety, e.g. from errors in hardware and software. However, the failsafe section does not guarantee the safety of the entire process, configuration and user program. This is the user's responsibility. Pay special attention when programming and observe standards and regulations. A faulty application program can jeopardize the safety of the entire process!

Define the safety requirements for the overall plant and also define how these are to be implemented from a technical and organisational standpoint. Technical measures include, for example, the choice of control system, the choice of periphery components and the user programming.

Organisational measures include, for example, the appointment of responsible personnel and the documentation of all work stages during commissioning. This also includes the allocation of responsibilities and access rights.

The safety requirement will depend on the plant's function and the risks. A safety assessment also must cover malfunctions, faulty operation and the possible consequences.

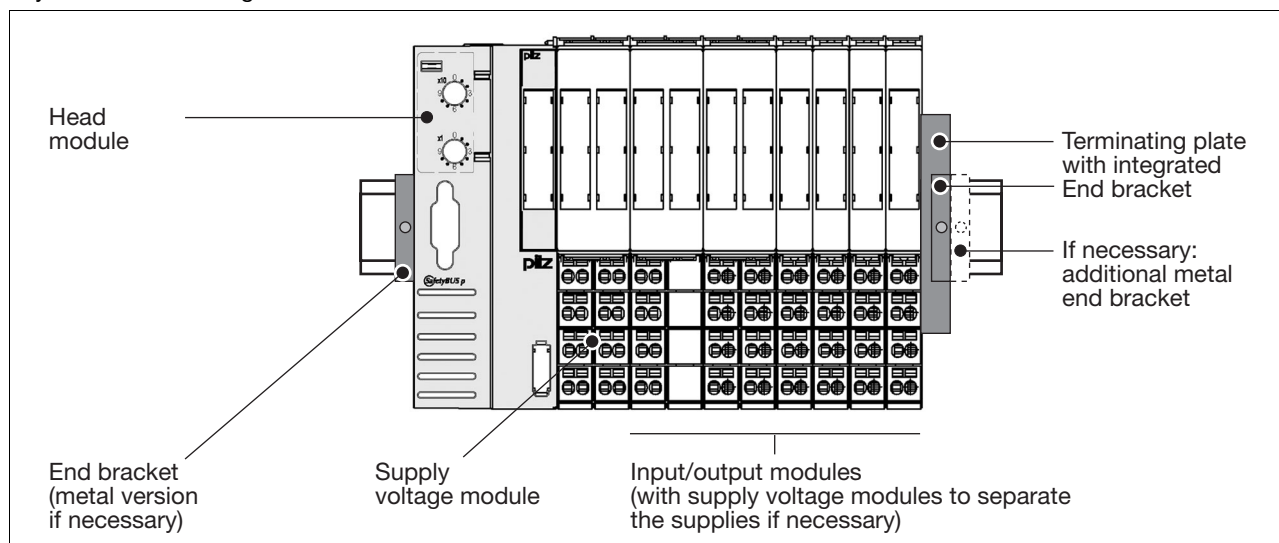
System description

Module layout

1.1

- ▶ 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 provide the module supply (supply for the head module and the input/output modules)
 - To provide the periphery supply (supply for the sensors and actuators)
 - On the head module for an InduraNET p remote system, the supply voltage is already integrated. There is no need for a supply voltage module.
- ▶ Input/output modules for FS and ST applications may follow on to the right:
 - The input/output modules may be installed in any order.
- Input/output modules for FS applications and ST applications may be combined as required.
- If modules of the same function are combined into groups it makes things clearer and simplifies the wiring.
- Base modules with screw terminals cannot be mixed in one PSSu system with base modules with cage clamp terminals.
- A base module with screw terminals may not be installed to the left of a compact module.
- The maximum number of input/output modules is determined by the system limits.
- Input/output modules for FS applications may not be used with head modules that are only designed for ST applications.
- ▶ Additional supply voltage modules may be required in order to refresh the module supply or periphery supply.
- ▶ Supply groups require an additional voltage supply module 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 terminating resistors for the module bus.
- ▶ The system is attached to the mounting rail using fastening elements at the start and end of the system. The following end brackets are available, depending on vibration and shock stress:
 - Plastic version (standard)
 - Metal version (where there is increased stress)

Layout of the fastening elements:



System description

Connections

Connections on the base modules

The connections on the base modules are divided into connection levels and connection columns. The connections have a two-digit number.

- ▶ The first digit denotes a base module's connection column (e.g.: connection **23** is in the second column).
- ▶ The second digit denotes a base module's connection level (e.g.: connection **23** is in the third level).

The function of the base module connections depends on the electronic module.

On input/output modules, the connection levels are typically arranged as follows:

- ▶ Connection level 1 and 4
Input and output connections
- ▶ Connection levels 2 and 3
Connections for the common supplies (periphery supply, analogue inputs/outputs or screening)

Many input/output modules may have two more connection levels:

- ▶ Connection level 5 and 6
Connections for the common supplies (periphery supply, analogue inputs/outputs or screening)

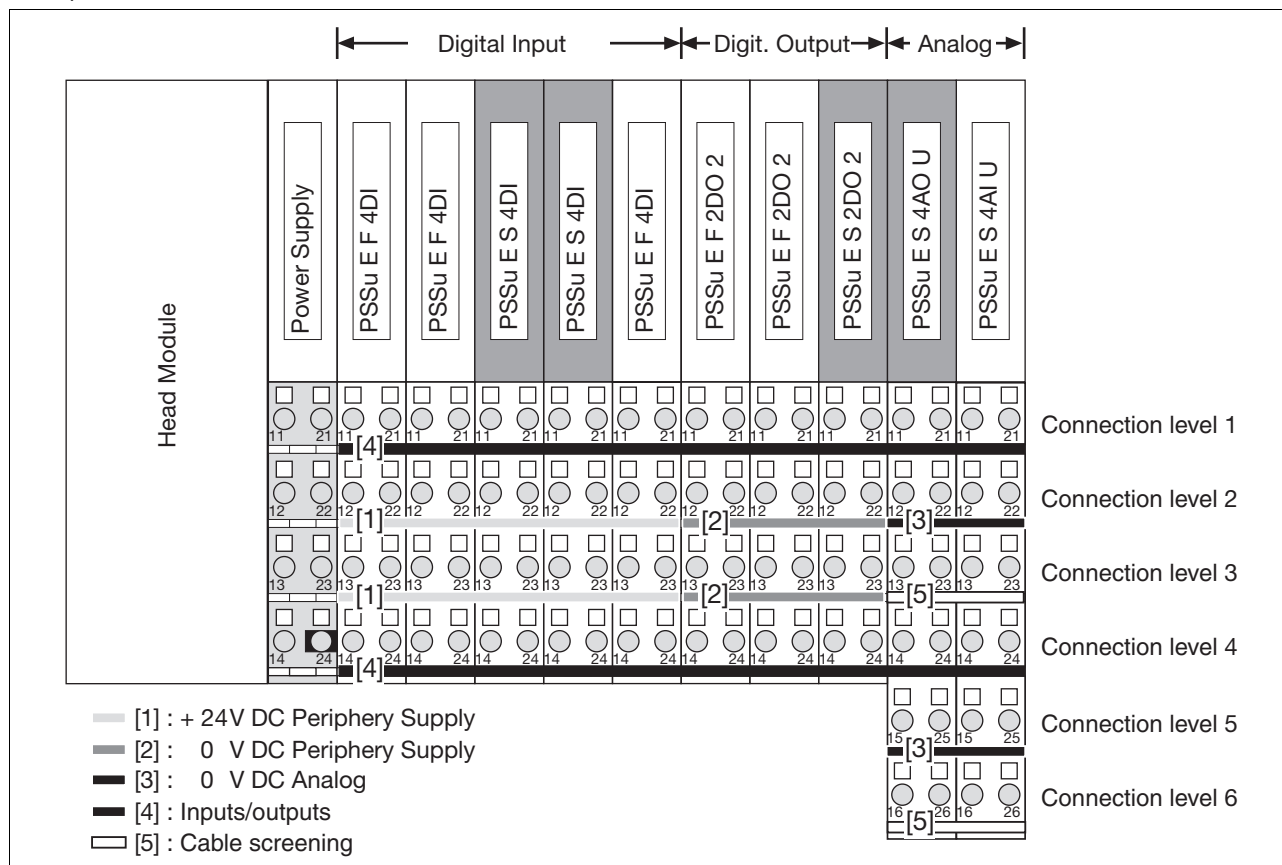
Input/output modules can be installed in any order. However, for the

connection diagram to be consistent it makes sense to arrange input/output modules of the same type into groups and not have them interrupted by compact modules (see example).

Colour marking on the connection levels

The colour marking on the connection levels is a wiring aid. Various colour markers are available for labelling. The colour markers can be used to label different supplies. This way the connection levels remain clearly visible, even after wiring.

Example:



System description

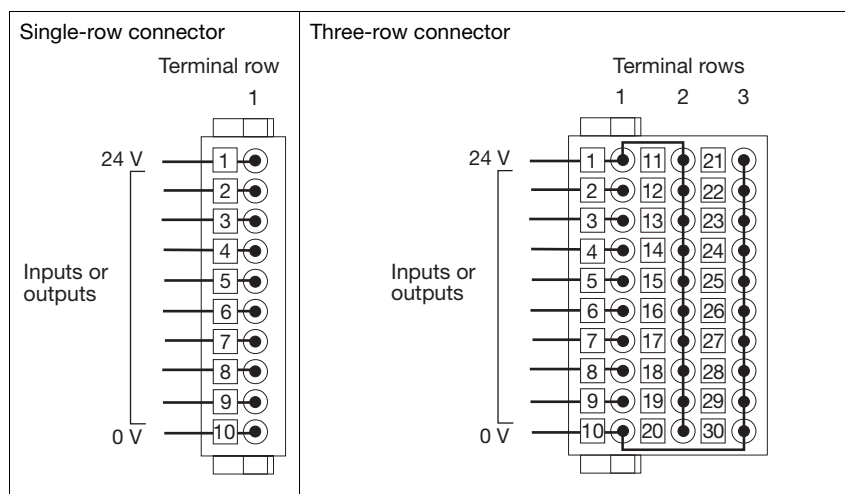
Connections

Connections on the compact modules

The connections on the compact modules are divided into terminal rows. Single or three-row connectors with spring-loaded terminals can be plugged into the device's single-row 10-pin connector strip.

The function of the connections depends on the compact module.

- ▶ **Terminal row 1**
Connection of the inputs and outputs, periphery supply (24 V and 0 V).
- ▶ **Terminal row 2**
All connections are linked; bridged to the 24 V periphery supply connection from the first connection level
- ▶ **Terminal row 3**
All connections are linked; bridged to the 0 V periphery supply connection from the first connection level
Input/output modules can be installed in any order. However, for the connection diagram to be consistent it makes sense to arrange input/output modules of the same type into groups.



System description

Installing within the control cabinet

A PSSu system must be installed in a control cabinet. Use a zinc-plated DIN-rail in accordance with DIN EN 50022 as the mounting rail (top hat rail). Dimensions:

- ▶ 35 x 7.5 mm or 35 x 15 mm
- When installing, please note the following:
- ▶ Where vibration and shock stress place increased requirements on the system fastenings, we recommend that the mounting rail is screwed to the mounting plate approximately every 200 mm.
 - ▶ We recommend that it is installed horizontally on a vertical wall. If other mounting positions are used (e.g.

vertical installation), please take the following into account:

- Optimum upward heat dissipation can no longer be guaranteed: The ambient temperature is restricted (see technical details for the modules).
 - Vibration and shock stress place higher requirements on the system fastenings: use additional metallic end brackets!
- We recommend you leave a distance of 20 mm from the control cabinet wall to enable you to exchange modules.

The coated versions of the PSSu modules are suitable for use where there

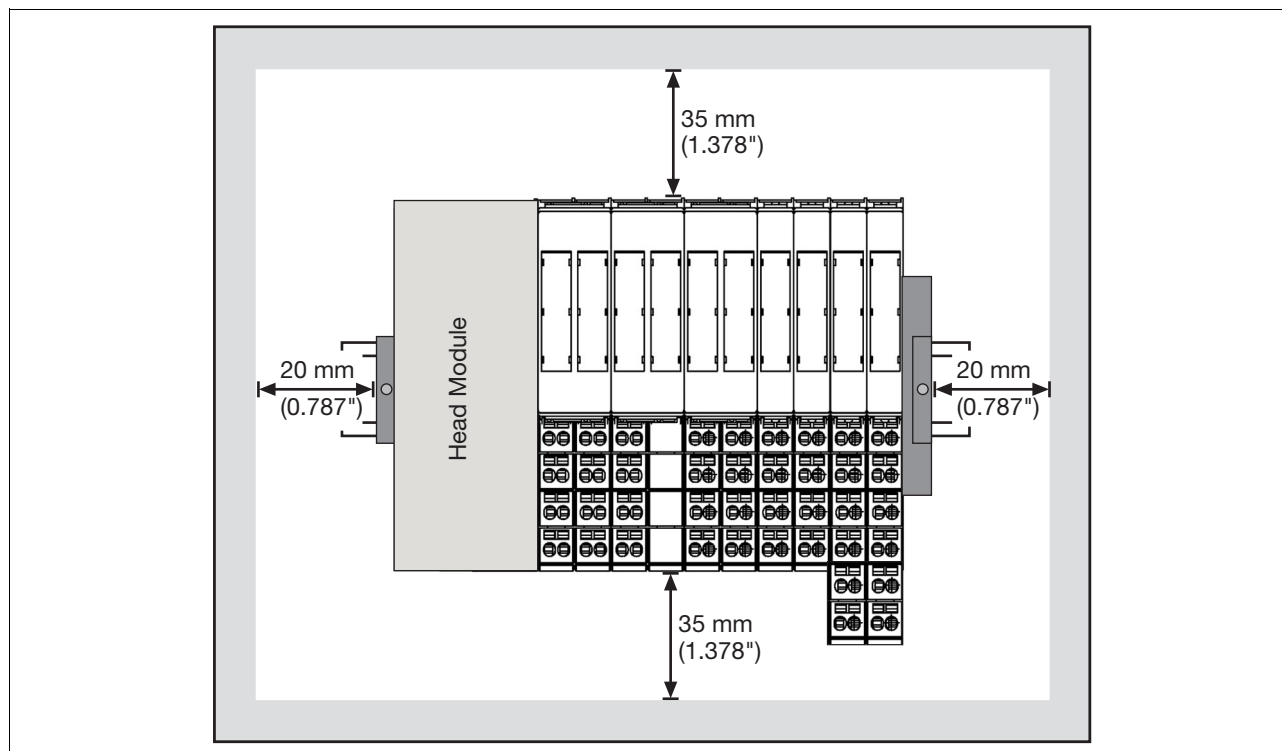
are increased environmental requirements on temperature and humidity. Please refer to the technical details. On the coated version of some output modules, please also note the derating at higher temperatures.

Mounting distances

The values shown in the diagram for mounting distances are minimum specifications.

The ambient temperature of the PSSu system in the control cabinet must not exceed the figure stated in the technical details for the modules, otherwise air conditioning will be required.

Mounting distances



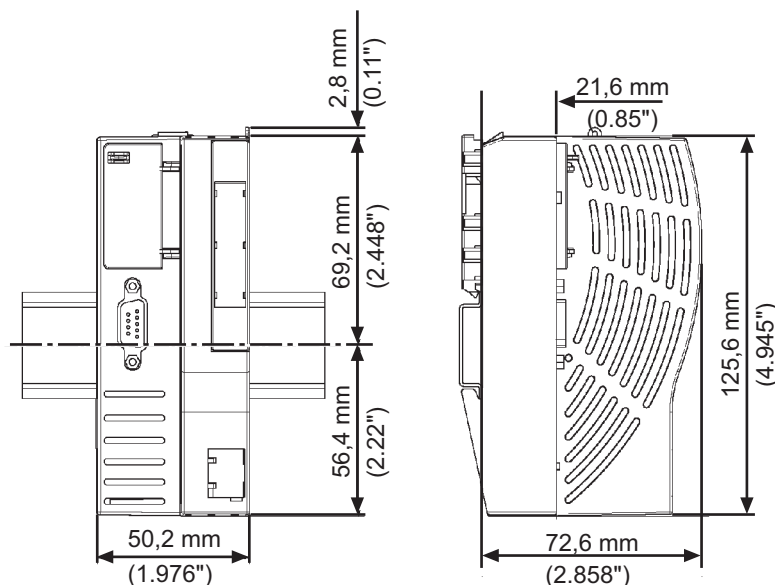
System description

Installing within the control cabinet

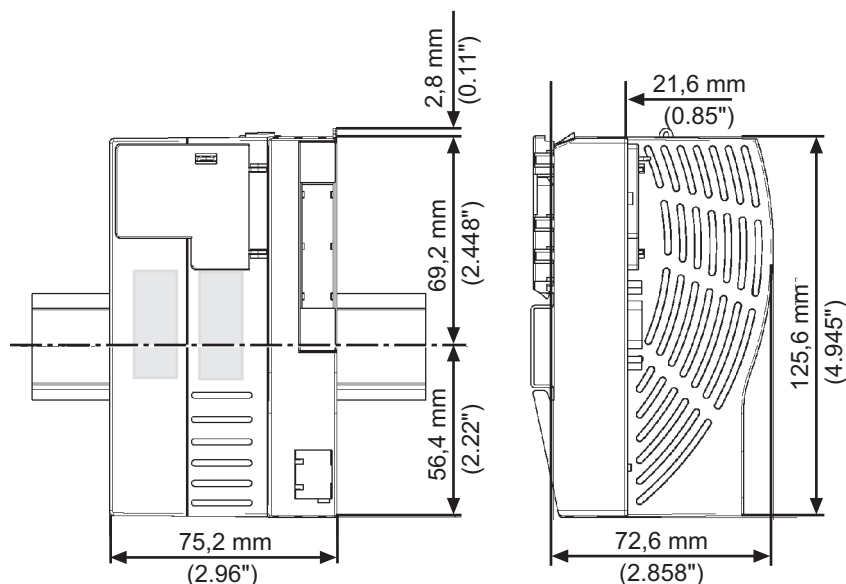
Dimensions of the head modules

Head modules without a standard fieldbus connection (PSSu H SB):

1.1



Head modules with a standard fieldbus connection:

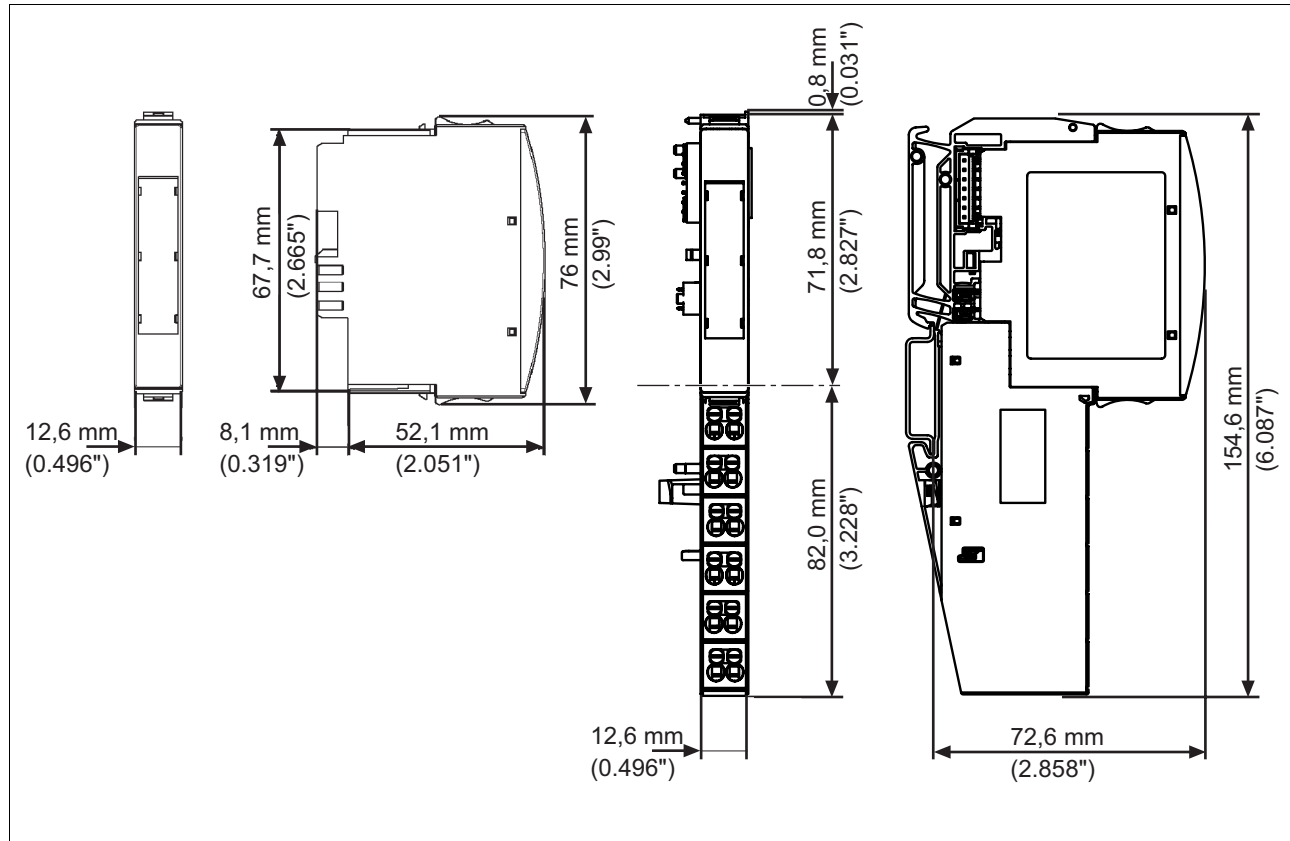


System description

Installing within the control cabinet

Dimensions of the electronic modules

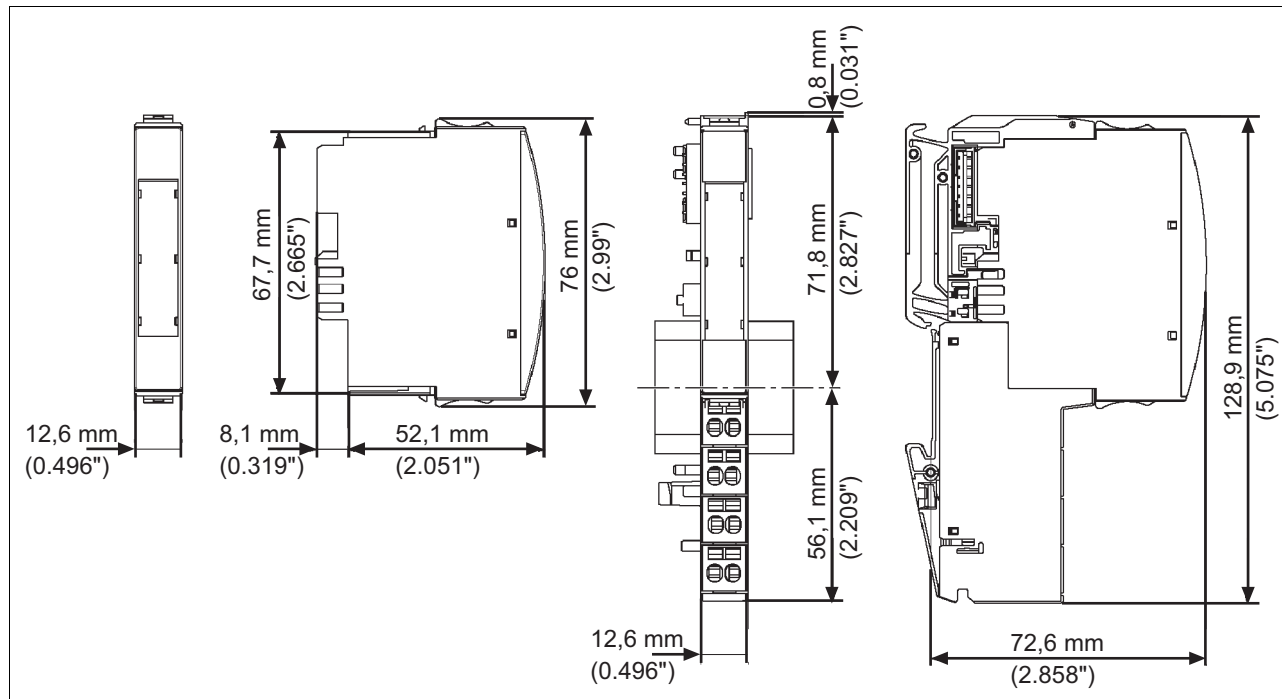
Base modules with six connection levels:



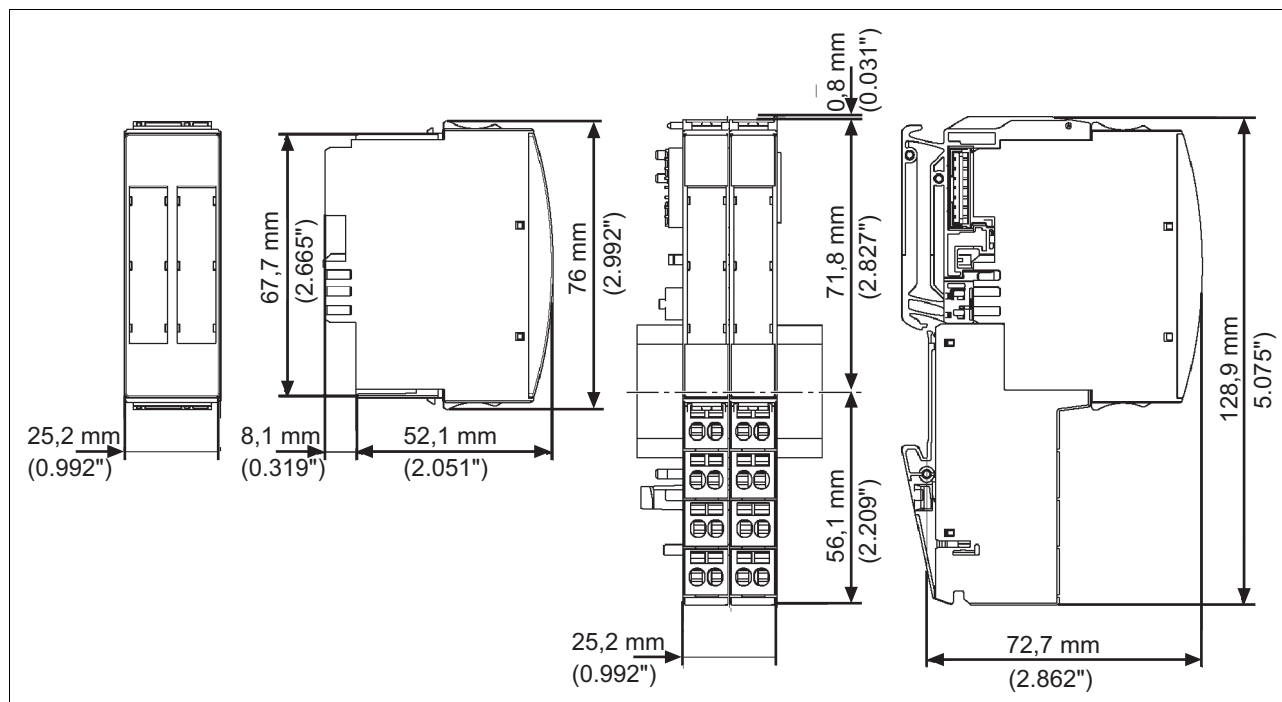
System description

Installing within the control cabinet

Single-width base modules with four connection levels:



Double-width base modules with four connection levels:

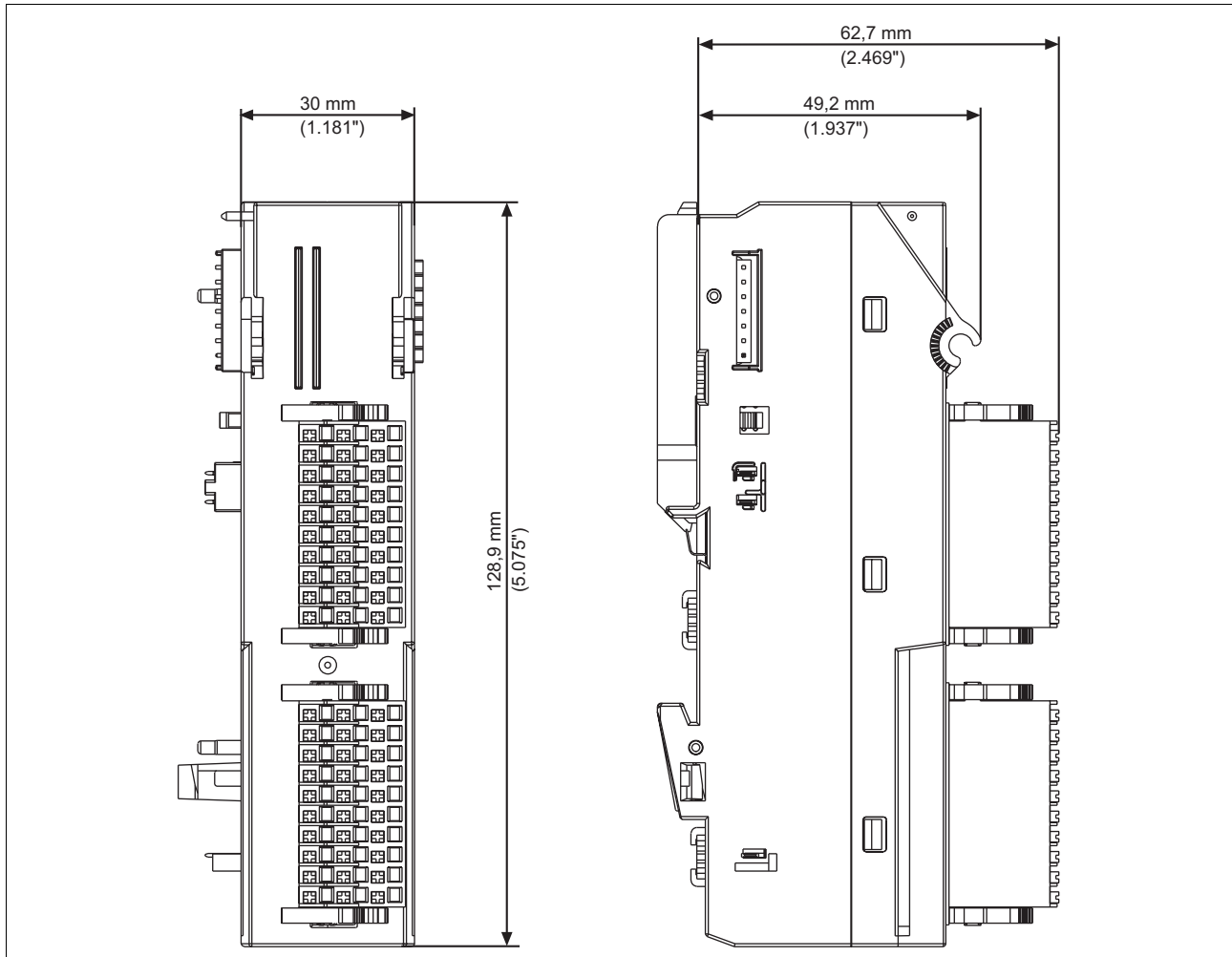


System description

Installing within the control cabinet

Dimensions of compact modules

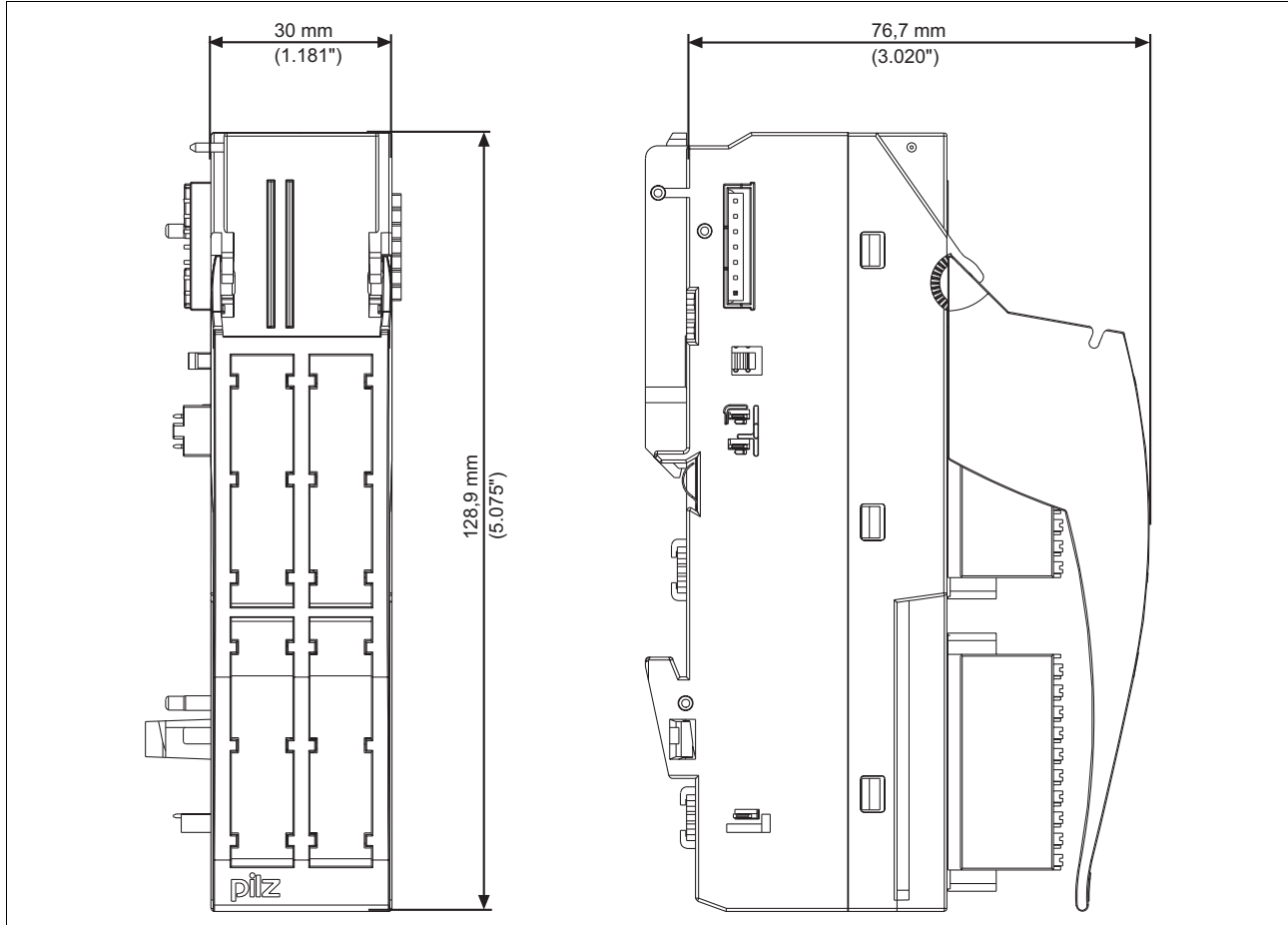
Module with connector:



System description

Installing within the control cabinet

Module with connector and labelling bracket:



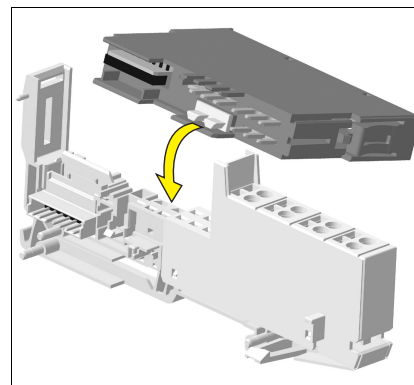
System description

Mechanical coding

Electronic modules are supplied with a two-part coding element. When an electronic module is plugged into a base module for the first time, one part of the coding element remains on the electronic module, while its counterpart is fixed on to the base module. This is how the base module is coded.

The coding element is designed to help prevent plugging errors (e.g. when exchanging an electronic module). Once a base module has been coded, it will only take electronic modules with the same mechanical coding.

The coding is identified by a letter and a colour. Codings with the same letters are mechanically identical and are distinguished through a different colour.



1.1

Overview of the mechanical coding elements

The types of coding elements are listed in the table below.

Please note:

Details of the mechanical coding of the

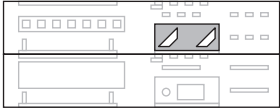
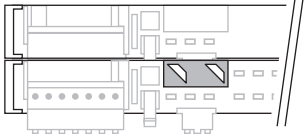
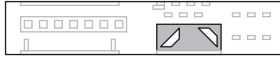
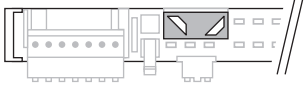
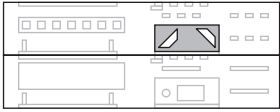
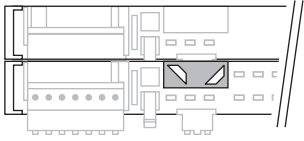
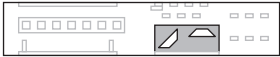
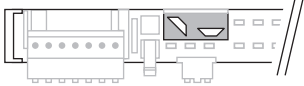
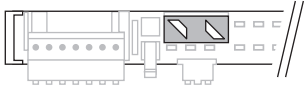
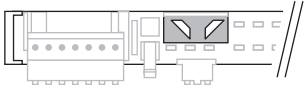
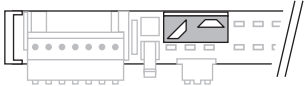
electronic modules (type and colour) can be found in the technical details in the data sheet and operating manual.

Type	Coding element Electronic module	Coding element on counterpart Base module
A		
B		
C		
D		
E		
F		
G		

System description

Mechanical coding

1.1

Type	Coding element Electronic module	Coding element on counterpart Base module
H		
I		
		
J		
K		
L		
M		

System description

Supply voltage and insulation

All PSSu systems voltages are provided via supply voltage modules. The voltages are distributed to the modules via the module bus.

▶ Module supply

The module supply is the internal supply voltage for the head module, the compact modules and the electronic modules.

▶ Periphery supply

The periphery supply supplies 24 VDC to the sensors and actuators on digital input/outputs on electronic modules. On compact modules, the supply for the inputs is generated from the periphery supply; the supply for the outputs must be fed to the module terminals.

The connection on the module bus can be disconnected in order to form supply groups. On digital fail-safe modules, the periphery supply is used to provide test pulses. Fail-safe input/output modules will not start until the periphery supply is connected correctly. On analogue input/output modules, the periphery supply is galvanically isolated from the inputs/outputs.

▶ C-rail

The C-rail is an additional, free power rail. Access to the C-rail is available via base modules that contain the letter “-C” in their description (e.g. PSSu BP-C 1/8 S,

PSSu BP-C 1/8 C).

The C-rail supply must belong to the same circuit as the other base module connections. Connecting PE to the C-rail provides a simple form of shield. On the compact modules, the C-rail is only looped through and is not available at the terminals. Permitted infeed at the C-rail:

- PE
- 0 V
- Shield
- - 30 VDC ... +30 VDC
- - 48 VAC ... + 48 VAC

▶ Inputs/outputs on the analogue modules and counter modules

The inputs and outputs on the analogue modules and counter modules are galvanically isolated from the periphery supply. On the base modules, the supply for the outputs is generated from the periphery supply.

▶ Earth (Ground)

The module supply and periphery supply have separate earth connections for the respective earth potential (Ground).

▶ Functional earth

A contact spring on the base modules and compact modules connects the modules' functional earth to the mounting rail.

The supply voltages for module supply and periphery supply must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410. Further requirements of the power supplies can be found in the data sheets for the supply voltage modules or head modules.

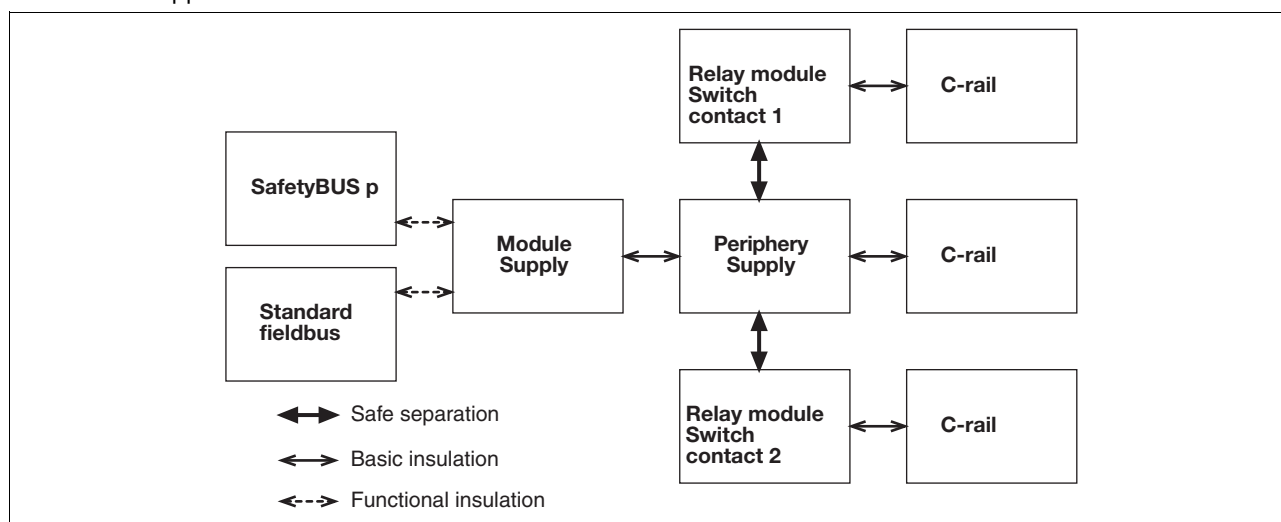
When the voltages are fed separately using two power supplies, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

Separate power supplies for module supply and periphery supply increase availability: In the case of a short circuit in the periphery supply, the module supply is maintained and the head module can continue to exchange data with fieldbus systems, e.g. for diagnostic purposes.

If voltages higher than 50 VAC or 120 VDC are connected to the PSSu system, e.g. to switch contacts on relay modules, please note the following:

- ▶ Specific accident prevention regulations apply.
- ▶ For safety reasons, only the protective earth (PE) may be connected to the C-rail of the supply group.

Insulation of supplies in a PSSu installation:



System description

Earthing and connection

1.1

Earthing of the system

When modules are attached to the mounting rail, a contact spring makes the electrical contact between the modules' functional earth and the mounting rail.

- ▶ Always connect the mounting rail to the protective earth via an earthing terminal. This will be used to dissipate hazardous voltages in the case of a fault.

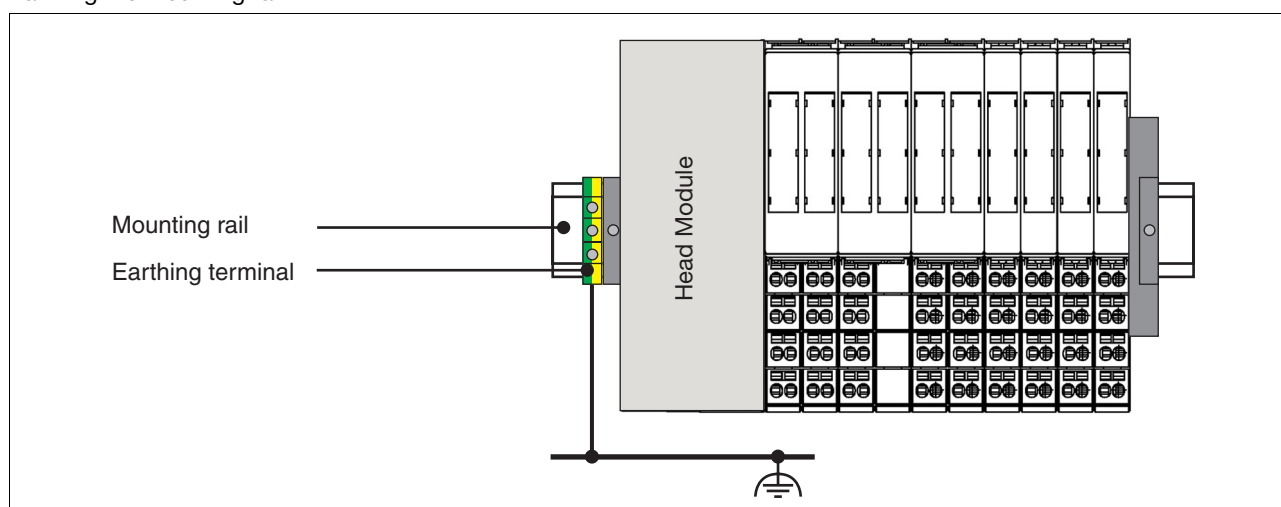
The earthing terminal is available as an accessory. The mounting rail must be properly earthed to ensure interference-free operation in accordance with EMC regulations.

The supplies on the PSSuniversal module bus (module supply, periphery

supply, C-rail) are not connected to the functional earth through the contact spring.

On analogue modules and counter modules with base modules without a C-rail, the contact spring also connects the shield connections to the mounting rail.

Earthing the mounting rail



Cable requirements with base modules

Please note:

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

- ▶ On base modules with screw terminals:

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

- ▶ Use copper wiring.

Cable requirements with compact modules

Please note:

- ▶ The cable cross section with spring-loaded terminals is 0.20 – 1.50 mm², 22 -16 AWG.

- ▶ If you are using multi-core or fine-core cables we recommend ferrules in accordance with DIN 46228/Part 1 or DIN 46228/Part 4, 0.2 ... 1.5 mm². To crimp the ferrules we recommend crimping pliers (crimp form A) conforming to EN 60947-1, such as the PZ 6/5 from Weidmüller, for example.
- ▶ Terminal points per connection: 1
- ▶ Stripping length: 8 mm

System description

Electromagnetic compatibility (EMC)

EMV compliance

The PSSu system is designed for use in an industrial environment. It is not suitable for use in a domestic environment, as this can lead to interference.

Connecting the earth cables

Please note:

- ▶ A cable cross section of at least 2.5 mm² should be used for the connection to the central earth bar. Connections should be kept as short as possible.
- ▶ Connections to the earth bar should always be in star form.
- ▶ Connect together the 0V connections on all the 24 V power supplies and earth the 0 V mains at a single point, or ensure that measures are in place to monitor for earth faults.
 - Earthed supply voltages offer the best noise immunity.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with relevant national regulations (such as EN 60204-1, NFPA 79:17-7, NEC: Article 250, for example).
- ▶ Connections should be protected from corrosion.
- ▶ Flexible earthing straps should be used on moving earth parts (e.g. machine parts, gates). Ensure these earthing straps are as short and wide as possible.

Equipotential bonding

Potential differences can occur if the PSSu system and its periphery devices are connected to different earth connections. Even cable shields that are connected at either end and have different earth connections can cause potential differences. In order to avoid interference, equipotential bonding cables must be installed. Please note:

- ▶ Select a low impedance equipotential bonding cable.
- ▶ Select the following as standard values for the cross section of the equipotential bonding cables:
 - 16 mm² for equipotential bonding cable up to 200 m in length
 - 25 mm² for equipotential bonding cable over 200 m in length

- ▶ If the PSSu system and periphery devices are connected with shielded signal cables which are earthed at either end, the impedance is calculated as follows:
 - Impedance equipotential bonding cable = 10 % of screen impedance
- ▶ Use copper or galvanised steel equipotential bonding cable.
- ▶ Connect equipotential bonding cables to the earth bar over as wide a surface area as possible.
- ▶ As short a distance as possible should be kept between the equipotential bonding cable and signal cable.

Suppression of inductive loads

Suppression should not be used to protect the digital semiconductor outputs.

Control cabinet lighting

Use low interference panel lighting for inside the control cabinet.

Screened cables

Digital inputs and outputs on the PSSu system do not need shielded cables. However, if the connection cables have a shield, it should be connected at one end.

Analogue inputs and outputs plus the inputs and outputs on the counter modules should always be connected using shielded cables.

- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On analogue modules and base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section of the configuration data sheets.
 - The module connects the shield to the functional earth via the mounting rail.

Fieldbuses

Please note:

- ▶ SafetyBUS p
 - See Installation Manual for SafetyBUS p
- ▶ Standard fieldbus systems
 - To connect the available fieldbus systems, please refer to the operating manual for the respective head module and the guidelines published by the user group or manufacturer.

ESD

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

System description

Supply groups

1.1

When used with the relevant base module, any electronic supply voltage module is suitable to separate supplies and form supply groups.

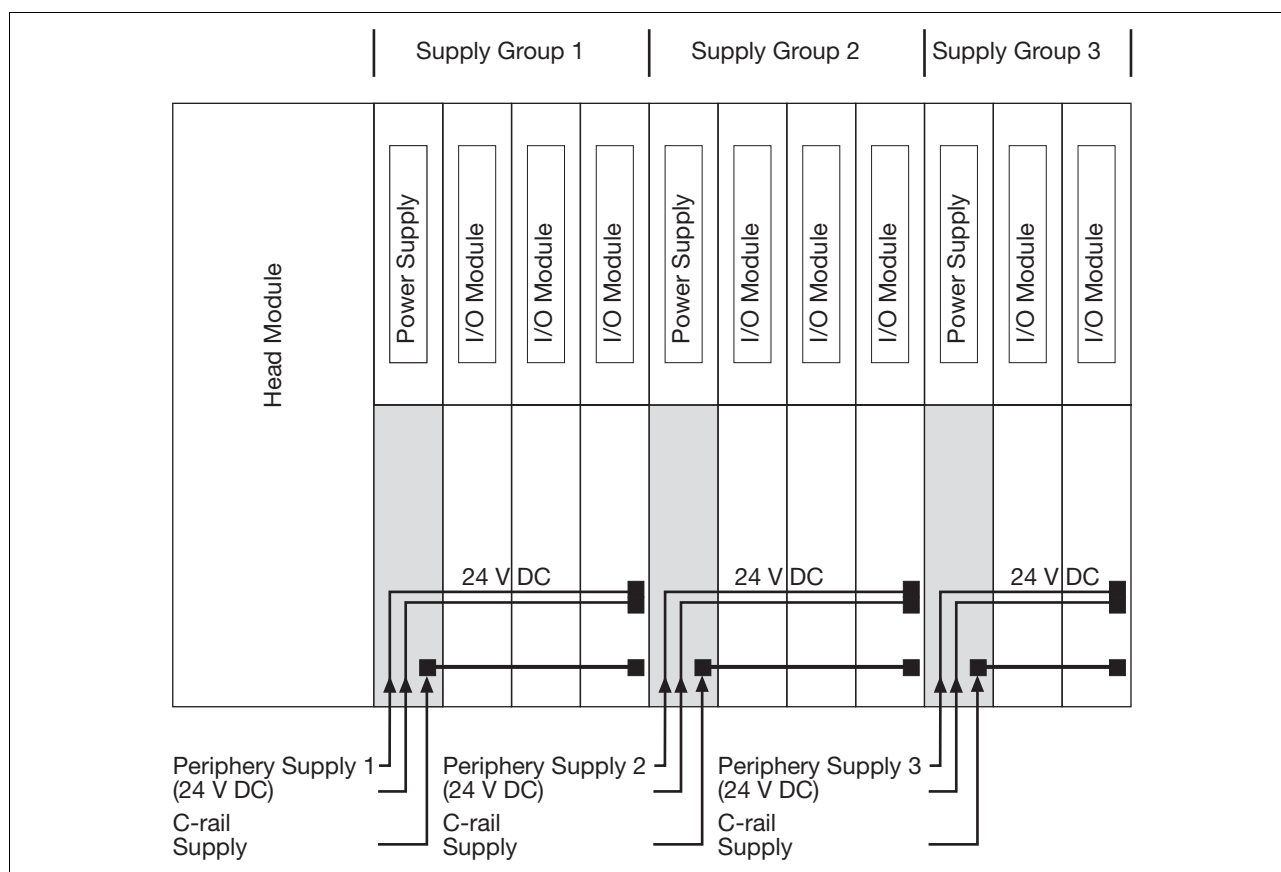
To separate supplies, the supply (periphery supply and C-rail supply) to the preceding (left-hand) modules is dis-

connected and a new supply provided for subsequent (right-hand) modules. With a new supply group it is also possible to refresh the module supply by providing a new supply voltage. The 0 V supply on the module supply is

never interrupted, but is always looped through across the whole module bus. You should always refer to the description of the relevant electronic supply voltage module.

The following modules are suitable for separating supplies, for example:

Electronic module	Base module	Module supply	Periphery supply and C-rail
PSSu E F PS	PSSu BS-R 1/8 S PSSu BS-R 1/8 C	Refreshing (new supply voltage is provided, 0 V supply is not interrupted).	Supply of the left-hand modules is interrupted and a new supply is provided for the right-hand modules.
PSSu E F PS1	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	No refreshing (5 V is not separated).	
PSSu E F BSW	PSSu BS 2/8 S PSSu BS 1/8 C		



System description

System software

System software is available to provide support when designing and assembling a PSSu system, configuring modules and during the wiring test. It consists of the following parts:

PSSuniversal Assistant

The PSSuniversal Assistant is a software package that provides support for designing and assembling PSSu systems. The software is available licence-free and can be used independently from the system software PSS WIN-PRO.

The PSSuniversal Assistant has the following function range, for example:

- ▶ Create project with PSSu systems and assemble PSSu systems
- ▶ Configure module parameters
- ▶ Generate project parts list
- ▶ Update modules' firmware
- ▶ Print/documentation

PSSuniversal Configurator

The PSSuniversal Configurator is a software package used to configure a PSSu system for SafetyBUS p or PROFINET/PROFINET with PROFIsafe profile. The software can only be used in conjunction with the SafetyBUS p Configurator of the PSS WIN-PRO system software or the Siemens software SIMATIC STEP 7 - HW Config.

The PSSuniversal Configurator has the following function range, for example:

- ▶ Assemble PSSu system
- ▶ Configure PSSu system for SafetyBUS p
- ▶ Configure PSSu system for local enable principle
- ▶ Configure module parameters
- ▶ Configure PSSu system for PROFINET or PROFINET with PROFIsafe profile

A licence for PSSuniversal Startup is required to download the FS configuration to a PSSu system via the Siemens software SIMATIC STEP 7 - HW Config.

- ▶ Print/documentation

PSSuniversal Startup

PSSuniversal Startup is a software package used to test the wiring of a PSSu system connected online.

A separate licence is required for the software. The software has the following function range, for example:

- ▶ Upload the system data of a PSSu system
- ▶ Test the wiring of the inputs on a PSSu system
- ▶ Test the wiring of the outputs on a PSSu system (forcing)
- ▶ Display system properties and system information
- ▶ Read error stack
- ▶ Print/documentation

PSSu systems can be assembled using both the PSSuniversal Assistant and PSSuniversal Configurator. However, it is easier and clearer to assemble a system while designing a configuration with the PSSuniversal Assistant. Already assembled PSSu systems can be imported in both system software sections.

Once installed, all the above system software sections are available. PSSuniversal Assistant and PSSuniversal Startup can be launched via the "Programs" directory" or a desktop icon, while PSSuniversal Configurator can only be launched via the SafetyBUS p Configurator of the PSS WIN-PRO system software or the Siemens software SIMATIC STEP 7 - HW Config.

System description

SafetyBUS p

1.1

SafetyBUS p is used as standard for safety-related, decentralised tasks in system environment A.

SafetyBUS p is based on Controller Area Network (CAN). The CAN controller has its own fault detection and correction mechanisms. Although the bus system is very noise resistant, CAN is categorised as non-safety-related. For this reason, SafetyBUS p intercepts in the second instance any errors that remain unnoticed by the fault detection and correction mechanisms on the CAN controller.

The safety concept behind SafetyBUS requires subscribers to be safe devices. This means that each device independently performs all the tests, monitoring functions and corresponding reactions necessary to achieve the required category (e.g. switching outputs to a safe condition in the event of an error).

These requirements can be met using head modules with SafetyBUS p interface and FS modules.

System description

Local enable principle

In safety technology, the FS section is usually separated from the ST section without feedback.

The local enable principle enables the ST section to have write access to the FS section.

In other words, with the help of the local enable principle, a standard control system can switch the FS outputs on the PSSu system via a standard bus

system, provided the enable is present via an FS signal. The ST signal and FS signal are logic AND-linked in the PSSu system. The result of the logic operation controls the FS output.

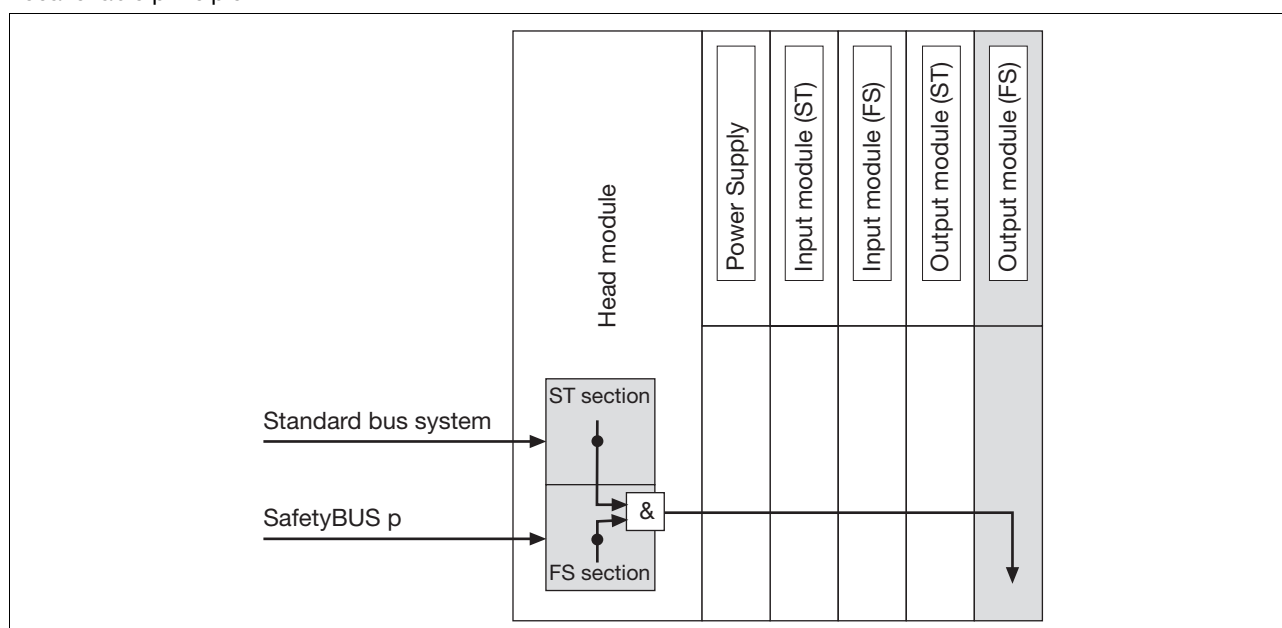
In the event of an error, the FS section must ensure that the FS output controlled by the standard control system can no longer be set.

An FS output that is intended for use with the local enable principle must be configured as such in the PSSuniversal Configurator.

Each FS output that is configured for the local enable principle will also require a bit in the process image of ST inputs and ST outputs. This must be taken into account when calculating the system limits.

1.1

Local enable principle:



System description

Reaction times

1.1

The reaction times refer exclusively to the inputs and outputs on a PSSu system. To determine the overall reaction times, the corresponding bus systems, InduraNET p wireless links, periphery devices and control systems must also be taken into account.

- ▶ **Digital inputs:**
The reaction time of the digital inputs is the time a PSSu system needs for a bus telegram to be finalised or for some other reaction from the head module to occur, once a signal has changed at an input.
- ▶ **Digital outputs:**
The reaction time of the digital outputs is the time a PSSu system needs to change a signal at the output once a bus telegram has been received.
- ▶ **Analogue inputs:**
The reaction time of the analogue inputs is the time a PSSu system needs to read in a value at the input and to make it available within a bus telegram.

- ▶ **Analogue outputs:**
The reaction time of the analogue outputs is the time a PSSu system needs to make the value available at the output once a bus telegram has been received.
An InduraNET p wireless link causes an additional time delay for the inputs/outputs on the remote system. This delay is heavily dependent on the quality of the transmission.

Scan time of a PSSu system

The PSSu module bus transfers fail-safe data and standard data independently from each other. This is why the FS scan time differs from the ST scan time.

t_{FS-Scan}
The FS scan time of the PSSuniversal is a constant 4 ms.

t_{ST-Scan}
The ST scan time of the PSSuniversal depends on the number of events that have occurred. The longest scan time

will need to be considered when the maximum number of ST modules is configured and all the inputs/outputs are changing simultaneously.

- ▶ Typical: 1 ms
- ▶ Maximum: 4 ms

Input/output processing time

t_{Processing In}

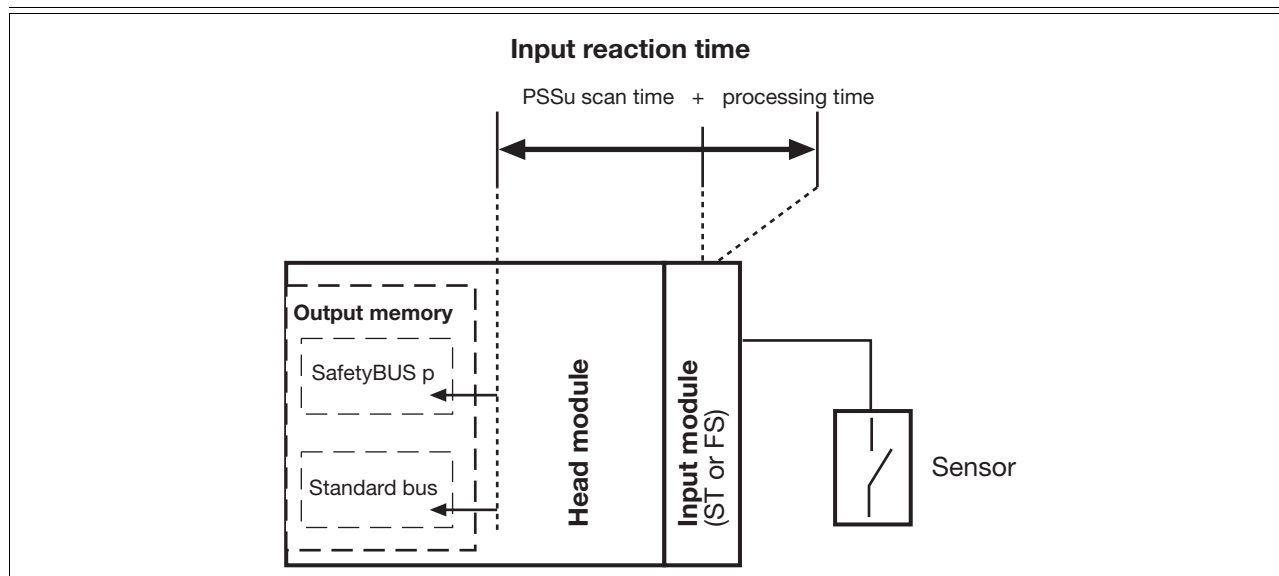
t_{Processing Out}

The processing time is the time an input/output module needs internally for signal processing. It varies depending on the module.

The processing time takes into account the input filter time and various influences such as internal run times, temperature drifts, spread of components, etc.

The processing times can be found in the technical details for the input/output modules.

Input		Reaction time	
Failsafe	Typical	$t_{FS-Reaction\ typ} = (1.5 \times t_{FS-Scan}) + t_{Processing\ In}$	$= 6\ ms + t_{Processing\ In}$
	Maximum	$t_{FS-Reaction\ max} = (2 \times t_{FS-Scan}) + t_{Processing\ In}$	$= 8\ ms + t_{Processing\ In}$
Standard	Typical	$t_{ST-Reaction\ typ} = (1.5 \times t_{ST-Scan\ typ}) + t_{Processing\ In}$	$= 1.5\ ms + t_{Processing\ In}$
	Maximum	$t_{ST-Reaction\ max} = (2 \times t_{ST-Scan\ max}) + t_{Processing\ In}$	$= 8\ ms + t_{Processing\ In}$

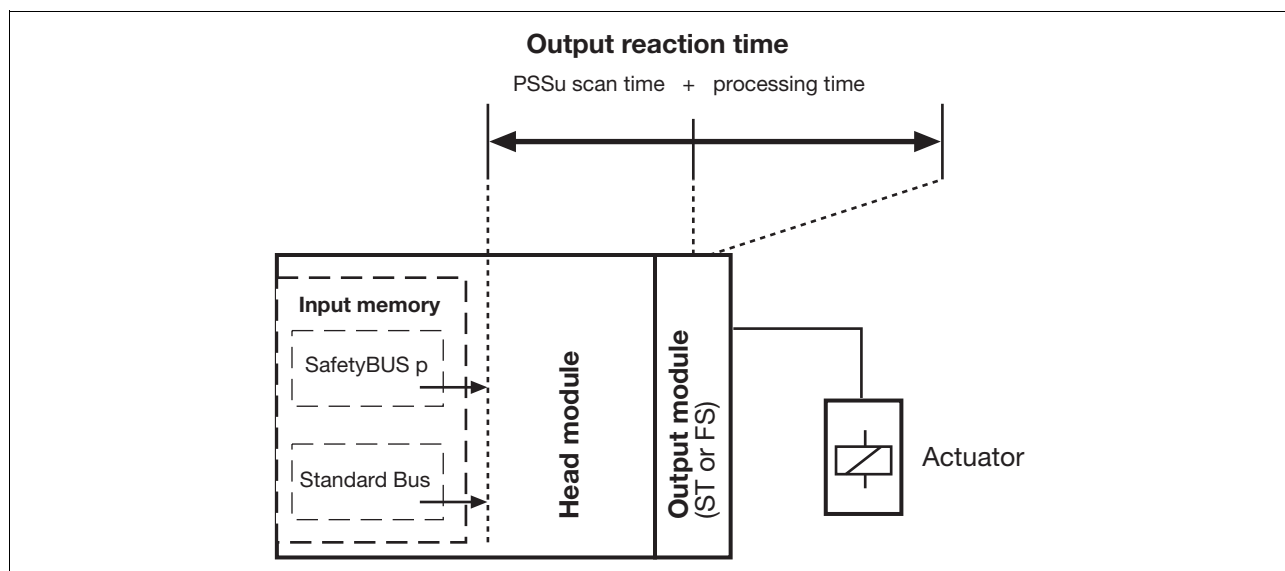


System description

Reaction times

Output		Reaction time	
Failsafe	Typical	$t_{FS\text{-}Reaction\ typ} = t_{FS\text{-}Scan} + t_{Processing\ Out}$	$= 4\ ms + t_{Processing\ Out}$
	Maximum	$t_{FS\text{-}Reaction\ max} = (2 \times t_{FS\text{-}Scan}) + t_{Processing\ Out}$	$= 8\ ms + t_{Processing\ Out}$
Failsafe with "&" (¹⁾)	Typical	$t_{FS\text{-}Reaction\ typ} = t_{FS\text{-}Scan} + 2\ ms$	$= 6\ ms$
	Maximum	$t_{FS\text{-}Reaction\ max} = (2 \times t_{FS\text{-}Scan}) + 2\ ms$	$= 10\ ms$
Standard	Typical	$t_{ST\text{-}Reaction\ typ} = t_{ST\text{-}Scan\ typ} + t_{Processing\ Out}$	$= 1\ ms + t_{Processing\ Out}$
	Maximum	$t_{ST\text{-}Reaction\ max} = (2 \times t_{ST\text{-}Scan\ max}) + t_{Processing\ Out}$	$= 8\ ms + t_{Processing\ Out}$

(¹) Special case: Digital FS outputs that are driven via the local enable principle. The processing time is a constant 2 ms when the FS output is enabled.



System description

Reaction times

1.1

Influence of InduraNET p on the control system's scan time

The typical scan time of an InduraNET p remote system is double

the size of the typical ST scan time of a PSSu system.

To ensure that no signal changes are "missed", the time taken by the control system to process the inputs/outputs

on a PSSu system as part of each cycle must not fall below a minimum time. This can be achieved in a number of ways:

- Calculate the control system's minimum scan time

$\text{Min. scan time} > (\text{Number of remote systems on a PSSu system} \times 2 \times 2 \text{ ms}) + 2 \text{ ms}$

- Adjust the control system's user program
Irrespective of the scan time, in the control system's user program it is possible to ensure that cyclical processing of the inputs/outputs on the PSSu system does not fall below a minimum time value. This can be implemented via a timer, for example.

$\text{Min. cycl. processing time} > (\text{Number of remote systems on a PSSu system} \times 2 \times 2 \text{ ms}) + 2 \text{ ms}$

System description

Firmware versions

1.1

							current firmware version				Type	Order no.	T-version
							PN IDN	PN ST	PN FS	FS			
							minimal required firmware version						
Digital input/output		FS	ST	PN FS	PN ST	IDN							
312195	PSSu E PD	1	1	1	1	1	◆				PSSu H SB	312010	314010
312196	PSSu E PD1	1	1	1	1	1	◆				PSSu H SB IBSe	312015	
312197	PSSu E S PD-D		16		1						PSSu H SB IBSo	312020	
312200	PSSu E F 4DI	4		1			◆				PSSu H SB DP	312025	314025
312210	PSSu E F 4DO 0.5	4		1			◆				PSSu H SB DN	312030	314030
312215	PSSu E F 2DO 2	4		1			◆				PSSu H SB CAN	312035	314035
312220	PSSu E F DI OZ 2	4		1			◆				PSSu H DP	312045	314045
312225	PSSu E F 2DOR 8	4		1			◆				PSSu H DN	312046	314046
312400	PSSu E S 4DI		5		1	1					PSSu H CAN	312047	314047
312401	PSSu E S 4DI-D		17		2						PSSu H IBSe	312048	
312405	PSSu E S 4DO 0.5		5		1	1					PSSu H IBSo	312049	
312406	PSSu E S 4DO 0.5-D		16		1						PSSu H F PN	312043	
312410	PSSu E S 2DO 2		5		1	1					PSSu H S PN	312041	
312411	PSSu E S 2DO 2-D		16		1						PSSu WR S IDN	312096	
312430	PSSu K S 16DI		17		2	9							
312431	PSSu K S 8DI 8DO 0.5		17		2	9							
312432	PSSu K S 16DO 0.5		17		2	9							
312510	PSSu E S 2DOR 10		16		2	9							
312511	PSSu E S 2DOR 2		16		2	9							

Firmware versions

current firmware version

current firmware version

System description

Firmware versions

minimal required firmware version							current firmware version			Type	Order no.	T-version
Voltage distributed	FS	ST	PN FS	PN ST	PN IDN	FS	ST	FS	ST			
312185 PSSu E F PS-P	4	5	1	1	6	◆	◆	◆	◆	PSSu H SB	312010	314010
312190 PSSu E F PS	4	5	1	1	6	◆	◆	◆	◆	PSSu H SB IBSe	312015	
312191 PSSu E F PS1	4	5	1	1	6	◆	◆	◆	◆	PSSu H SB IBSo	312020	
312230 PSSu E F BSW	4		1			◆	◆	◆	◆	PSSu H SB DP	312025	314025
312590 PSSu E PS-P 5V	1	1	1	1	1	◆	◆	◆	◆	PSSu H SB DN	312030	314030
312591 PSSu E PS-P +/-10V	1	1	1	1	1	◆	◆	◆	◆	PSSu H SB CAN	312035	314035
312592 PSSu E PS-P +/-15V	1	1	1	1	1	◆	◆	◆	◆	PSSu H DP	312045	314045
						◆	◆	◆	◆	PSSu H DN	312046	314046
						◆	◆	◆	◆	PSSu H CAN	312047	314047
						◆	◆	◆	◆	PSSu H IBSe	312048	
						◆	◆	◆	◆	PSSu H IBSo	312049	
						◆	◆	◆	◆	PSSu H F PN	312043	
						◆	◆	◆	◆	PSSu H S PN	312041	
						◆	◆	◆	◆	PSSu WR S IDN	312096	

Legend:

FS = Failsafe

ST = Standard

PN = PROFINET

IDN = InduraNET p

T-version = Temperature-resistant modules

System description

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System description

Terminology: System environment A and B

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

The distinction is made between

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

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

PSSu in system environment A may be used in the

- ▶ Decentralised system PSSu I/O with SafetyBUS p
- ▶ Decentralised system PSSu I/O with ST fieldbuses such as CANopen, DeviceNet
- ▶ **Not** in the automation system PSS 4000

PSSu in system environment B may be used in the

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

System description

Terminology: System environment A and B

This chapter "System environment B basics" describes the PSSu system in system environment B.

System description

Glossary

2.1

- ▶ **Absolute encoder**
Encoder that provides an absolute value for each position. The absolute value corresponds directly to the position of the detected machine component
- ▶ **Base module**
Carrier unit for an electronic module; used to connect the field wiring
- ▶ **Base station**
PSSu module that exchanges data from the PSSu with a remote station via wireless signals or cable connection
- ▶ **Base system**
PSSu subsystem that is connected to the remote system, e.g. via wireless signals or cable connection
- ▶ **Bit module**
Electronic/compact module whose data requires one bit each in the process image
- ▶ **Byte module**
Electronic/compact module, the data for which requires different data widths in the process image (bit, byte and/or word).
Example: Counter modules
- ▶ **Certification**
Procedure by which a product's compliance with the applicable regulations and standards is tested by a notified body; proven compliance is confirmed through the issue of a certificate
- ▶ **Certification body**
Notified body in accordance with Article 14 of the Directive 2006/42/EC
Otherwise: Accredited institution, often a government body, which examines and confirms a product's compliance with applicable regulations and standards
- ▶ **CFM**
(Coexistence Frequency Management) Technology that prevents interference between InduraNET p and other wireless-based systems
- ▶ **Coated version**
The coated versions of the modules are suitable for use where there are increased environmental requirements on temperature and humidity
- ▶ **Cold start**
A PSSu system performs a cold start when the module supply is applied
- ▶ **Compact module**
Combines the function unit (inputs or outputs) and connection levels in one housing
- ▶ **Competent person**
A person who, through training, experience and current professional activity, has acquired the necessary knowledge and authorisation to test, assess and handle devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology
- ▶ **C-rail**
Additional, available power rail
- ▶ **Derating diagram**
Dependency of the maximum permitted current on the ambient temperature
- ▶ **Device Editor**
Software tool for defining the settings for a device and for calling up information from the device
- ▶ **Diagnostic list**
List of the current diagnostic messages
- ▶ **Diagnostic log**
Log that shows when diagnostic messages arrived, when they were cleared and when they were acknowledged. It also contains entries regarding operation and debugging
- ▶ **Diversely redundant**
A piece of information is processed more than once and in different ways
- ▶ **Download**
Download of data from the PC to the device
- ▶ **Dual-pole, differential**
Property of a positive (+24 V) switching and earth (0V) switching output
- ▶ **Electronic module**
Module that provides a function, e.g. input or output; plugged into the base module
- ▶ **Enable principle**
ST section has write access to the FS section; FS outputs can be switched via the ST section
On PSS 4000, FS data sinks (e.g. FS hardware outputs) can be switched via ST data sources (e.g. ST hardware inputs)
- ▶ **Failsafe**
Abbreviation: FS
Safety-related, failsafe; a failsafe system switches to a safe condition in the event of an error
- ▶ **Fieldbus**
Standard bus system that transfers process data between various bus subscribers, e.g. DeviceNet, PROFIBUS
- ▶ **FIR filter**
Filter with finite impulse response
- ▶ **Firmware**
Abbreviation: FW
Software created by a manufacturer for a device, to perform device-specific functions
- ▶ **Firmware update**
Updating a device's firmware
- ▶ **FS resource**
Execution unit for safety-related control code
- ▶ **Gain**
Amplification factor; signed value, which is multiplied by the transferred value in the event of a correction
- ▶ **Gray code**
Display format of binary figures, in which adjacent figures differ in only one single bit
- ▶ **Grid width**
Base modules and electronic modules have a grid width of 12.6 mm or an integer multiple thereof
- ▶ **Hardware input**
Physical input of a device
- ▶ **Hardware output**
Physical output of a device
- ▶ **Head module**
Module that co-ordinates process data traffic via standard fieldbus systems or SafetyBUS p
- ▶ **IIR filter**
Filter with infinite impulse response
- ▶ **Incremental encoder**
Sensor for detecting linear or rotational positional changes; path, speed and direction can be determined by evaluating the number of pulses, pulse frequency and phase position
- ▶ **InduraNET p**
Wireless system from Pilz, suitable for industrial use
- ▶ **InduraNET p system**
Base station in conjunction with the corresponding remote stations

System description

Glossary

- ▶ **Input/output module**
Electronic module with input or output function and base module with terminals for connecting the inputs or outputs
 - ▶ **Intended use of a machine**
Use of a machine in accordance with the information provided in the instructions for use
[EN ISO 13849-1] and
[EN ISO 14121-1]
 - ▶ **Inverted signals**
Each bit in a transmission is sent inverted on another line, i.e. "1" becomes "0" and "0" becomes "1".
 - ▶ **I/O mapping**
Mapping of a PI variable to an input/output or to another PI variable
 - ▶ **I-PI variable**
Variable in the process image which can be mapped to a hardware input or O-PI variable
 - ▶ **LSB**
Least significant bit
 - ▶ **Mechanical coding**
Coding element on the electronic module, with its counterpart in the base module.
 - ▶ **Module bus**
Bus to supply voltage to the modules and transfer data between the head module and electronic modules
 - ▶ **Module supply**
Internal supply voltage for the head module and electronic modules
 - ▶ **MSB**
Most significant bit
 - ▶ **Offset**
Zero point compensation; constant, signed value, which is added to the transferred value in the event of a correction
 - ▶ **O-PI variable**
Variable in the process image which can be mapped to a hardware input or O-PI variable
 - ▶ **Periphery supply**
Supply voltage for the sensors and actuators on input/output modules
 - ▶ **PI variable**
Variable in the process image which can be mapped to a hardware input/output or to another PI variable
There are I-PI and O-PI variables
 - ▶ **Processing time**
The time a module requires internally to process signal changes
 - ▶ **Program**
Logical assembly of all the programming language elements and constructs necessary for the intended signal processing required for the control of a machine or process by a PLC-system.
[IEC 61131-1]
 - ▶ **Project**
A project contains all the data needed to control and monitor a system (plant, machine). Project = User program + hardware configuration
 - ▶ **Quality of process data**
Information on whether process data relates to the "process value" or a "substitute" value
 - ▶ **Reaction time**
Time it takes for a bus telegram to be finalised or for some other reaction from the head module to take place once a signal has changed at an input, or the time it takes the signal at an output to change once a bus telegram has been received
 - ▶ **Real-time system**
System in which the validity of a calculated result depends not only on logical accuracy but also on the time at which the result is provided. A response that is too early or too late is an incorrect response
 - ▶ **Redundant antenna**
Two offset antennas in one housing, which can compensate for local quenching, e.g. in mobile applications
 - ▶ **Remote station**
First module in a remote system, which exchanges data with the PSSu base station via wireless signals or cable connection
 - ▶ **Remote system**
PSSu subsystem that is connected to the base system, e.g. via wireless signals or cable connection
 - ▶ **Resolution**
Number of bits for the display of a numerical value
 - ▶ **Resource**
Entity to execute code, e.g. FS resource, ST resource, VISU resource, MC resource.
Term in the component model: Unit that executes the content of the aspect blocks.
- Example: a PSSu system contains two resources: one to execute fail-safe (FS) IEC 61131 code and one to execute non-failsafe (ST) IEC 61131 code
- ▶ **Safe condition**
Condition in which power is removed from the safety circuits
 - ▶ **Scaling**
Setting for offset and gain on analogue modules
 - ▶ **Sign and magnitude representation**
Display format of binary figures for positive and negative values. The MSB is the sign bit.
 - ▶ **Single-pole, referenced to earth**
Property of an earth (0 V) switching output; also: single ended
 - ▶ **SSI**
Abbreviation for synchronous serial interface; interface for absolute encoder, used in the drive technology sector to transmit positional data
 - ▶ **Standard**
Abbreviation: ST
Not safety-related, in contrast to failsafe.
 - ▶ **Standard bus system**
Non-safety-related bus system, e.g. DeviceNet or PROFIBUS, in contrast to SafetyBUS p or SafetyNET p from Pilz
 - ▶ **ST resource**
Execution unit for non-safety-related control code
 - ▶ **Supply module**
Consists of an electronic module and a base module; also: Supply voltage module
 - ▶ **System**
A number of modules combined to form a functional unit
 - ▶ **System environment A**
For use in
 - Decentralised system PSSu I/O with SafetyBUS p
 - Decentralised system PSSu I/O with ST fieldbuses such as CANopen, DeviceNet
 - Not for use in the automation system PSS 4000

System description

Glossary

2.1

► **System environment B**

For use in the automation system

PSS 4000, e.g. with

- Decentralised system PSSu I/O with SafetyNET p

- Control system PSSu PLC

Control system PSSu multi

► **Test pulse**

Test pulse signal which is wired to an input in order to detect wiring errors in that input. These errors may be: open circuit, short circuit to 24 VDC or 0 V or shorts between two inputs.

► **Two's complement**

Display format of binary figures for positive and negative values. To form a negative figure, each bit of the positive figure is inverted and 1 is added

System description

Modular design

A PSSu system is assembled from a variety of modules, to suit the functions required. The modular structure makes it easier to react to modifications and adjustments. With a PSSu system, not only is it possible to adapt the scope retrospectively (e.g. extend the number of I/Os, extend/modify the I/O technology, such as using relay outputs, adding I/O functions such as analogue evaluation, counter functions, temperature evaluation), it's also possible to convert a PSSu system with a lower performance rating (e.g. decentralised system PSSuniversal I/O) into a PSSu system with a higher performance rating (e.g. control system PSSuniversal PLC).

A PSSu system is configured in the PSSu Module Editor of the PAS4000.

A PSSu system consists of:

- ▶ A head module with integrated supply voltage
- ▶ Input/output modules for standard and failsafe applications
- ▶ Supply voltage modules (only if necessary)
- ▶ End bracket to secure the system at the start
- ▶ Terminating plate with integrated bus terminating resistors and end bracket to secure the system at the end

Head module:

The head module co-ordinates a PSSu system's entire data traffic and determines its performance class. There are three different performance classes:

- ▶ Decentralised system PSSu I/O
 - PSSu system without control functionality
 - Consists of head module, electronic modules and/or compact modules
 - I/Os are controlled via SafetyNET p by means of a control system PSSu PLC/PSSu multi
- ▶ Control system PSSu multi
 - PSSu system with the functionality of a compact safety control system
 - Consists of head module, electronic modules and/or compact modules
 - FS resource available
 - One task only can be configured

- Programmed via the PAS4000 Multi Editor
- ▶ Control system PSSu PLC
 - PSSu system to control automation plants
 - Consists of head module, electronic modules and/or compact modules; however, the electronic modules/compact modules are not needed if the PSSu system is used exclusively to control decentralised I/Os with SafetyNET p
 - Control of I/Os from decentralised PSSu systems of all performance classes when networking with SafetyNET p
 - ST resource and FS resource available
 - Max. of 9 tasks can be configured
 - Programmed via the PAS4000 Multi Editor or programmed in PAS4000 in accordance with IEC 61131 in PAS4000

Input/output modules:

Input/output modules are available in different designs:

- ▶ Electronic module and base module
- ▶ Compact module

The input/output modules are available for a wide range of input/output functions.

Supply voltage modules:

The head module provides the supply voltage for the remaining modules. Additional power supplies may also be required (e.g. potential isolation, voltage refresh).

Supply voltage modules consist of an electronic module and base module.

Designs:

Electronic modules and base modules:

The electronic modules determine the function of the supply voltage or input/output module.

- ▶ Electronic modules
 - Are plugged into the base modules
 - Communicate with the head module via the module bus

The base modules are the carrier units for the electronic modules.

- ▶ Base modules
 - Are used to connect the field wiring

- Are available with the following connection types:
 - Cage clamp terminals or screw terminals

Compact modules:

The compact modules combine the function unit (inputs and/or outputs) and connection levels in one housing. Wiring is via multi-pin connectors with spring-loaded terminals, which are plugged into the connector strips on the module.

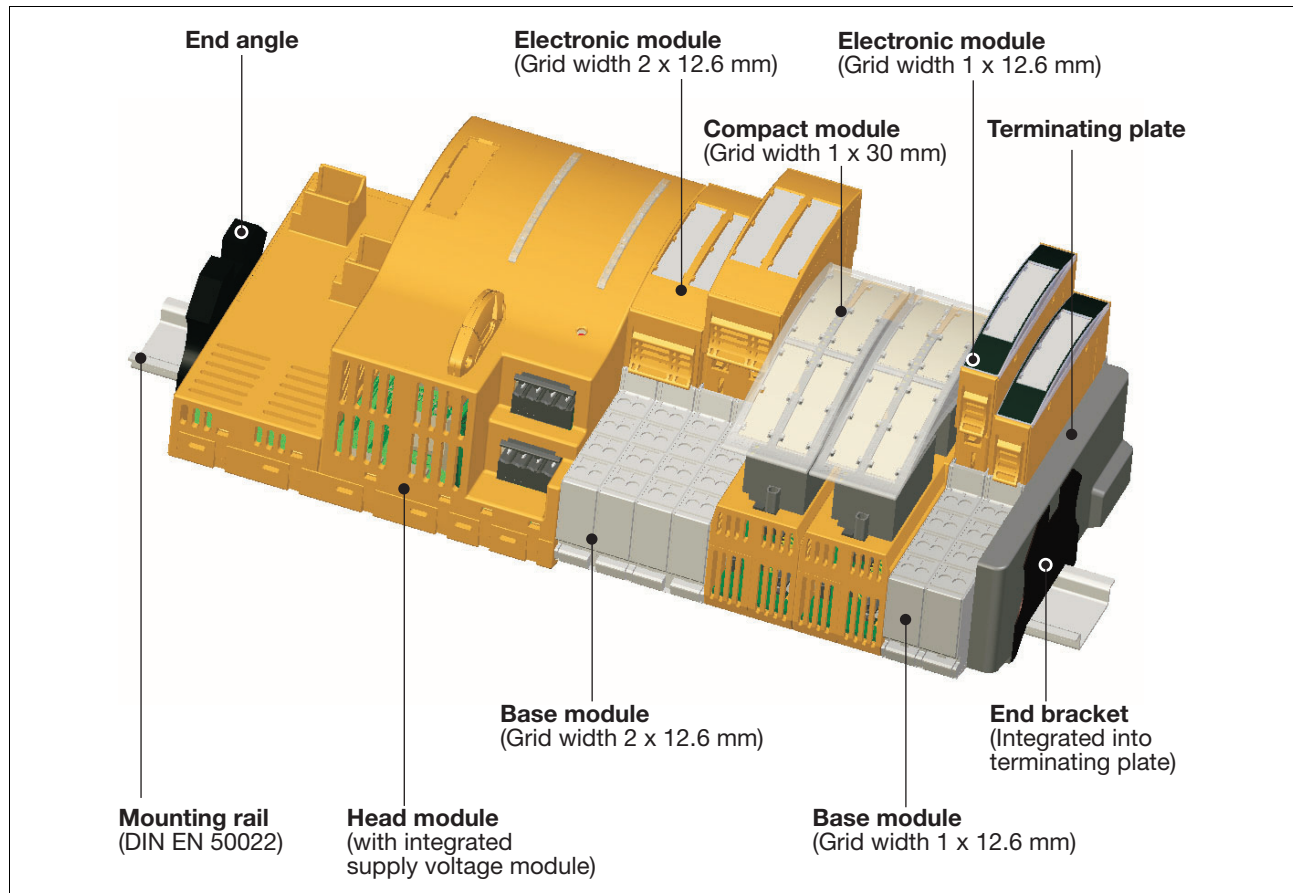
Compact modules

- ▶ Do not need base modules
- ▶ Are used to connect the field wiring
- ▶ Communicate with the head module via the module bus

System description

Modular design

2.1



System description

Module descriptions

The module descriptions provide information on their function. The descriptions are made up of multi-level combinations of letters and numbers. All module names begin with **PSSu**. This is followed by:

- ▶ **H** for head modules
e. g.: PSSu **H** PLC1 FS DP SN SD
- ▶ **E** for electronic modules, then:
 - **S** for standard module,
e. g.: PSSu **E S** 4DI
 - **F** for failsafe module,
e. g.: PSSu **E F** 4DI
- ▶ **K** for compact module, then:
 - **S** for standard module,
e. g.: PSSu **K S** 16DI
 - **F** for failsafe module,
e. g.: PSSu **K F** 16DI
- ▶ **B** for base modules,
e. g.: PSSu **BP** 1/8S

Base modules	Basic function	Size	Connection type	Additional function
PSSu B...	PSSu BP... – Base module for periphery (input/output) PSSu BP-C... – Base module for periphery with C-rail PSSu BS... – Base module for power supply PSSu BS-R... – Base module for refreshing the power supply	PSSu BP-C 1/8... – 1 x grid width, 8 connections PSSu BP-C 1/12... – 1 x grid width, 12 connections PSSu BP-C 2/16... – 2 x grid width, 16 connections PSSu BP-C 2/8... – 2 x grid width, 8 connections	PSSu BP-C 1/8 C – Cage clamp terminals PSSu BP-C 1/8 S – Screw terminals	PSSu BP 1/8S- J – Integrated cold junction compensation

Link modules have individual letter codes, depending on their application, as e. g.:

- ▶ PSSu **WB** S IDN, PSSu **WR** S IDN
(for wireless communication with InduraNET p)
- ▶ PSSu **XB** F-T, PSSu **XR** F-T
(for cable-based subdivision)

The accessories of the PSSu systems are designated **PSSu A...**

PSSu modules are available which are suitable for use in applications where the environmental requirements regarding temperature and humidity are increased. These are called coated versions of PSSu modules. The functionality of the coated versions of PSSu modules is no different from that of uncoated modules. It is identified by a "**-T**" at the end of the product name, e.g.: PSSu E F DI OZ 2-**T**.

In the following text, the designation "PSSu E F DI OZ 2(-**T**)", with "**-T**" in brackets, is used when the information specifically refers to both modules. In function descriptions and diagrams, "PSSu E F DI OZ 2" is used to represent both modules.

System description

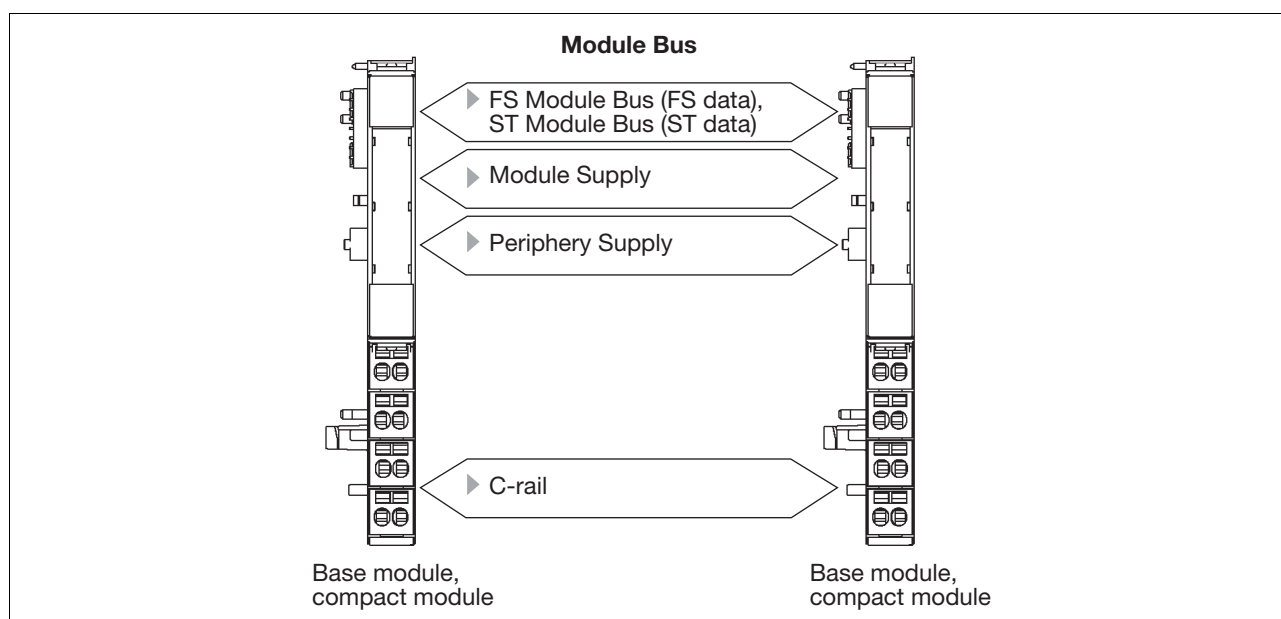
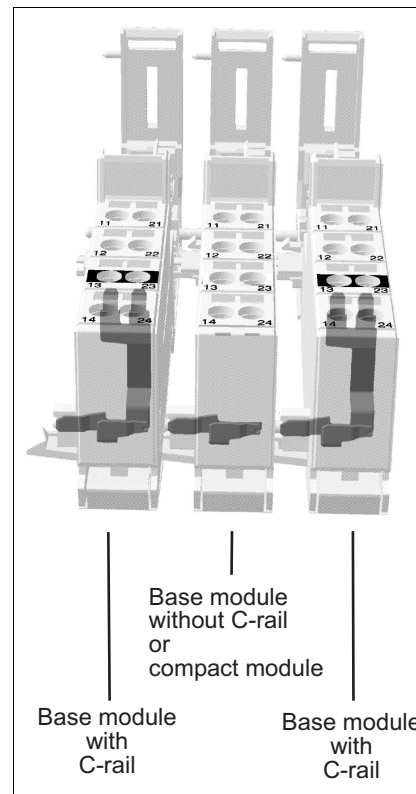
Module bus

The module bus supplies the modules of a PSSu system with voltage and transfers data between the head module and the electronic/compact modules. The module bus is formed by arranging the base modules/compact modules together and connecting them via a mechanical latch. The module bus is structured as follows:

- ▶ Data bus
 - two separate bus systems for fail-safe data (FS module bus) and standard data (ST module bus).
- ▶ Supply voltage for:
 - Module supply
 - The module supply is the internal supply voltage for the head module and electronic modules.
 - Periphery Supply
 - The periphery supply supplies 24 VDC to the sensors and actuators on digital input/outputs on electronic modules. On compact modules, the supply for the inputs is generated from the periphery supply; the supply for the outputs must be fed to the module terminals. The connection on

the module bus can be disconnected in order to form supply groups.

- ▶ C-rail ("cross connection")
 - The C-rail is an additional, free power rail. Access to the C-rail is available via base modules that contain the letter "-C" in their description (e.g. PSSu BP-C 1/8 S, PSSu BP-C 1/8 C).
 - The C-rail supply must belong to the same circuit as the other base module connections. Connecting PE to the C-rail provides a simple form of shield. On the compact modules, the C-rail is only looped through and is not available at the terminals.



System description

Maximum system expansion

The PSSu Module Editor on PAS4000 provides support in assembling a PSSu system. The tool checks the system limits as the data is entered.

The expansion of a PSSu system is limited by the following values

- ▶ Number of modules
- ▶ Number of FS modules
- ▶ Number of ST modules

- ▶ Number of failsafe inputs/outputs
 - ▶ Number of standard inputs/outputs
 - ▶ Current load of module bus
- The system limits are listed and explained below.

Number of modules and inputs/outputs on a PSSu system

The following system limits apply:

Module type	Max. number per PSSu system
- - -	Total of 64 modules
ST modules	64 modules
FS modules	64 modules
PSSu E F DIOZ 2	16 modules
PSSu E F BSW	24 modules
ST bit modules	256 ST input bits 240 ST output bits
FS bit modules	256 FS input bits 256 FS output bits
ST byte modules	16 modules
FS byte modules	16 modules
PSSu E S RS232	6 modules
PSSu E S RS485	6 modules

A PSSu system may have a max. 64 modules. When counting up the modules, please note the following peculiarities:

- ▶ The head module and passive junction modules (e. g. PSSu E PD, PSSu E PD1) are not counted.
- ▶ The following modules in a PSSu system are included in the count:
 - Supply voltage modules
(identifier: PSSu E F PS...)
 - Standard modules
(Identifier: PSSu E S..., PSSu K S...)
 - Failsafe modules
(identifier: PSSu E F..., PSSu K F...)

System description

Maximum system expansion

Maximum current load capacity on the supply voltage modules

System supply	Max. current load
Module supply when supplied via - PSSu E F PS(-T)	1.5 A
Module supply when supplied via - PSSu E F PS1(-T)	2 A
Periphery supply	10 A
C-rail	10 A

- ▶ **Module supply**
The module supply's current load is the total current consumption resulting from the electronic modules and compact modules. If the total current consumption is higher than the supply module's current load capacity, the module supply must be refreshed with an additional supply module (see modules' technical details). The system software takes this into account.
- ▶ **Periphery supply**
Maximum current load: 10 A

The current load of the periphery supply is the sum of the current consumption of the sensors and actuators supplied via the input/output modules. If the current load is higher, the periphery supply must be refreshed with an additional supply module to prevent overload. Please refer to the derating diagram.

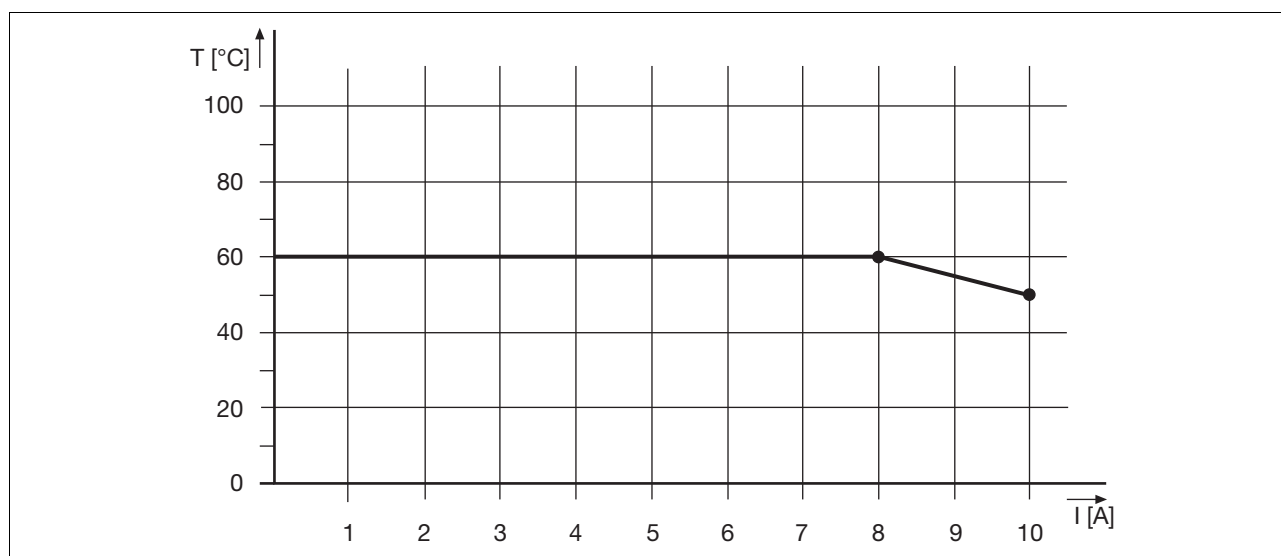
- ▶ **C-rail**
Maximum current load: 10 A
If the current load is higher, the C-rail must use a different supply to

prevent overload. Please refer to the derating diagram.

Maximum current load capacity based on temperature

The maximum current load capacity of the module bus with regard to the periphery supply and C-rail can only be achieved if the max. permitted ambient temperature is adhered to.

Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



System description

Maximum system expansion

Coated version: Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



System description

Diagnostics

Effective diagnostics are required in order to keep machine downtimes to a minimum. Diagnostics must provide all the information necessary to rectify faults quickly, prevent faults and analyse machine conditions.

The PSS 4000 distinguishes between system diagnostics and process diagnostics.

► System diagnostics

Diagnostics on hardware and firmware, including errors in the hardware configuration or user program.

The system diagnostics are provided by Pilz in full. Only a few adjustments can be made by the user, e.g. switch off mandatory acknowledgement.

► Process diagnostics

Diagnostics performed on procedures and conditions. The process diagnostics are created by the user within the user program. Pilz component blocks are supplied with process diagnostics, which users can adapt to suit their own requirements.

System description

Safety

Application area of a PSSu system

PSSu systems of all performance classes are designed for use in an industrial environment, as follows:

- ▶ Safety-related applications via the FS resource of a control system PSSu PLC/PSSu multi, including connection to SafetyNET p for decentralised tasks.
- ▶ Non-safety-related applications via the ST resource of a control system PSSu PLC, including connection to SafetyNET p and/or other standard bus systems for decentralised tasks.

In principle, PSSu systems of all performance classes can be used in any situation where the result of the risk assessment indicates they may be used. However, they are primarily suitable for use in machine safety circuits in which a safe condition is brought about by the removal of power.

Examples:

- ▶ Presses
- ▶ Transfer lines
- ▶ Tank storage facilities
- ▶ E-STOP functions
- ▶ Burner control systems
- ▶ Cable cars/traction operations
- ▶ Stage technology

Foreseeable misuse and abuse

- ▶ Without additional measures, the automation system PSS 4000 is not suitable for use in areas with increased environmental requirements (e.g. potentially explosive areas).
- ▶ The automation system PSS 4000 is not suitable for plants in which the removal of power does not lead to a safe condition.
- ▶ On passenger transportation systems, appropriate evacuation measures must be made or self-contained rescue equipment installed, should the plant should come to a standstill as the result of an error.
- ▶ Where locked zones have an electrical release, emergency release devices should be provided.
- ▶ Safety devices may not be overridden until appropriate measures of equal value are put in place.

Achieving a safety class

Please note: To achieve the corresponding category or safety class, the whole system including all safety-related components (parts, devices, user program etc.) must be included in the assessment. For this reason, Pilz cannot accept liability for the correct classification into a category or requirement class.

Safety automation system PSS 4000

Depending on the application area and its respective regulations, PSSu systems of all performance classes can be used up to SIL 3 of EN 62061 and up to PL e (Cat. 4) of EN ISO 13849-1. The relevant technical details for a risk assessment can be found in the respective operating manual.

SafetyNET p is used for networked automation functions. This safe communication was developed in accordance with relevant standards, such as EN IEC 61508. Independent certification bodies such as BG have confirmed the security of the concept and the suitability of SafetyNET p in safety-related applications up to PL e (Cat. 4) of EN ISO 13849-1 or SIL 3 of EN/IEC 62061. The relevant technical details for the modules, as required for the risk assessment, can be found in the operating manual for the respective module.

Before using a PSSu system it is necessary to perform a safety assessment in accordance with the Machinery Directive. A PSSu system as an individual component is a safety-related system for the purposes of EN/IEC 61508. It guarantees functional safety against hardware and firmware errors, for example. However, it does not guarantee the safety of the overall process and design, nor of the project. The user is responsible for the safety of the project. Pay special attention when programming and observe local standards and regulations. A faulty user program can jeopardize the safety of the entire process!

Define the safety requirements for the entire plant, for all phases of the service life and the entire safety lifecycle, and also define how these will be implemented from a technical and organisational standpoint.

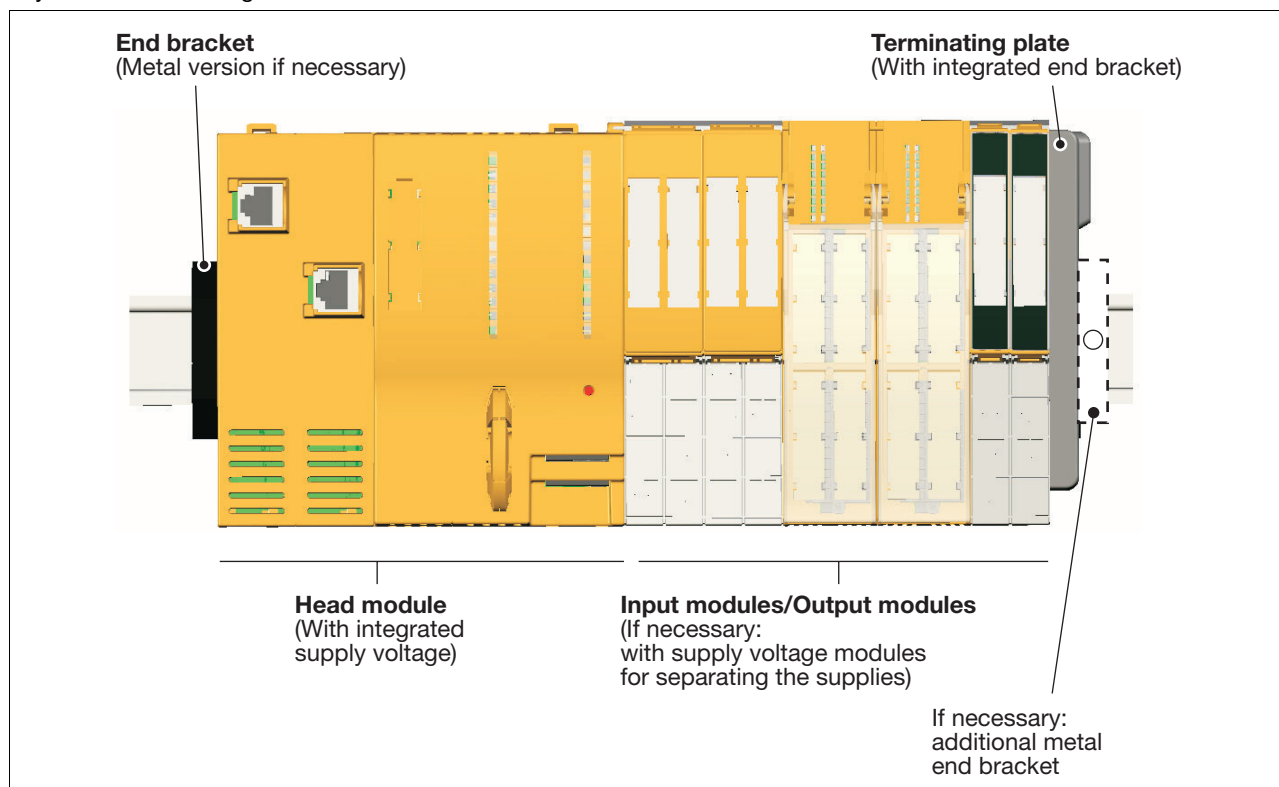
System description

Module layout

Module layout

- ▶ The first module on a PSSu system is always a head module. The supply voltage is integrated within the head module:
 - Module supply (to supply the head module and input/output modules)
 - Periphery supply (to supply the sensors and actuators)
 - The supply voltage is already integrated on the InduraNET p head module. There is no need for a supply voltage module.
- ▶ Input/output modules for FS and ST applications may follow on to the right:
 - The input/output modules may be installed in any order.
 - Input/output modules for FS applications and ST applications may be combined as required.
 - If modules of the same function are combined into groups it makes things clearer and simplifies the wiring.
 - Base modules with screw terminals cannot be mixed in one PSSu system with base modules with cage clamp terminals.
 - A base module with screw terminals may not be installed to the left of a compact module.
 - The maximum number of input/output modules is determined by the system limits.
 - Input/output modules for FS applications may not be used with head modules that are only designed for ST applications.
- ▶ Additional supply voltage modules may be required in order to refresh the module supply or periphery supply.
- ▶ Supply groups require an additional voltage supply module 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 terminating resistors for the module bus.
- ▶ The system is attached to the mounting rail using fastening elements at the start and end of the system. The following end brackets are available, depending on vibration and shock stress:
 - Plastic version (standard)
 - Metal version (where there is increased stress)

Layout of the fastening elements:



System description

Connections

Connections on the base modules

The connections on the base modules are divided into connection levels and connection columns. The connections have a two-digit number.

- ▶ The first digit denotes a base module's connection column (e.g.: connection **23** is in the second column).
- ▶ The second digit denotes a base module's connection level (e.g.: connection **23** is in the third level).

The function of the base module connections depends on the electronic module.

On input/output modules, the connection levels are typically arranged as follows:

- ▶ Connection level 1 and 4
Input and output connections
- ▶ Connection levels 2 and 3
Connections for the common supplies (periphery supply, analogue inputs/outputs or screening)

Many input/output modules may have two more connection levels:

- ▶ Connection level 5 and 6
Connections for the common supplies (periphery supply, analogue inputs/outputs or screening)

Input/output modules can be installed in any order. However, for the connection diagram to be consistent it makes sense to arrange input/output modules of the same type into groups and not have them interrupted by compact modules (see example).

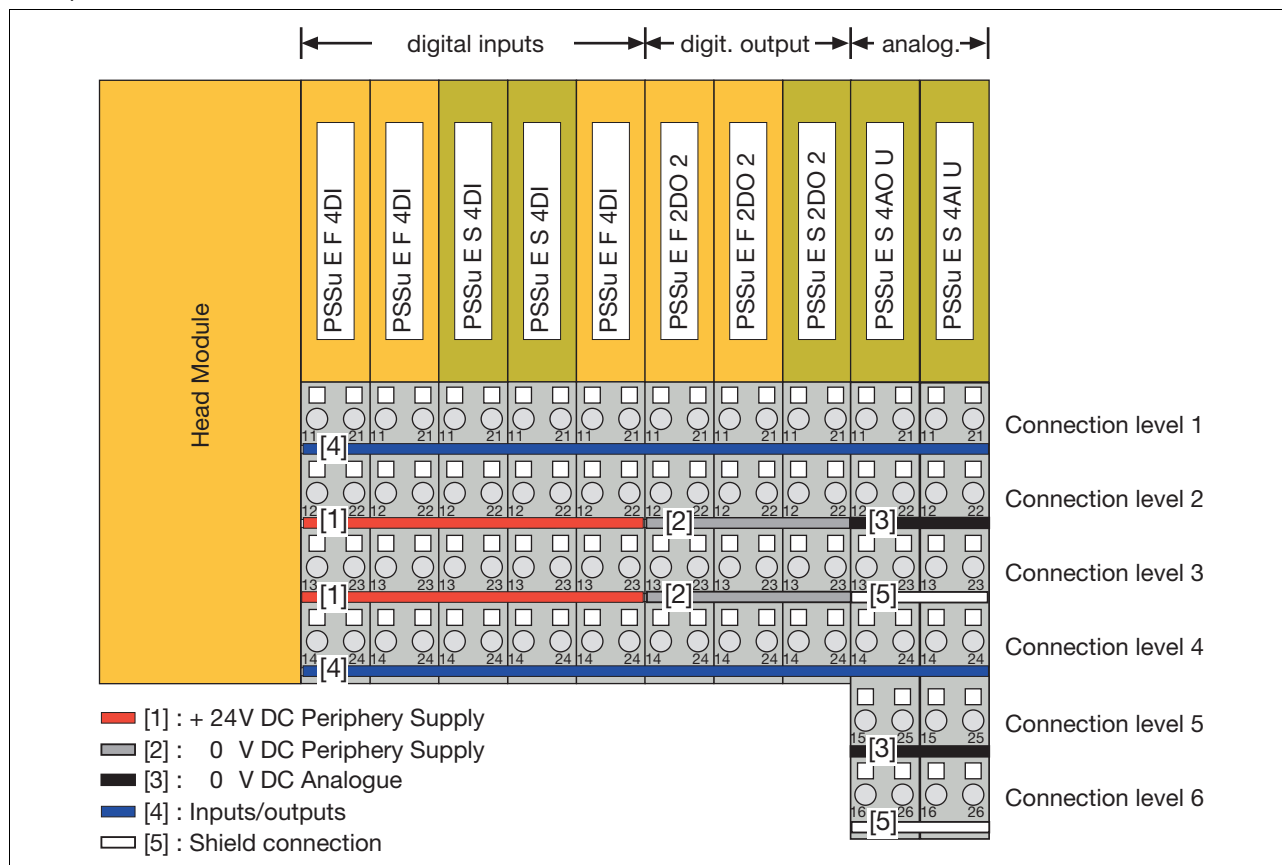
tion diagram to be consistent it makes sense to arrange input/output modules of the same type into groups and not have them interrupted by compact modules (see example).

Colour markings on the connection levels

The colour marking on the connection levels is a wiring aid. Various colour markers are available for labelling. The colour markers can be used to label different supplies. This way the connection levels remain clearly visible, even after wiring.

2.1

Example:



System description

Connections

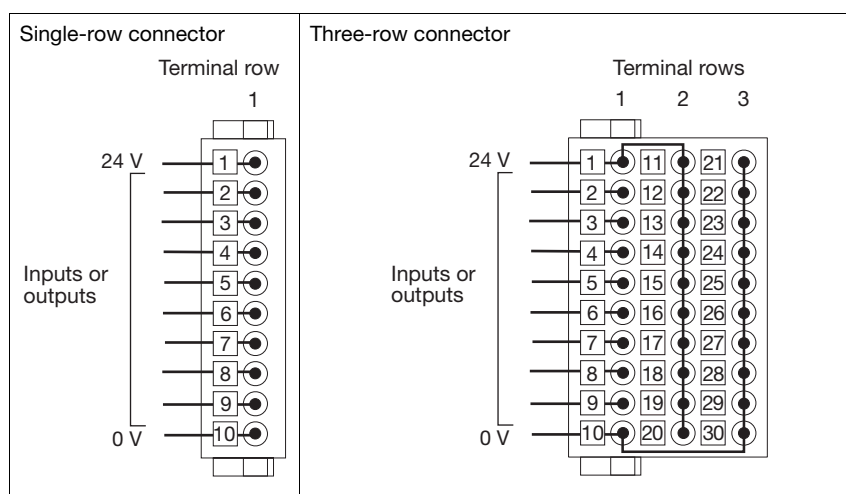
Connections on the compact modules

The connections on the compact modules are divided into terminal rows. Single or three-row connectors with spring-loaded terminals can be plugged into the device's single-row 10-pin connector strip.

The function of the connections depends on the compact module.

- ▶ **Terminal row 1**
Connection of the inputs and outputs, periphery supply (24 V and 0 V).
- ▶ **Terminal row 2**
All connections are linked; bridged to the 24 V periphery supply connection from the first connection level

- ▶ **Terminal row 3**
All connections are linked; bridged to the 0 V periphery supply connection from the first connection level
Input/output modules can be installed in any order. However, for the connection diagram to be consistent it makes sense to arrange input/output modules of the same type into groups.



System description

Installing within a control cabinet

A PSSu system must be installed in a control cabinet. Use a zinc-plated DIN-rail in accordance with DIN EN 50022 as the mounting rail (top hat rail). Dimensions:

- ▶ 35 x 7.5 mm or 35 x 15 mm

When installing, please note the following:

- ▶ Where vibration and shock stress place increased requirements on the system fastenings, we recommend that the mounting rail is screwed to the mounting plate approximately every 200 mm.
- ▶ We recommend that it is installed horizontally on a vertical wall. If other mounting positions are used (e.g.

vertical installation), please take the following into account:

- Optimum upward heat dissipation can no longer be guaranteed: The ambient temperature is restricted (see technical details for the modules).
- Vibration and shock stress place higher requirements on the system fastenings: use additional metallic end brackets!
- ▶ We recommend you leave a distance of 20 mm from the control cabinet wall to enable you to exchange modules.

The coated versions of the PSSu modules are suitable for use where there

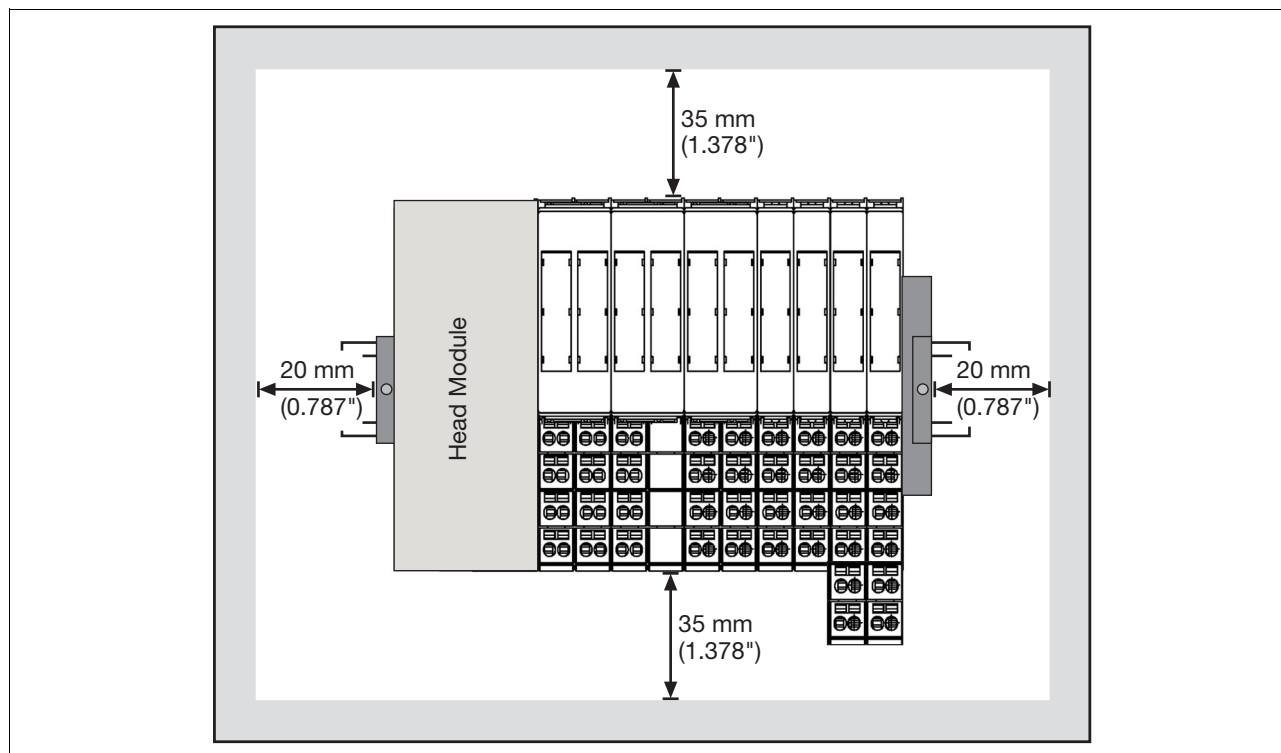
are increased environmental requirements on temperature and humidity. Please refer to the technical details. On the coated version of some output modules, please also note the derating at higher temperatures.

Mounting distances

The values shown in the diagram for mounting distances are minimum specifications.

The ambient temperature of the PSSu system in the control cabinet must not exceed the figure stated in the technical details for the modules, otherwise air conditioning will be required.

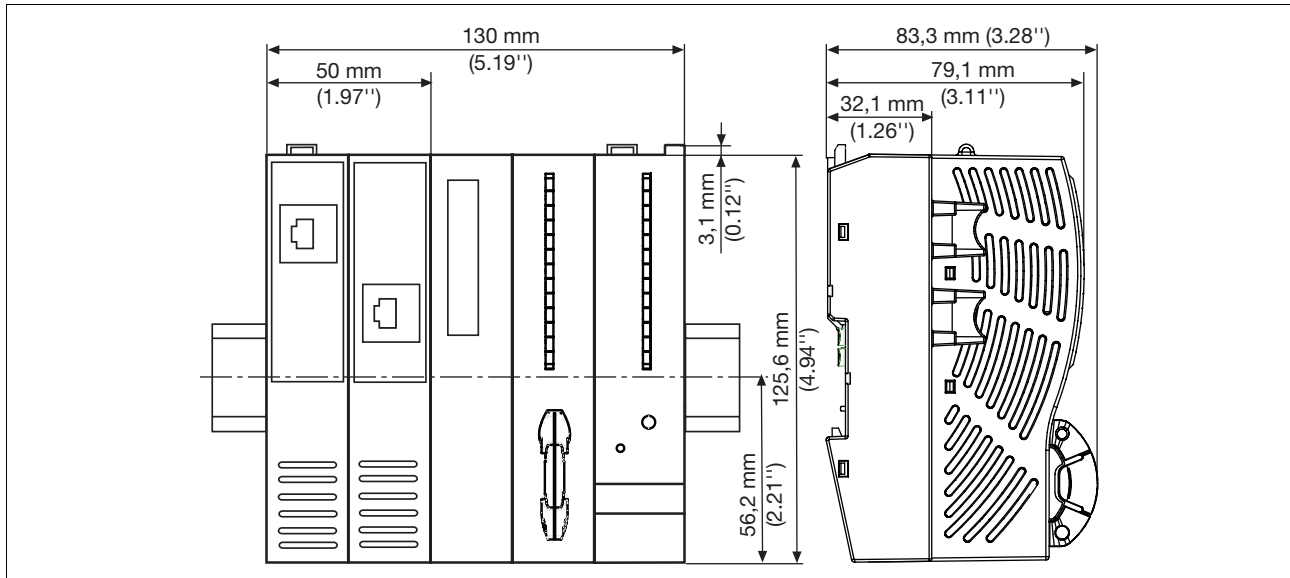
Mounting distances



System description

Installing within a control cabinet

Dimensions of the head modules

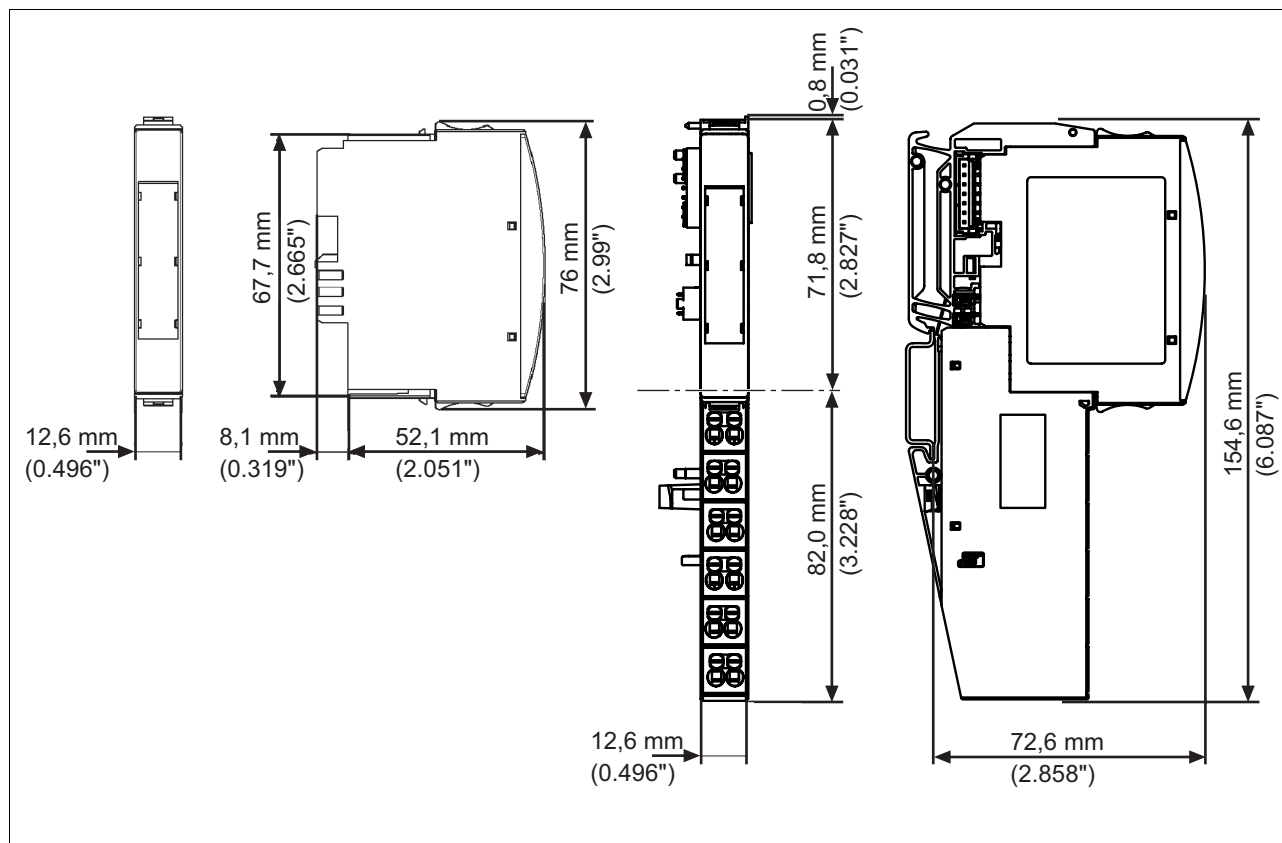


System description

Installing within a control cabinet

Dimensions of the electronic modules

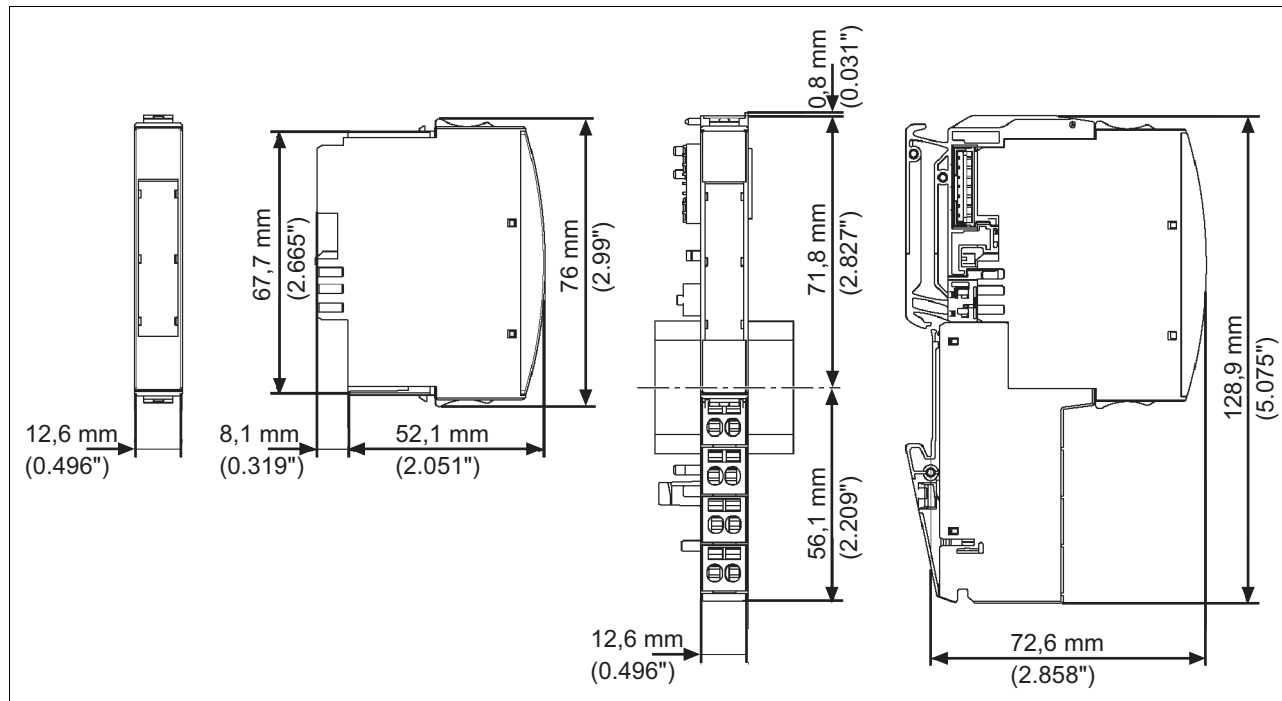
Base modules with six connection levels:



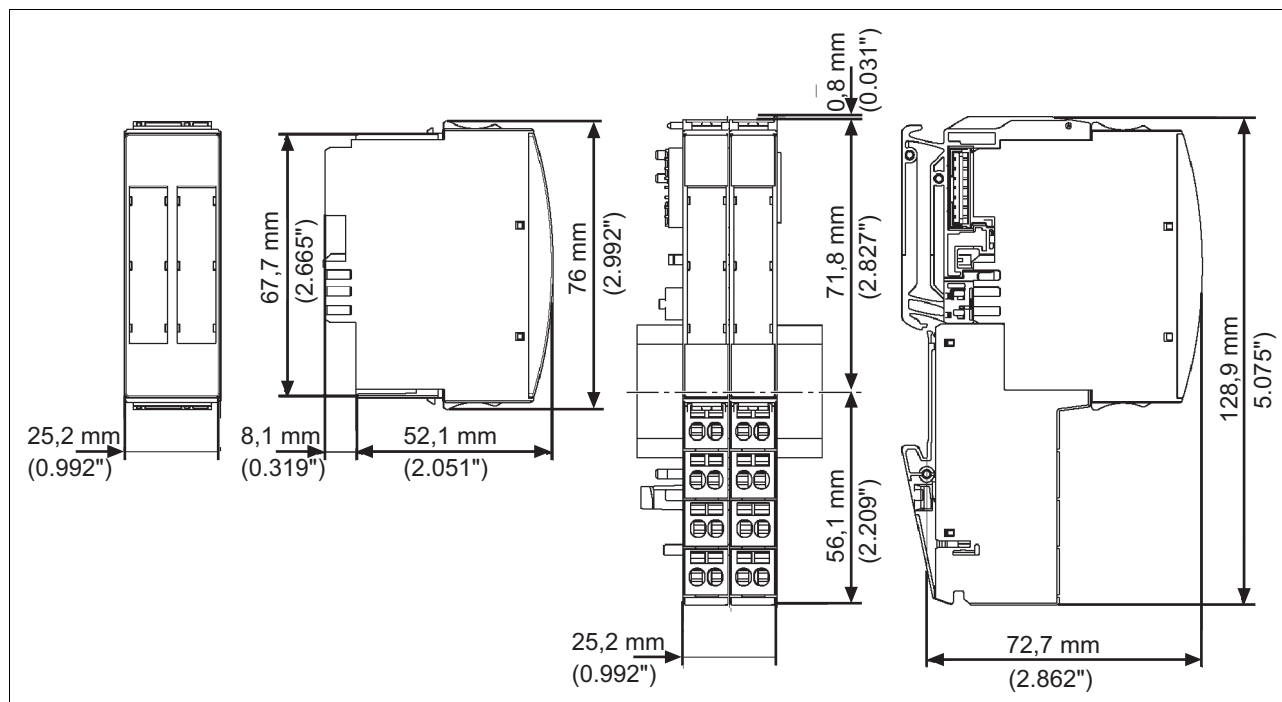
System description

Installing within a control cabinet

Single-width base modules with four connection levels:



Double-width base modules with four connection levels:

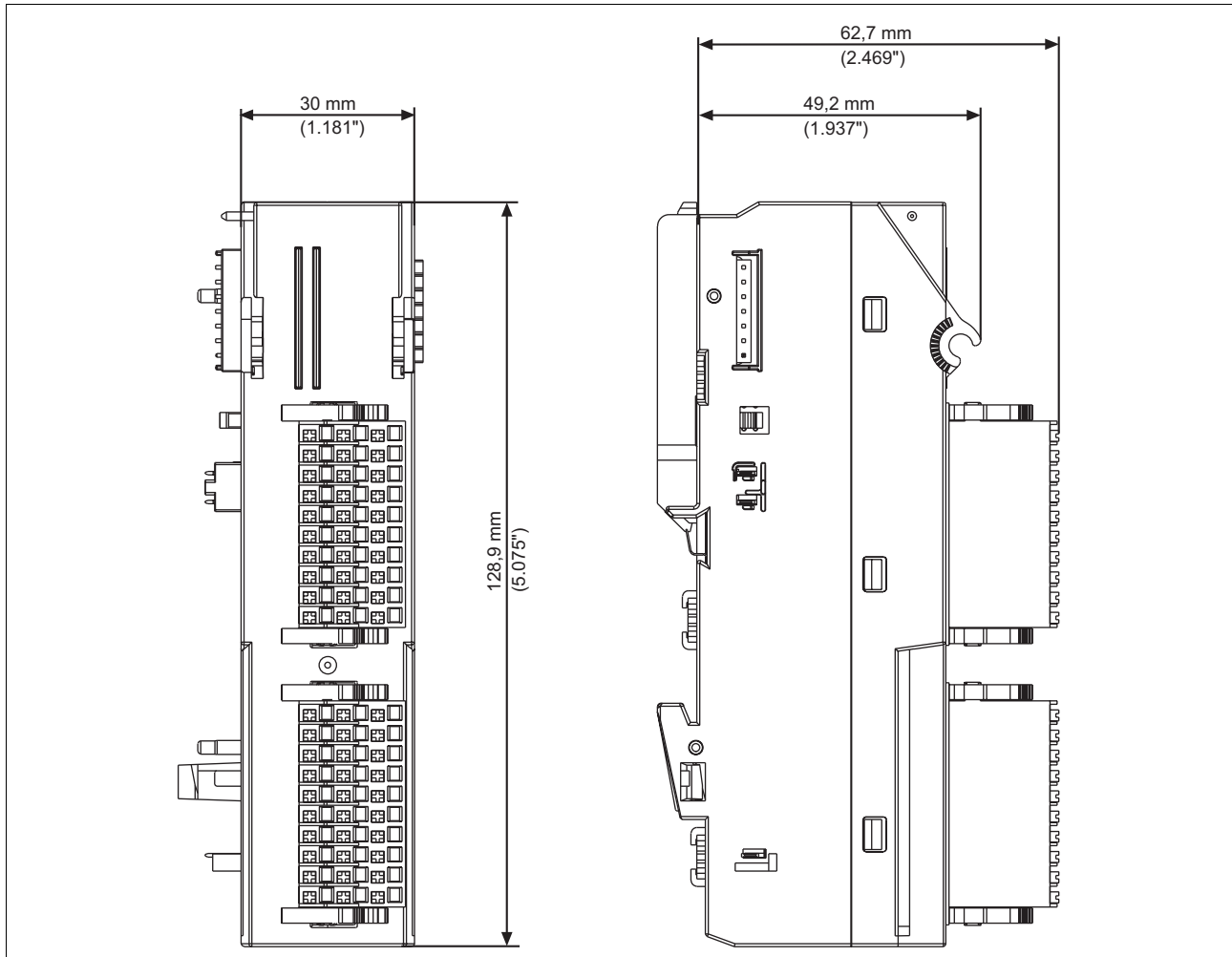


System description

Installing within a control cabinet

Dimensions of compact modules

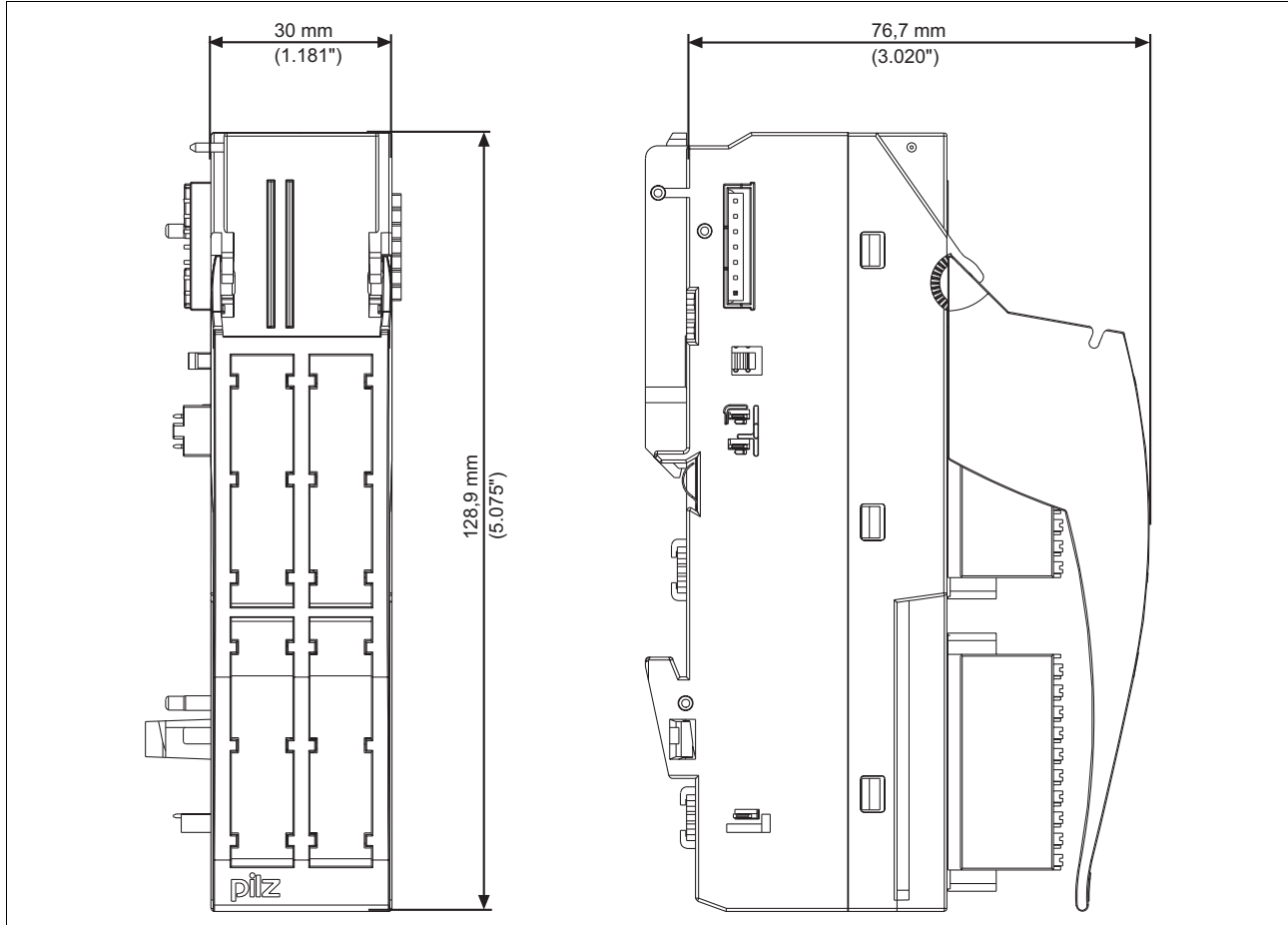
Module with connector:



System description

Installing within a control cabinet

Module with connector and labelling bracket:



System description

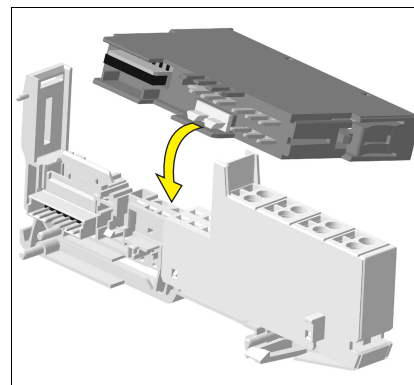
Mechanical coding

Electronic modules are supplied with a two-part coding element.

When an electronic module is plugged into a base module for the first time, one part of the coding element remains on the electronic module, while its counterpart is fixed on to the base module. This is how the base module is coded.

The coding element is designed to help prevent plugging errors (e.g. when exchanging an electronic module). Once a base module has been coded, it will only take electronic modules with the same mechanical coding.

The coding is identified by a letter and a colour. Codings with the same letters are mechanically identical and are distinguished through a different colour.



2.1

Overview of the mechanical coding elements

The types of coding elements are listed in the table below.

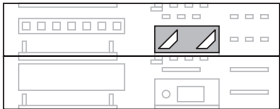
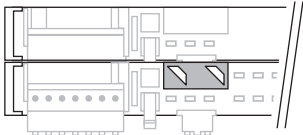
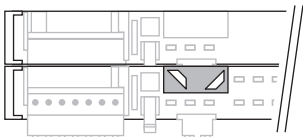
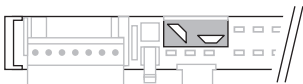
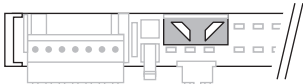
Please note:

Details of the mechanical coding of the

electronic modules (type and colour) can be found in the technical details in the data sheet and operating manual.

Type	Coding element Electronic module	Coding element on counterpart Base module
A		
B		
C		
D		
E		
F		
G		

System description
Mechanical coding

Type	Coding element Electronic module	Coding element on counterpart Base module
H		
I		
		
J		
K		
L		
M		

System description

Supply voltage and insulation

All voltages are supplied via the head module. If more voltages are needed (voltage refresh, potential isolation etc.), these will be supplied via additional supply voltage modules. The voltages are distributed to the modules via the module bus.

► Module supply

The module supply is the internal supply voltage for the head module, the compact modules and the electronic modules.

► Periphery supply

The periphery supply supplies 24 VDC to the sensors and actuators on digital input/outputs on electronic modules. On compact modules, the supply for the inputs is generated from the periphery supply; the supply for the outputs must be fed to the module terminals.

The connection on the module bus can be disconnected in order to form supply groups. On digital fail-safe modules, the periphery supply is used to provide test pulses. Fail-safe input/output modules will not start until the periphery supply is connected correctly. On analogue input/output modules, the periphery supply is galvanically isolated from the inputs/outputs.

► C-rail

The C-rail is an additional, free power rail. Access to the C-rail is available via base modules that contain the letter “-C” in their description (e.g. PSSu BP-C 1/8 S, PSSu BP-C 1/8 C).

The C-rail supply must belong to the same circuit as the other base module connections. Connecting PE to the C-rail provides a simple form of shield. On the compact modules, the C-rail is only looped through and is not available at the terminals. Permitted infeed at the C-rail:

- PE
- 0 V
- Shield
- - 30 VDC ... +30 VDC
- - 48 VAC ... + 48 VAC

► Inputs/outputs on the analogue modules and counter modules

The inputs and outputs on the analogue modules and counter modules are galvanically isolated from the periphery supply. On the base modules, the supply for the outputs is generated from the periphery supply.

► Earth (Ground)

The module supply and periphery supply have separate connections for the respective earth potential (Ground).

► Functional earth

A contact spring on the base modules and compact modules connects the modules' functional earth to the mounting rail.

The supply voltages for module supply and periphery supply must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410. Further requirements of the power supplies can be found in the data sheets for the supply voltage modules or head modules.

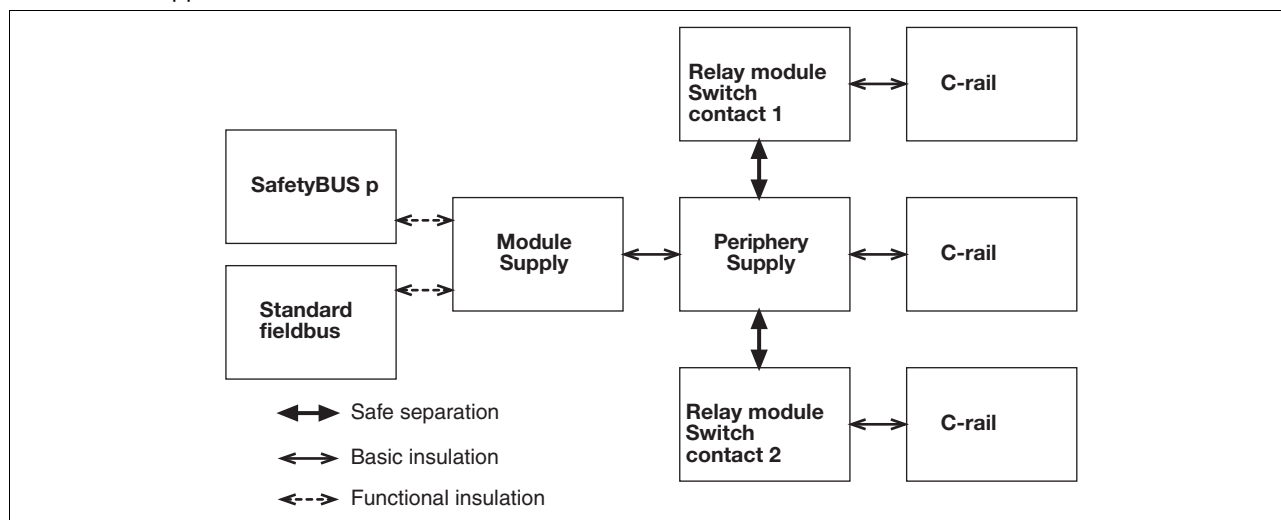
When the voltages are fed separately using two power supplies, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

Separate power supplies for module supply and periphery supply increase availability: In the case of a short circuit in the periphery supply, the module supply is maintained and the head module can continue to exchange data with fieldbus systems, e.g. for diagnostic purposes.

If voltages higher than 50 VAC or 120 VDC are connected to the PSSu system, e.g. to switch contacts on relay modules, please note the following:

- Specific accident prevention regulations apply.
- For safety reasons, only the protective earth (PE) may be connected to the C-rail of the supply group.

Insulation of supplies in a PSSu installation:



System description

Earthing and connection

Earthing of the system

When modules are attached to the mounting rail, a contact spring makes the electrical contact between the modules' functional earth and the mounting rail.

- ▶ Always connect the mounting rail to the protective earth via an earthing terminal. This will be used to dissi-

pate hazardous voltages in the case of a fault.

The earthing terminal is available as an accessory. The mounting rail must be properly earthed to ensure interference-free operation in accordance with EMC regulations.

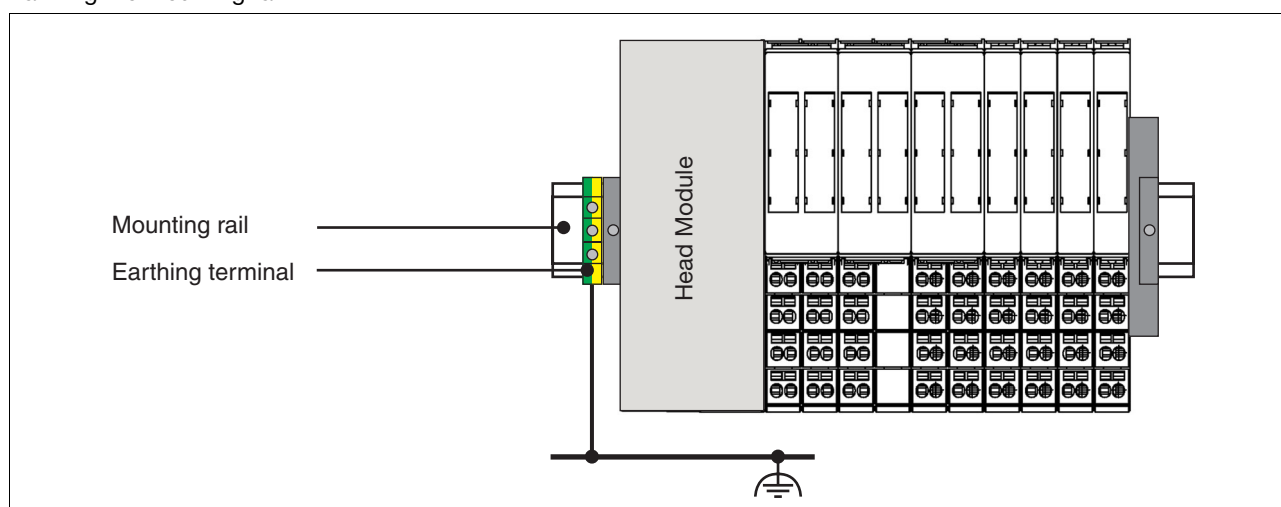
The supplies on the PSSuniversal module bus (module supply, periphery

supply, C-rail) are not connected to the functional earth through the contact spring.

On analogue modules and counter modules with base modules without a C-rail, the contact spring also connects the shield connections to the mounting rail.

2.1

Earthing the mounting rail



Cable requirements with base modules

Please note:

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

- ▶ On base modules with screw terminals:

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

- ▶ Use copper wiring.

Cable requirements with compact modules

Please note:

- ▶ The cable cross section with spring-loaded terminals is 0.20 – 1.50 mm², 22 -16 AWG.
- ▶ If you are using multi-core or fine-core cables we recommend ferrules in accordance with DIN 46228/Part 1 or DIN 46228/Part 4, 0.2 ... 1.5 mm². To crimp the ferrules we recommend crimping pliers (crimp form A) conforming to EN 60947-1, such as the PZ 6/5 from Weidmüller, for example.
- ▶ Terminal points per connection: 1
- ▶ Stripping length: 8 mm

System description

Electromagnetic compatibility (EMC)

EMV compliance

The PSSu system is designed for use in an industrial environment. It is not suitable for use in a domestic environment, as this can lead to interference.

Connecting the earth cables

Please note:

- ▶ A cable cross section of at least 2.5 mm² should be used for the connection to the central earth bar. Connections should be kept as short as possible.
- ▶ Connections to the earth bar should always be in star form.
- ▶ Connect together the 0V connections on all the 24 V power supplies and earth the 0 V mains at a single point, or ensure that measures are in place to monitor for earth faults.
 - Earthed supply voltages offer the best noise immunity.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with relevant national regulations (such as EN 60204-1, NFPA 79:17-7, NEC: Article 250, for example).
- ▶ Connections should be protected from corrosion.
- ▶ Flexible earthing straps should be used on moving earth parts (e.g. machine parts, gates). Ensure these earthing straps are as short and wide as possible.

Equipotential bonding

Potential differences can occur if the PSSu system and its periphery devices are connected to different earth connections. Even cable shields that are connected at either end and have different earth connections can cause potential differences. In order to avoid interference, equipotential bonding cables must be installed. Please note:

- ▶ Select a low impedance equipotential bonding cable.
- ▶ Select the following as standard values for the cross section of the equipotential bonding cables:
 - 16 mm² for equipotential bonding cable up to 200 m in length
 - 25 mm² for equipotential bonding cable over 200 m in length

- ▶ If the PSSu system and periphery devices are connected with shielded signal cables which are earthed at either end, the impedance is calculated as follows:
 - Impedance equipotential bonding cable = 10 % of screen impedance
- ▶ Use copper or galvanised steel equipotential bonding cable.
- ▶ Connect equipotential bonding cables to the earth bar over as wide a surface area as possible.
- ▶ As short a distance as possible should be kept between the equipotential bonding cable and signal cable.

Suppression of inductive loads

Suppression should not be used to protect the digital semiconductor outputs.

Control cabinet lighting

Use low interference panel lighting for inside the control cabinet.

Screened cables

Digital inputs and outputs on the PSSu system do not need shielded cables. However, if the connection cables have a shield, it should be connected at one end.

Analogue inputs and outputs plus the inputs and outputs on the counter modules should always be connected using shielded cables.

- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On analogue modules and base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section of the configuration data sheets.
 - The module connects the shield to the functional earth via the mounting rail.

Fieldbuses

Please note:

- ▶ SafetyBUS p
 - See Installation Manual for SafetyBUS p
- ▶ Standard fieldbus systems
 - To connect the available fieldbus systems, please refer to the operating manual for the respective head module and the guidelines published by the user group or manufacturer.

ESD

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

System description

Supply groups

When used with the relevant base module, any electronic supply voltage module is suitable to separate supplies and form supply groups.

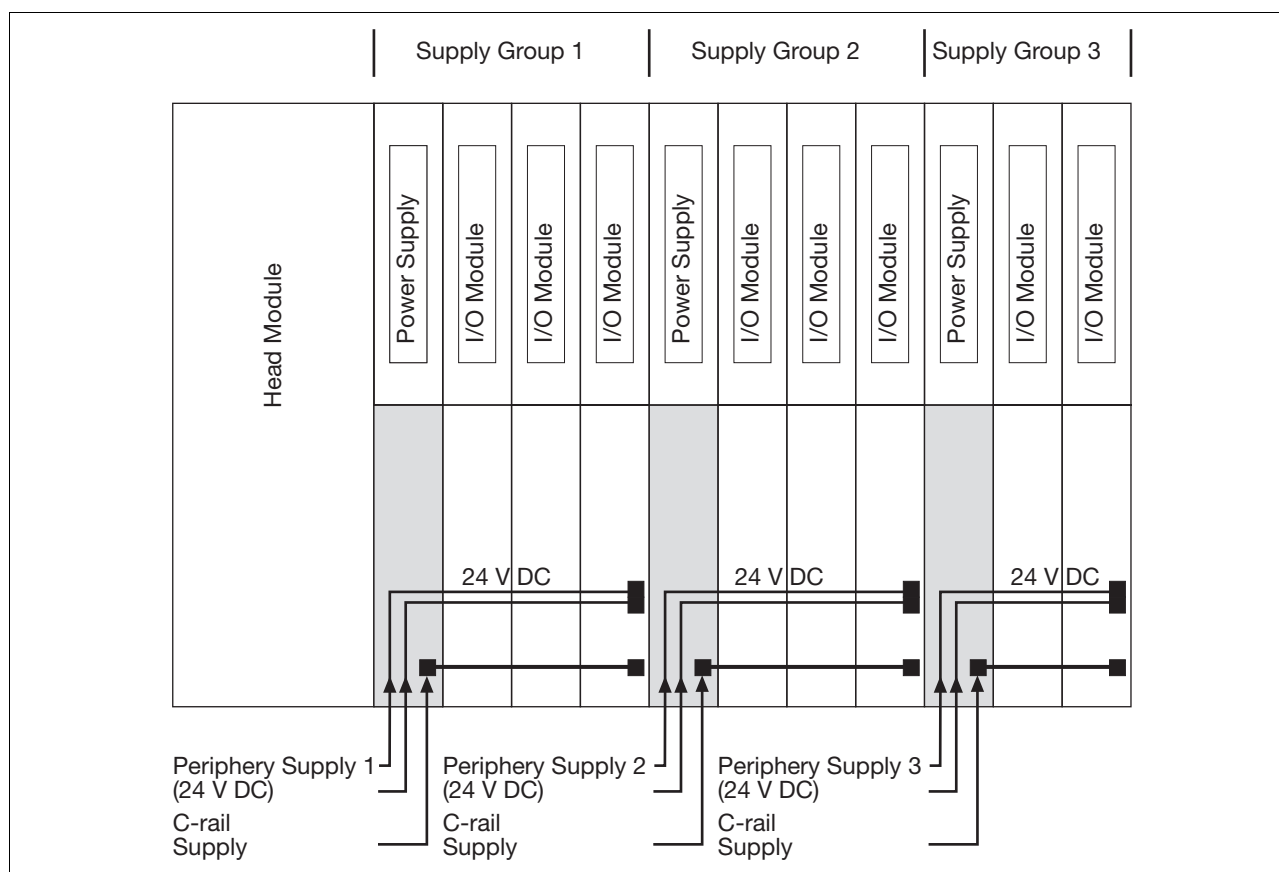
To separate supplies, the supply (periphery supply and C-rail supply) to the preceding (left-hand) modules is dis-

connected and a new supply provided for subsequent (right-hand) modules. With a new supply group it is also possible to refresh the module supply by providing a new supply voltage. The 0 V supply on the module supply is

never interrupted, but is always looped through across the whole module bus. You should always refer to the description of the relevant electronic supply voltage module.

The following modules are suitable for separating supplies, for example:

Electronic module	Base module	Module supply	Periphery supply and C-rail
PSSu E F PS	PSSu BS-R 1/8 S PSSu BS-R 1/8 C	Refreshing (new supply voltage is provided, 0 V supply is not interrupted).	Supply of the left-hand modules is interrupted and a new supply is provided for the right-hand modules.
PSSu E F PS1	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	No refreshing (5 V is not separated).	
PSSu E F BSW	PSSu BS 2/8 S PSSu BS 1/8 C		



The supply voltage for the first supply group can also be integrated within the head module.

System description

System software

Design, configuration, programming, commissioning and diagnostics take place centrally via PAS4000 (Pilz Automation Suite 4000).

PAS4000 is a collection of various tools which can be used to create and edit a project, e.g.:

- ▶ PSSu Module Editor
The required PSSu systems are assembled and configured in the PSSu Module Editor.
- ▶ I/O Mapping Editor
The connection between the user program and hardware is established in the I/O Mapping Editor.
- ▶ IL Editor
In the IL Editor, the user program is programmed in the instruction list (IL) programming language.

System description

SafetyNET p

SafetyNET p is used for networked automation functions. SafetyNET p is an Ethernet-based multi-master bus system suitable for industrial use.

The SafetyNET p protocol contains a safe data channel for safety-related data. This channel is certified for data transfer in accordance with SIL 3 of IEC 61508. On SafetyNET p, safety and non-safety-related data is transferred via different data channels, but using the same connection cable. In terms of the topology, SafetyNET p supports the familiar Ethernet architectures, so modular system architectures and individual subnetworks can be implemented. If necessary, this method can be used to divide automation functions into decentralised and largely independent function units. The main benefits of this type of architecture lie in the reusability, modification and availability of function units.

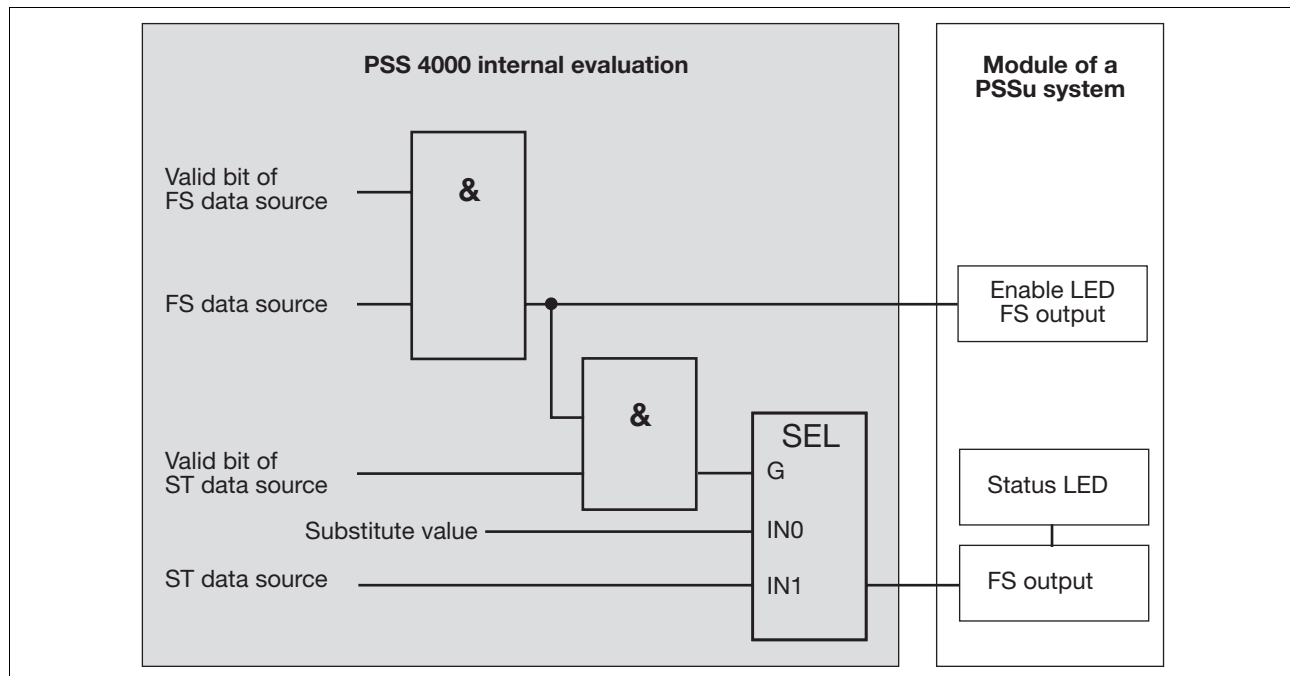
System description

Enable principle

In safety technology, the FS section is usually separated from the ST section without feedback.

With the enable principle, an ST data source can control an FS hardware output, provided there is an enable from an FS data source. In the event of an error, the FS data source must ensure that the FS hardware output controlled by the ST data source can no longer be set.

Enable principle:



System description

Reaction times

2.1

The following description of the reaction times refers exclusively to the inputs and outputs on PSSu systems. If the inputs and outputs are distributed over various PSSu systems, the processing time of the SafetyNET p interfaces and the SafetyNET p transmission time must also be taken into account.

If necessary, the relevant external communication relationships (e.g. communication via Modbus/TCP, UDP, PROFIBUS-DP), third party periphery devices, sensors/actuators and third party control systems must also be taken into account when determining the overall reaction times. These influences are not described here.

INFORMATION

The description of the reaction times below is valid for PAS4000 from Version 1.2.0

Times that influence reaction times

The reaction times are determined by the following times:

- ▶ **Cycle time of a periodic task (t_{Task})**
The task cycle time t_{Task} is defined by the user during the task configuration in PAS4000. It defines the time within which a task must be executed.
Value range:
ST tasks: 2 ms ... 2 000 000 ms
FS tasks: 6 ms ... 10 000 ms
- ▶ **Task execution time (t_{ProcTask})**
The execution time t_{ProcTask} is the length of time from the start of the task cycle to the end of the task execution, i.e. the point at which the process image of outputs and the resource global variables are available (see Formation of data paths – Data paths with tasks, Page 36).
- ▶ **Module bus cycle time (t_{MBUS})**
The FS module bus and ST module bus of a PSSu system each have a cycle time, which is calculated by PAS4000 and displayed. The cycle time t_{MBUS} is the time needed to transport data between the head module and module.

Value range:

ST module bus: 2 ms ... 45 ms

FS module bus: 6 ms ... 30 ms

Please note:

- The cycle time of the respective module bus always corresponds to that of the task with the shortest cycle time, provided the task cycle time is less than/equal to the maximum possible cycle time for the corresponding module bus:

$$t_{\text{MBUS}} = t_{\text{Task min}}$$

- If only one task is executed on a PSSu system, the module bus cycle time will correspond to the task's cycle time, provided the task cycle time is less than/equal to the maximum possible cycle time of the corresponding module bus:

$$t_{\text{MBUS}} = t_{\text{Task}}$$

▶ Processing time for a module's input data (t_{ProcIM})

Processing time t_{ProcIM} : see module's technical details

The processing time t_{ProcIM} is the time a module requires internally to process the I-data. The processing time takes into account the input filter time and various influences such as internal run times, temperature drifts, spread of components, etc. It varies depending on the module.

▶ Processing time for a module's output data (t_{ProcOM})

Processing time t_{ProcOM} : see module's technical details

The processing time t_{ProcOM} is the time a module requires internally to process the O-data. The processing time takes into account various influences such as internal run times, temperature drifts, spread of components, etc. It varies depending on the module.

▶ Basic cycle time of SafetyNET p (t_{BasicSNp})

The basic cycle time t_{BasicSNp} describes the time it takes to run tests within a project as part of each cycle, to check whether data is available to send via SafetyNET p.

The basic cycle time is calculated by PAS4000 and displayed.

▶ SafetyNET p cycle time (t_{SNp})

The cycle time refers to a transmit connection (Tx connection) on a PSSu system. In other words, each Tx connection on a PSSu system has its own cycle time t_{SNp} . The cycle time t_{SNp} describes the time it takes to start a Tx connection as part of each cycle, in order to send data. The cycle times of the Tx connections are calculated by PAS4000 and displayed.

▶ Transmission delay time of SafetyNET p (t_{DelaySNp})

The transmission delay time t_{DelaySNp} describes the time that may elapse within a project between the start of data transmission via a transmit connection (Tx connection) on a PSSu system A and the data becoming available for further processing in a PSSu system B. The maximum time for the transmission delay time is $t_{\text{DelaySNp}} = 2 \times t_{\text{BasicSNp}}$.

System description

Reaction times

► Cycle time with external communication (t_{ExtCo})

External communication refers to data exchange in which O-data leaves the automation system PSS 4000 and I-data enters the system (e.g. via Modbus/TCP, UDP, fieldbuses). External O-data is sent from the O-data area of a PSSu system, depending on the communication mode that is used. Depending on the communication mode that is used, external I-data can be found in the I-data area of a PSSu system and is read from there.

In this description, the cycle times for send and receive are designated with t_{ExtCo} . Their meaning depends on the communication mode that is used:

– Modbus/TCP Client connection:

The cycle time t_{ExtCo} describes the time the connection Client takes to start data transfer as part of each cycle.

The cycle time can be set separately in PAS4000 for each connection Client on a PSSu system; in other words, each connection Client on a PSSu system has its own cycle time t_{ExtCo} . It can either be calculated automatically it can be configured by the user (configuration in PAS4000).

– Modbus/TCP Server connection:

The cycle time t_{ExtCo} describes the time it takes to read in data from a Server mapping table on a PSSu system and transmit requested data from a Server mapping table to the connection Client, as part of each cycle.

The cycle time can be set separately in PAS4000 for each Server mapping table on a PSSu system; in other words, each Server mapping table on a PSSu system has its own cycle time t_{ExtCo} . It can either be calculated automatically it can be configured by the user (configuration in PAS4000).

– Raw UDP communication "Receive data" and "Send data":

The cycle time t_{ExtCo} describes the time it takes to read in external I-data from a UDP connection and start transmitting data (external O-data) via a UDP connection as part of each cycle.

The cycle time can be set separately in PAS4000 for each UDP connection on a PSSu system; in other words, each UDP connection has its own cycle time t_{ExtCo} . It can either be calculated automatically it can be configured by the user (configuration in PAS4000).

– PROFIBUS-DP Slave "Receive data" and "Send data":

The cycle time t_{ExtCo} describes the time it takes to read in external I-data from the PROFIBUS-DP Master and start transmitting the requested data (external O-data) as part of each cycle.

The cycle time can be defined in PAS4000 for each PSSu system, i.e. each PSSu system has its own cycle time t_{ExtCo} for data transfer with PROFIBUS-DP. It can either be calculated automatically it can be configured by the user (configuration in PAS4000).

► Cycle times of tasks

The cycle times of tasks (t_{Task}) are constant. They are not influenced by the current task cycle.

Processing rules during data processing

The following applies for data processing on a PSSu system:

► Processing times of modules

The processing times of modules (t_{ProcOM} and t_{ProcIM}) are constant. They are not influenced by the current task cycle.

► Module bus cycle times

The ST module bus and the FS module bus each have their individual cycle times. The module bus cycle time t_{MBUS} always corresponds to that of the task with the shortest cycle time, provided that the task cycle time is less than/equal the maximum possible cycle time of the corresponding module bus:

$$t_{MBUS} = t_{Task \min}$$

System description

Reaction times

Formation of data paths

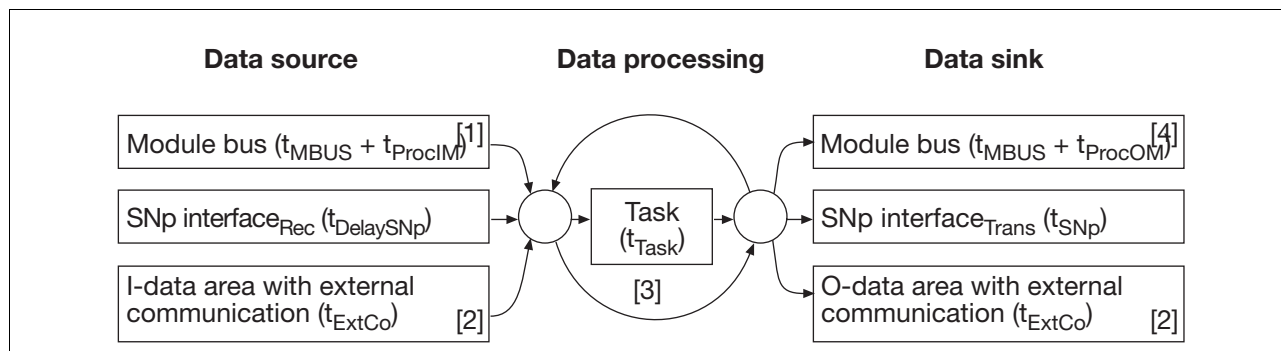
Data subpaths are available to enable you to track a single I/O datum over a complete data path. A data path,

therefore, is made up of the relevant data subpaths.

The reaction time of a data path is calculated by adding the reaction times of the relevant data subpaths. A data

path always starts with the I-datum in a data source and ends with the O-datum in a data sink.

2.1



[1]

If the data source is an I-datum from a PSSu module, the processing time for the I-datum on the module bus (t_{ProcIM}) needs to be considered in addition to the module bus cycle time (t_{MBUS}).

[2]

With external communication, the I-

data from the I-data area is also referred to as "external I-data" and the O-data from the O-data area as "external O-data".

[3]

The following data paths are impossible:

- Data source: Module bus (I-datum) → Data sink: Module bus (O-datum)

- Data source: SNp interface_{Rec} → Data sink: SNp interface_{Trans}

[4]

If the data sink is an O-datum on a PSSu module, the processing time for the O-datum on the module (t_{ProcOM}) needs to be considered in addition to the module bus cycle time (t_{MBUS}).

Data paths with tasks

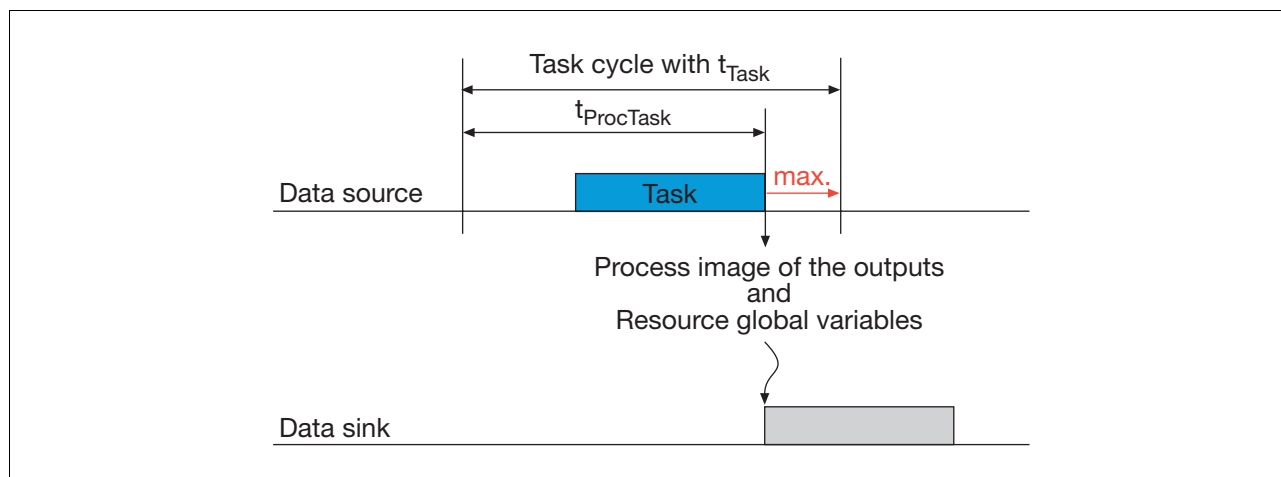
For data paths with tasks, please note:

► Task as data source

The reaction time for a datum starts at the beginning of the task cycle

and ends after the execution time $t_{ProcTask}$ with the process image of outputs and the resource global variables available in the data sink for further processing.

When the processing time $t_{ProcTask}$ almost corresponds to the task cycle time t_{Task} , that is the maximum reaction time.



System description

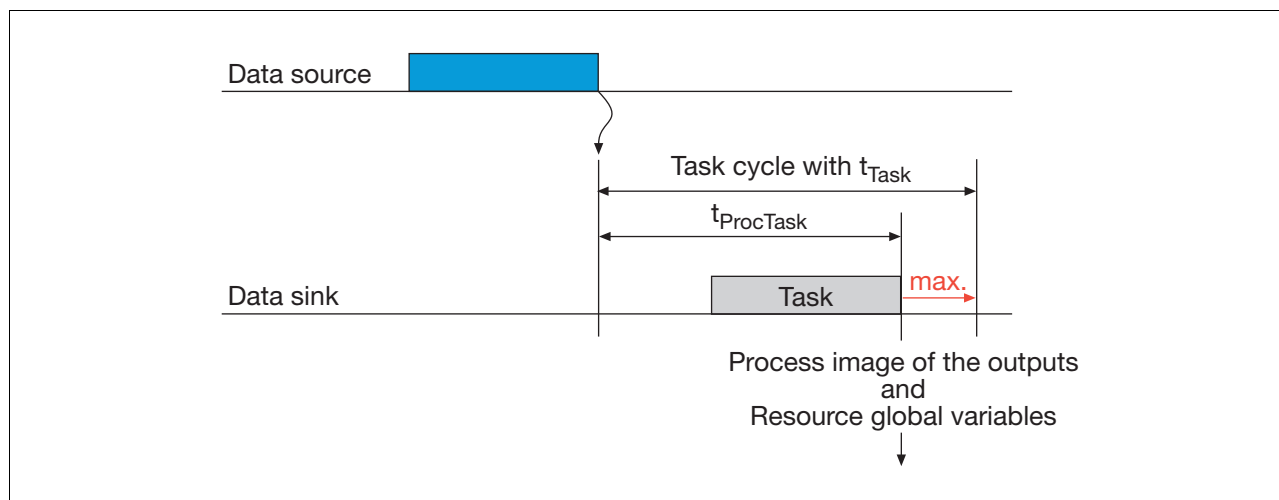
Reaction times

► Task as data sink

The reaction time for a datum starts at the beginning of the task cycle and ends after the execution time t_{ProcTask} with the process image of

outputs and the resource global variables available for further processing. When the processing time t_{ProcTask} almost corresponds to the task

cycle time t_{Task} , that is the maximum reaction time.



2.1

Maximum reaction time for data subpaths with module bus as data source

► Module bus -> Task

PSS 4000-Firmware from version 1.2.0 to 1.3.x:

$$t_{\text{MBUS\_Task\_max}} = t_{\text{ProcIM}} + 2t_{\text{Task}} + t_{\text{MBUS}}$$

PSS 4000 firmware from version 1.4.0:

$$t_{\text{MBUS\_Task\_max}} = t_{\text{ProcIM}} + 2t_{\text{Task}}$$

$t_{\text{MBUS\_Task\_max}}$:	Max. reaction time for this data subpath
t_{ProcIM} :	Processing time for a module's I data
t_{MBUS} :	PSSu system's module bus cycle time
t_{Task} :	Task cycle time of the task on the PSSu system

► Module bus -> SNp interface_{Trans}

$$t_{\text{MBUS\_SNp\_max}} = t_{\text{ProcIM}} + 2t_{\text{SNp}}$$

$t_{\text{MBUS\_SNp\_max}}$:	Max. reaction time for this data subpath
t_{ProcIM} :	Processing time for a module's I data
t_{MBUS} :	PSSu system's module bus cycle time
t_{SNp} :	Cycle time for the cyclical start of the SNp Tx connection (send data)

System description

Reaction times

► Module bus -> O-data area with external communication

$$t_{\text{MBUS\_ExtCo\_max}} = t_{\text{ProclM}} + 2t_{\text{ExtCo}}$$

$t_{\text{MBUS\_ExtCo\_max}}$:	Max. reaction time for this data subpath
t_{ProclM} :	Processing time for a module's I data
t_{MBUS} :	PSSu system's module bus cycle time
t_{ExtCo} :	Cycle time for the cyclical start of data transfer from the O-data area with external communication

Data subpaths with Snp interface as data source

► Snp interface_{Rec} -> Task

$$t_{\text{Snp\_Task\_max}} = t_{\text{DelaySnp}} + 2t_{\text{Task}}$$

$t_{\text{Snp\_Task\_max}}$:	Max. reaction time for this data subpath
t_{DelaySnp} :	Transmission delay time of SafetyNET p in a project
t_{Task} :	Task cycle time of the task on the PSSu system

► Snp interface_{Rec} -> Module bus

PSS 4000-Firmware from version 1.2.0 to 1.3.x:

$$t_{\text{Snp\_MBUS\_max}} = t_{\text{DelaySnp}} + 3t_{\text{MBUS}} + t_{\text{ProcOM}}$$

PSS 4000 firmware from version 1.4.0:

$$t_{\text{Snp\_MBUS\_max}} = t_{\text{DelaySnp}} + 2t_{\text{MBUS}} + t_{\text{ProcOM}}$$

$t_{\text{Snp\_MBUS\_max}}$:	Max. reaction time for this data subpath
t_{DelaySnp} :	Transmission delay time of SafetyNET p in a project
t_{MBUS} :	PSSu system's module bus cycle time
t_{ProcOM} :	Processing time for O-data on a module with outputs

► Snp interface_{Rec} -> O-data area with external communication

$$t_{\text{Snp\_ExtCo\_max}} = t_{\text{Delay}} + 2t_{\text{ExtCo}}$$

$t_{\text{Snp\_ExtCo\_max}}$:	Max. reaction time for this data subpath
t_{DelaySnp} :	Transmission delay time of SafetyNET p in a project
t_{ExtCo} :	Cycle time for the cyclical start of data transfer from the O-data area with external communication

System description

Reaction times

Data subpaths with external I-data as data source

► I data area with external communication -> Module bus

$$t_{\text{ExtCo\_MBUS\_max}} = t_{\text{ExtCo}} + \min(t_{\text{ExtCo}}, t_{\text{MBUS}}) + t_{\text{MBUS}} + t_{\text{ProcOM}}$$

$t_{\text{ExtCo\_MBUS\_max}}$:	Max. reaction time for this data subpath
t_{ExtCo} :	Cycle time for cyclical reading of the external I-data from the I-data area with external communication
t_{MBUS} :	PSSu system's module bus cycle time
t_{ProcOM} :	Processing time for O-data on a module

► I-data area with external communication -> Task

$$t_{\text{ExtCo\_Task\_max}} = 2t_{\text{ExtCo}} + 2t_{\text{Task}}$$

$t_{\text{ExtCo\_Task\_max}}$:	Max. reaction time for this data subpath
t_{ExtCo} :	Cycle time for cyclical reading of the external I-data from the I-data area
t_{Task} :	Task cycle time of the task on the PSSu system

► I-data area with external communication -> SNp interface_{Trans}

$$t_{\text{ExtCo\_SNp\_max}} = 2t_{\text{ExtCo}} + 2t_{\text{SNp}}$$

$t_{\text{ExtCo\_SNp\_max}}$:	Max. reaction time for this data subpath
t_{ExtCo} :	Cycle time for cyclical reading of the external I-data from the I-data area with external communication
t_{SNp} :	Cycle time for the cyclical start of the SNp Tx connection (send data)

► I-data area with external communication -> O-data area with external communication

$$t_{\text{ExtCo1\_ExtCo2\_max}} = 2t_{\text{ExtCo1}} + 2t_{\text{ExtCo2}}$$

$t_{\text{ExtCo1\_ExtCo2\_max}}$:	Max. reaction time for this data subpath
t_{ExtCo1} :	Cycle time for cyclical reading of the external I-data from the I-data area (external communication with communication mode 1)
t_{ExtCo2} :	Cycle time for the cyclical start of data transfer from the O-data area (external communication with communication mode 2)

System description

Reaction times

Data subpaths with a task as data source

► Task -> Module bus

PSS 4000-Firmware from version 1.2.0 to 1.3.x:

$$t_{\text{Task\_MBUS\_max}} = 2t_{\text{MBUS}} + t_{\text{ProcOM}}$$

PSS 4000 firmware from version 1.4.0:

$$t_{\text{Task\_MBUS\_max}} = t_{\text{MBUS}} + t_{\text{ProcOM}}$$

$t_{\text{Task\_MBUS\_max}}$: Max. reaction time for this data subpath

t_{MBUS} : PSSu system's module bus cycle time

t_{ProcOM} : Processing time for O-data on a module

► Task -> Snp interface_{Trans}

$$t_{\text{Task\_SNp\_max}} = 2t_{\text{SNp}}$$

$t_{\text{Task\_SNp\_max}}$: Max. reaction time for this data subpath

t_{SNp} : Cycle time for the cyclical start of the Snp Tx connection (send data)

► Task1 -> Task2

$$t_{\text{Task1\_Task2\_max}} = 2t_{\text{Task2}}$$

$t_{\text{Task1\_Task2\_max}}$: Max. reaction time for this data subpath

t_{Task2} : Task cycle time of task2

► Task -> O-data area with external communication

$$t_{\text{Task\_ExtCo\_max}} = 2t_{\text{ExtCo}}$$

$t_{\text{Task\_ExtCo\_max}}$: Max. reaction time for this data subpath

t_{ExtCo} : Cycle time for the cyclical start of data transfer from the O-data area with external communication

System description

Reaction times

Example for calculating a data path on one PSSu system

The example was created for a device that has a PSS 4000 firmware from version 1.4.0.

For the data path in this example, the following applies:

- ▶ I-datum (e.g. HW input of a module) and O-datum (e.g. HW output of a module) are on the same PSSu system.

- ▶ The data path is composed as follows:
Module bus (I-datum) -> Task -> Module bus (O-datum)
- ▶ To calculate the maximum reaction time, the data path is divided into the following data subpaths:

- Data subpath 1: Module bus (I-datum) -> Task

Applicable for the maximum reaction time of data subpath 1:

$$t_{\text{MBUS\_Task\_max}} = t_{\text{ProcIM}} + 2t_{\text{Task}}$$

- Data subpath 2: Task -> Module bus (O-datum)

Applicable for the maximum reaction time of data subpath 2:

$$t_{\text{Task\_MBUS\_max}} = t_{\text{MBUS}} + t_{\text{ProcOM}}$$

Applicable for the data path's maximum reaction time:

$$t_{\text{React\_max}} = t_{\text{ProcIM}} + 2t_{\text{Task}} + t_{\text{MBUS}} + t_{\text{ProcOM}}$$

Example for calculating a data path via three PSSu systems

The example was created for a device that has a PSS 4000 firmware from version 1.4.0.

For the data path in this example, the following applies:

- ▶ The I-datum (e.g. HW input) is on PSSu system A. The datum is transferred to PSSu system B via SafetyNET p.
- ▶ On PSSu system B, the datum is processed in a task and is then transferred to PSSu system C via SafetyNET p.
- ▶ On PSSu system C, the datum is transferred to a module with outputs.

- ▶ The data path is composed as follows:
Module bus (I-datum) to PSSu system A -> SafetyNET p -> Task on PSSu system B -> SafetyNET p -> Module bus (O-datum) on PSSu system C
- ▶ To calculate the maximum reaction time, the data path is divided into the following data subpaths:

- Data subpath 2: SNp interface Rec(B) -> Task(B)

Applicable for the maximum reaction time of data subpath 2:

$$t_{\text{SNp\_Task\_max(B)}} = t_{\text{DelaySNp}} + 2t_{\text{Task(B)}}$$

- Data subpath 3: Task(B) -> SNp interface Trans(B)

Applicable for the maximum reaction time of data subpath 3:

$$t_{\text{Task\_SNp\_max(B)}} = 2t_{\text{SNp(B)}}$$

- Data subpath 4: SNp interface Rec(C) -> Module bus(C) (O-datum)

Applicable for the maximum reaction time of data subpath 3:

$$t_{\text{SNp\_MBUS\_max(C)}} = t_{\text{DelaySNp}} + 2t_{\text{MBUS(C)}} + t_{\text{ProcOM}}$$

Applicable for the data path's maximum reaction time:

$t_{\text{React\_max}}$	$= t_{\text{ProcIM}} + 2t_{\text{SNp(A)}} + t_{\text{DelaySNp}} + 2t_{\text{Task(B)}} + 2t_{\text{SNp(B)}} + t_{\text{DelaySNp}} + 2t_{\text{MBUS(C)}} + t_{\text{ProcOM}}$

Firmware versions

current
firmware
version

		minimal required firmware version	
Digital input/output		FS	ST
312195	PSSu E PD	1.0.0	1.0.0
312196	PSSu E PD1	1.0.0	1.0.0
312200	PSSu E F 4DI	1.0.0	
312210	PSSu E F 4DO 0.5	1.0.0	
312215	PSSu E F 2DO 2	1.0.0	
312220	PSSu E F DI OZ 2	1.0.0	
312225	PSSu E F 2DOR 8	1.0.0	
312400	PSSu E S 4DI		1.0.0
312405	PSSu E S 4DO 0.5		1.0.0
312410	PSSu E S 2DO 2		1.0.0
312431	PSSu K S 8DI 8DO 0.5		1.2.0
Analogue input/output		FS	ST
312260	PSSu E F AI I	1.0.0	
312261	PSSu E AI SHT1	1.0.0	
312265	PSSu E F AI U	1.0.0	
312275	PSSu E F ABS SSI	1.0.0	
312280	PSSu E F INC	1.0.0	
312437	PSSu K F INC	1.0.0	
312440	PSSu E S 2AI U		1.0.0
312445	PSSu E S 4AI U		1.0.0
312450	PSSu E S 2AI I se		1.0.0
312460	PSSu E S 2AO U		1.0.0
312465	PSSu E S 4AO U		1.0.0
312470	PSSu E S 2AO I		1.0.0
312480	PSSu E S ABS SSI		1.0.0
312485	PSSu E S INC		1.0.0

System description

Firmware versions

				current firmware version		Type	Order no.	T-version
				ST	FS			
				minimal required firmware version				
Communication				FS	ST			
312438	PSSu K S RS232 Modbus ASCII				1.0.0	◆	312070	314070
312515	PSSu E S RS232				1.0.0	◆		
312516	PSSu E S RS485				1.0.0	◆	312071	
Link modules				FS	ST			
314092	PSSu XB F -T	1.2.0	1.2.0			◆	312085	314085
314093	PSSu XR F -T	1.2.0	1.2.0			◆	312060	
Power Supply				FS	ST			
312185	PSSu E F PS-P	1.0.0	1.0.0			◆		
312190	PSSu E F PS	1.0.0	1.0.0			◆		
312191	PSSu E F PS1	1.0.0	1.0.0			◆		
312192	PSSu E F PS2	1.3.0	1.3.0			◆		
312590	PSSu E PS-P 5V	1.0.0	1.0.0			◆		
312591	PSSu E PS-P +/-10V	1.0.0	1.0.0			◆		
312592	PSSu E PS-P +/-15V	1.0.0	1.0.0			◆	312065	

Legend:

FS = Failsafe

ST = Standard

T-version = Temperature-resistant modules

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Selection guide	from 3.1-1
Head modules	from 3.2-1
Voltage supply	from 3.3-1
Digital input/output (standard)	from 3.4-1
Digital input/output (failsafe)	from 3.5-1
Analogue input/output (standard)	from 3.6-1
Analogue input/output (failsafe)	from 3.7-1
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Selection guide

Selection guide

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Selection guide	
Electronic modules with base modules	3.1-2

Selection guide

Electronic modules with base modules

Type	PSSu BP 1/8 C	PSSu BP-C 1/8 C	PSSu BP 1/12 C	PSSu BP-C 1/12 C	PSSu BP-C1 1/12 C	PSSu BP 2/16 C	PSSu BP-C 2/16 C	PSSu BP 1/ 8S-J	PSSu BP-C 1/8S-J	PSSu BS 1/8 C	PSSu BS-R 1/8 C	PSSu BS 2/8 C	PSSu BS-R 2/8 C
	PSSu BP 1/8 S	PSSu BP-C 1/8 S	PSSu BP 1/12 S	PSSu BP-C 1/12 S	PSSu BP-C1 1/12 S	PSSu BP 2/16 S	PSSu BP-C 2/16 S	PSSu BP 1/ 8C-J	PSSu BP-C 1/8C-J	PSSu BS 1/8 S	PSSu BS-R 1/8 S	PSSu BS 2/8 S	PSSu BS-R 2/8 S
Voltage supply													
PSSu E F PS(-T)										◆	◆		
PSSu E F PS1(-T)												◆	◆
PSSu E F PS-P(-T)										◆			
PSSu E F BSW(-T)												◆	
Voltage distribution													
PSSu E PD(-T)	◆	◆	◆		◆								
PSSu E S PD-D	◆	◆	◆		◆								
PSSu E PD1(-T)						◆	◆						
PSSu E PS-P 5V	◆		◆		◆								
PSSu E PS-P +/- 10V	◆		◆		◆								
PSSu E PS-P +/- 15V	◆		◆		◆								
Digital input/output (standard)													
PSSu E S 4DI(-T)	◆	◆	◆		◆								
PSSu E S 4DI-D	◆		◆		◆								
PSSu E S 4DO 0.5(-T)	◆	◆	◆		◆								
PSSu E S 4DO 0.5(-T)D	◆	◆	◆		◆								
PSSu E S 2DO 2(-T)	◆	◆	◆		◆								
PSSu E S 2DO 2(-T)D	◆	◆	◆		◆								
PSSu E S 2DOR 2(-T)	◆	◆	◆		◆								
PSSu E S 2DOR 10(-T)						◆	◆						
Digital input/output (failsafe)													
PSSu E F 4DI(-T)	◆		◆		◆								
PSSu E F 4DO 0.5(-T)	◆	◆	◆		◆								
PSSu E F 2DO 2(-T)	◆	◆	◆		◆								
PSSu E F 2DOR 8(-T)						◆	◆						
PSSu E F DI OZ 2(-T)	◆	◆	◆		◆								
Analogue input/output (standard)													
PSSu E S 2AI I se(-T)	◆	◆	◆	◆									
PSSu E S 4AI U(-T)	◆	◆	◆	◆									
PSSu E S 2AI U(-T)	◆	◆	◆	◆									
PSSu E S 2 AO I(-T)	◆	◆	◆	◆									
PSSu E S 4AO U(-T)	◆	◆	◆	◆									
PSSu E S 2AO U(-T)	◆	◆	◆	◆									
PSSu E S 2AI RTD(-T)			◆	◆									
PSSu E S 2AI TC								◆	◆				
PSSu E AI SHT1	◆	◆	◆	◆									
Analogue input/output (failsafe)													
PSSu E F AI I(-T)	◆	◆	◆	◆									
PSSu E F AI U(-T)	◆	◆	◆	◆									
Counter (standard)													
PSSu E S ABS SSI(-T)	◆	◆	◆		◆								
PSSu E S INC(-T)						◆	◆						
PSSu E S INC 24V se(-T)						◆	◆						
Counter (failsafe)													
PSSu E F ABS SSI	◆	◆	◆		◆								
PSSu E F INC						◆	◆						

Selection guide

Electronic modules with base modules

Type	PSSu BP 1/8 C	PSSu BP-C 1/8 C	PSSu BP 1/12 C	PSSu BP-C 1/12 C	PSSu BP-C1 1/12 C	PSSu BP 2/16 C	PSSu BP-C 2/16 C	PSSu BP 1/ 8S-J	PSSu BP-C 1/8S-J	PSSu BS 1/8 C	PSSu BS-R 1/8 C	PSSu BS 2/8 C	PSSu BS-R 2/8 C
Serial interfaces													
PSSu E S RS232(-T)	◆	◆	◆	◆									
PSSu E S RS485(-T)	◆	◆	◆	◆									
Link modules													
PSSu WB S IDN						◆	◆						
PSSu XB F-T						◆	◆						

◆ can be used with this base module

A coated version of the base modules (-T) is also available for use with the coated version of the electronic modules (-T).

Head modules

Head modules

Contents	Page
Head modules	
PSSu H SB(-T)	3.2-2
PSSu H SB DP(-T)	3.2-6
PSSu H SB DN(-T)	3.2-11
PSSu H SB CAN(-T)	3.2-15
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Head modules PSSu H SB(-T)



Head module to connect the PSSuniversal system to **SafetyBUS p**

Module features

- ▶ **SafetyBUS p** interface for
 - Failsafe inputs/outputs
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - **SafetyBUS p** status
 - USB status
- ▶ Coated version of the module: **PSSu H SB-T**: for increased environmental requirements
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyBUS p** interface
- ▶ When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

Approvals

	PSSu H SB
	◆
	◆
	◆

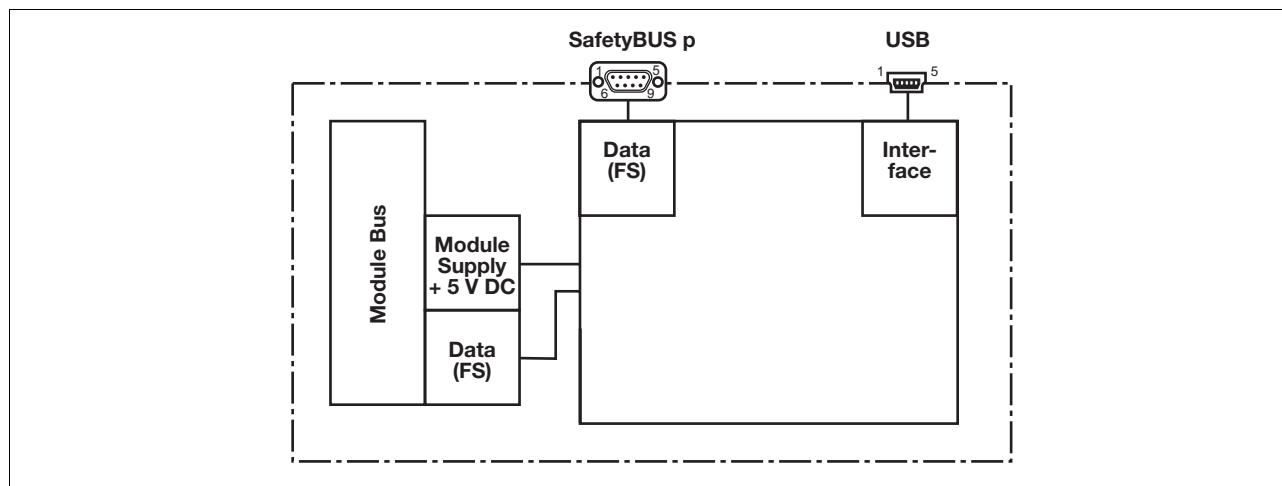
Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

The module is designed for use in safety-related applications with **SafetyBUS p**.

The module **PSSu H SB-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Block diagram



Head modules PSSu H SB(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.

Interfaces

- ▶ **SafetyBUS p** interface
 - The **SafetyBUS p** interface enables data to be transferred safely between the PSSuniversal and a

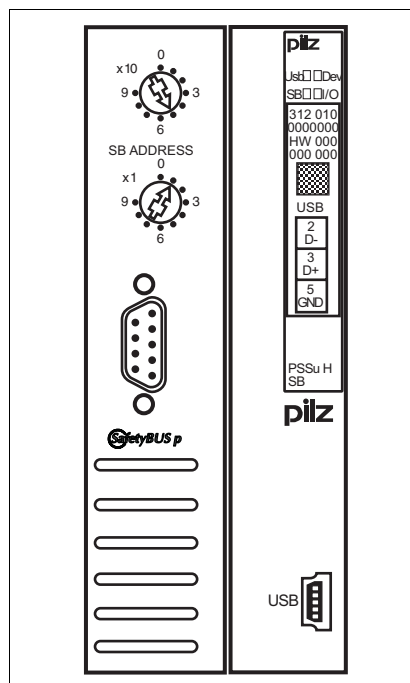
master controller.

- The device address of the **SafetyBUS p** is set via two rotary switches.
- If a fault occurs, the module switches off the connected fail-safe output modules.
- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please refer to the Installation Manual for **SafetyBUS p**.
- ▶ Please note the specification of the USB port.

Front view



Connection

SafetyBUS p	Layout
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 fibre-optic couplers from Pilz 9: n.c.
USB	Layout
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground

- ▶ n.c. = not connected

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Head modules

PSSu H SB(-T)

Technical details

Application range	Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0220h

Electrical data

Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	205 mA
FO connection's current consumption	120 mA
Module's power consumption without FO connection	1.03 W
FO connection's power consumption	0.60 W
Max. power dissipation of the module	1.03 W
Potential isolation between module supply and SafetyBUS p	700 V

SafetyBUS p

Application range	Failsafe applications
Device address	32d ... 95d
Max. transmission rate	500 kBit/s
Cable runs	3,500 m
Transmission type	differential two-wire cable
Connection	Male 9-pin D-SUB connector

USB

Connection	Mini-B connector

Environmental data

Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Mechanical data

Housing material	
Front	PC
Bottom	PC

Head modules

PSSu H SB(-T)

Mechanical data

Dimensions	
Height	125.6 mm
Width	50.2 mm
Depth	72.6 mm
Weight	135 g

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.88E-09	20

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

Order reference

Description	Order no.
PSSu H SB (Head module with SafetyBUS p interface)	312 010
PSSu H SB-T (Head module with SafetyBUS p interface, coated version)	314 010

Head modules PSSu H SB DP(-T)



Head module to connect the PSSuniversal system to **SafetyBUS p** and **PROFIBUS DP**

Approvals

	PSSu H SB DP
	◆
	◆
	◆

Module features

- ▶ **SafetyBUS p** interface for
 - Failsafe inputs/outputs
- ▶ **PROFIBUS DP** interface for
 - Standard inputs/outputs
 - Failsafe outputs with the local enable principle
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - **SafetyBUS p** status
 - USB status
 - Status of the **PROFIBUS DP** interface
- ▶ Coated version of the module: **PSSu H SB DP-T**: for increased environmental requirements
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)
 - All standard modules (PSSu E S...)

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

The module is designed for use in:

- ▶ Safety-related applications with
 - **SafetyBUS p**
 - **PROFIBUS DP** With local enable principle
- ▶ Non-safety-related applications with
 - **PROFIBUS DP**

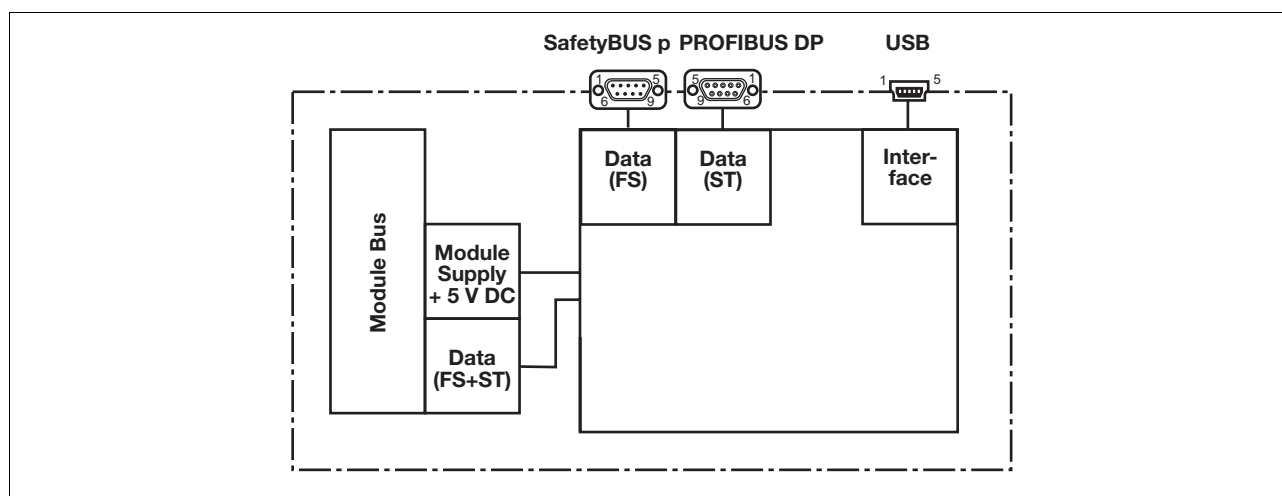
The module **PSSu H SB DP-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyBUS p** interface
- ▶ Potentially isolated **PROFIBUS DP** interface
- ▶ When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

Block diagram



Head modules PSSu H SB DP(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.
- ▶ The module can be configured for the local enable principle.

Interfaces

- ▶ **SafetyBUS p** interface
 - The **SafetyBUS p** interface enables data to be transferred safely

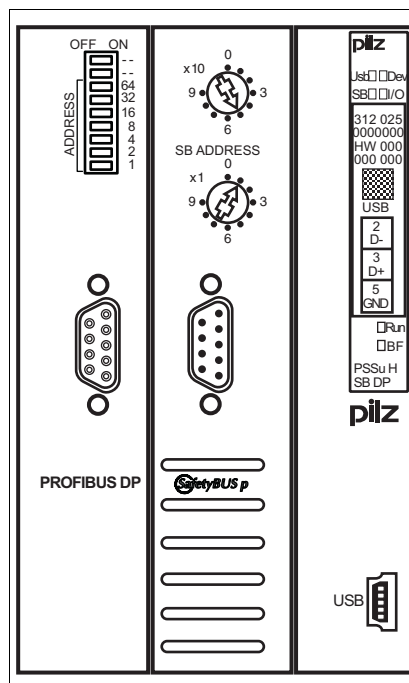
between the PSSuniversal and a master controller.

- The device address of the **SafetyBUS p** is set via two rotary switches.
- If a fault occurs, the module switches off the connected fail-safe output modules.
- ▶ interface
 - The interface enables standard data to be exchanged with a master controller.
- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please refer to the Installation Manual for **SafetyBUS p**.
- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **PROFIBUS DP**.

Front view



Connection

SafetyBUS p	Layout
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 fibre-optic couplers from Pilz 9: n.c.
PROFIBUS-DP	Layout
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.
USB	Layout
Mini-B USB connector	1: n.c. 2: D- USB Data – 3: D+ USB Data + 4: n.c. 5: GND Ground

- ▶ n.c. = not connected

Head modules

PSSu H SB DP(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Standard/Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0221h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	450 mA
FO connection's current consumption	120 mA
Module's power consumption without FO connection	2.25 W
FO connection's power consumption	0.60 W
Max. power dissipation of the module	2.25 W
Potential isolation between module supply and PROFIBUS DP	700 V
Potential isolation between module supply and SafetyBUS p	700 V
SafetyBUS p	
Application range	Failsafe applications
Device address	32d ... 95d
Max. transmission rate	500 kBit/s
Cable runs	3,500 m
Transmission type	differential two-wire cable
Connection	Male 9-pin D-SUB connector
PROFIBUS DP	
Application range	Standard applications Failsafe applications with local enable principle
Device type	Slave
Station address	0 ... 126d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	64 Byte
Transmission rates	1.5 MBit/s, 12 MBit/s, 185.5 kBit/s, 19.2 kBit/s, 3 MBit/s, 45.45 kBit/s, 500 kBit/s, 6 MBit/s, 9.6 kBit/s, 93.75 kBit/s
Set via	automatic
Connection	Female 9-pin D-SUB connector
Protocol	DPV0
Operating modes	AutoBaud, Freeze Mode, Set Slave Address, Sync Mode
Certification	PNO
Description file	PILZ092F.GSD
Manufacturer's ID	092Fh
USB	
Connection	Mini-B connector

Head modules PSSu H SB DP(-T)

Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.88E-09	20

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

Head modules

PSSu H SB DP(-T)

Order reference	
Description	Order no.
PSSu H SB DP (Head module with SafetyBUS p interface and PROFIBUS DP interface)	312 025
PSSu H SB DP-T (Head module with SafetyBUS p interface and PROFIBUS DP interface, coated version)	314 025

Head modules PSSu H SB DN(-T)



Head module to connect the PSSuniversal system to **SafetyBUS p** and **DeviceNet**

Approvals

	PSSu H SB DN
	◆
	◆
	◆

Module features

- ▶ **SafetyBUS p** interface for
 - Failsafe inputs/outputs
- ▶ **DeviceNet** interface for
 - Standard inputs/outputs
 - Failsafe outputs with the local enable principle
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - **SafetyBUS p** status
 - USB status
 - Status of the **DeviceNet** interface
- ▶ Coated version of the module: **PSSu H SB DN-T**: for increased environmental requirements
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)
 - All standard modules (PSSu E S...)

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

The module is designed for use in:

- ▶ Safety-related applications with
 - **SafetyBUS p**
 - **DeviceNet** With local enable principle
- ▶ Non-safety-related applications with
 - **DeviceNet**

The module **PSSu H SB DN-T** is suitable for use where there are increased environmental requirements (see Technical Details).

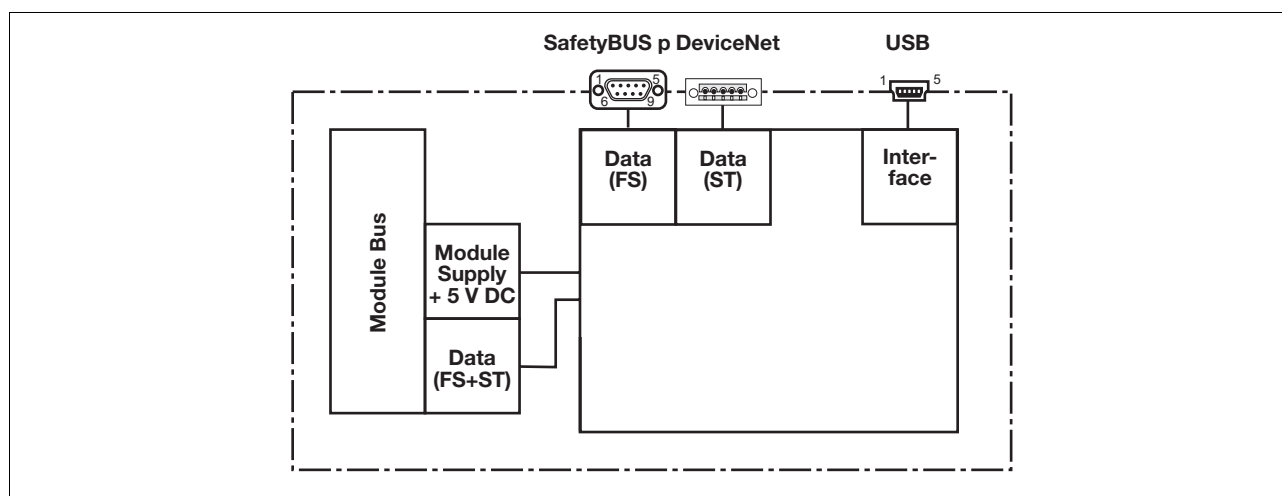
Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyBUS p** interface
- ▶ Potentially isolated **DeviceNet** interface
- ▶ When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

3.2

Block diagram



Head modules PSSu H SB DN(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.
- ▶ The module can be configured for the local enable principle.

Interfaces

- ▶ **SafetyBUS p** interface
 - The **SafetyBUS p** interface enables data to be transferred safely

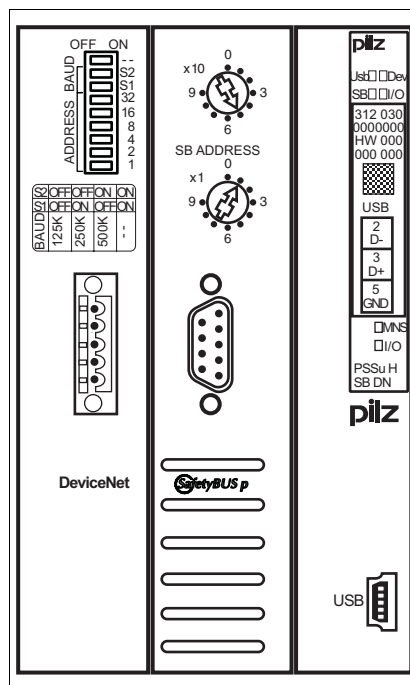
between the PSSuniversal and a master controller.

- The device address of the **SafetyBUS p** is set via two rotary switches.
- If a fault occurs, the module switches off the connected fail-safe output modules.
- ▶ interface
 - The interface enables standard data to be exchanged with a master controller.
- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please refer to the Installation Manual for **SafetyBUS p**.
- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **DeviceNet**.

Front view



Connection

SafetyBUS p	Layout
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 fibre-optic couplers from Pilz 9: n.c.
DeviceNet	Layout
5-pin Combicon plug-in connector	1: V- 2: CAN_Low 3: Shield 4: CAN_High 5: V+
USB	Layout
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground

- ▶ n.c. = not connected

Head modules

PSSu H SB DN(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0222h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	290 mA
FO connection's current consumption	120 mA
Module's power consumption without FO connection	1.45 W
FO connection's power consumption	0.60 W
Max. power dissipation of the module	1.45 W
Potential isolation between module supply and DeviceNet	700 V
Potential isolation between module supply and SafetyBUS p	700 V
SafetyBUS p	
Application range	Failsafe applications
Device address	32d ... 95d
Max. transmission rate	500 kBit/s
Cable runs	3,500 m
Transmission type	differential two-wire cable
Connection	Male 9-pin D-SUB connector
DeviceNet	
Application range	Standard applications Failsafe applications with local enable principle
Device type	Slave
Station address	0 ... 63d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	6 Byte
Transmission rates	125 kBit/s, 250 kBit/s, 500 kBit/s
Set via	DIP switch
Connection	5-pin Combicon plug-in connector
Protocol	Group 2 Only Device
External supply (DC)	24 V
Certification	ODVA
Description file	PSSu.EDS
Manufacturer's ID	181d
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)

Head modules PSSu H SB DN(-T)

Environmental data	
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.88E-09	20

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

Order reference	
Description	Order no.
PSSu H SB DN (Head module with SafetyBUS p interface and DeviceNet interface)	312 030
PSSu H SB DN-T (Head module with SafetyBUS p interface and DeviceNet interface, coated version)	314 030

Head modules PSSu H SB CAN(-T)



Head module to connect the PSSuniversal system to **SafetyBUS p** and **CANopen**

Approvals

	PSSu H SB CAN
	◆
	◆

Module features

- ▶ **SafetyBUS p** interface for
 - Failsafe inputs/outputs
- ▶ **CANopen** interface for
 - Standard inputs/outputs
 - Failsafe outputs with the local enable principle
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - **SafetyBUS p** status
 - USB status
 - Status of the **CANopen** interface
- ▶ Coated version of the module: **PSSu H SB CAN-T**: for increased environmental requirements
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)
 - All standard modules (PSSu E S...)

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

The module is designed for use in:

- ▶ Safety-related applications with
 - **SafetyBUS p**
 - **CANopen** With local enable principle
- ▶ Non-safety-related applications with
 - **CANopen**

The module **PSSu H SB CAN-T** is suitable for use where there are increased environmental requirements (see Technical Details).

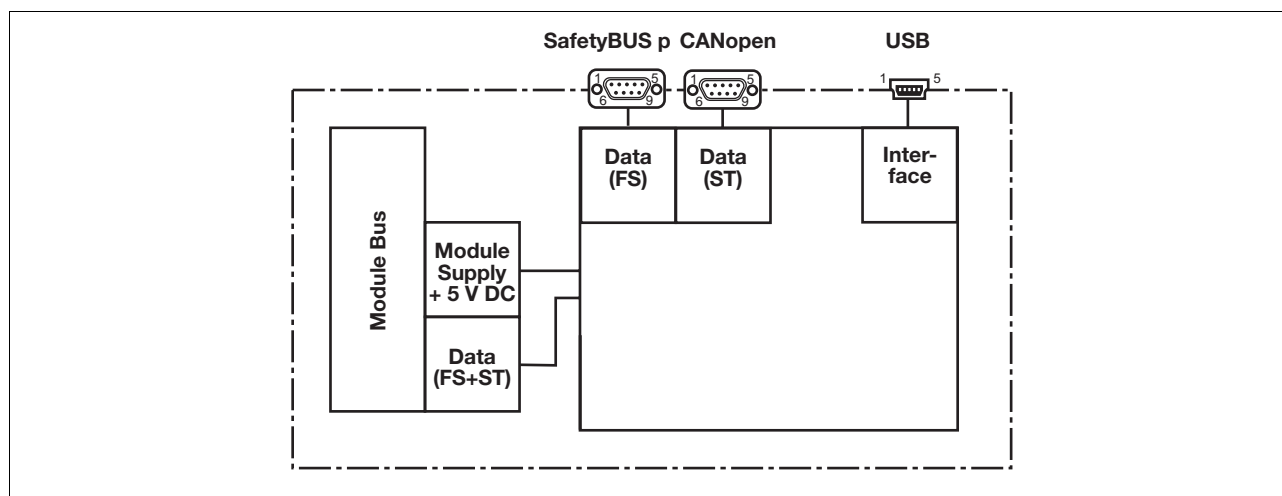
Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyBUS p** interface
- ▶ Potentially isolated **CANopen** interface
- ▶ When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

3.2

Block diagram



Head modules PSSu H SB CAN(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output

modules; it processes these signals and passes them on to a master controller.

- ▶ The module can be configured for the local enable principle.

Interfaces

- ▶ **SafetyBUS p** interface
 - The **SafetyBUS p** interface enables data to be transferred safely between the PSSuniversal and a master controller.
 - The device address of the **SafetyBUS p** is set via two rotary switches.
 - If a fault occurs, the module switches off the connected fail-safe output modules.

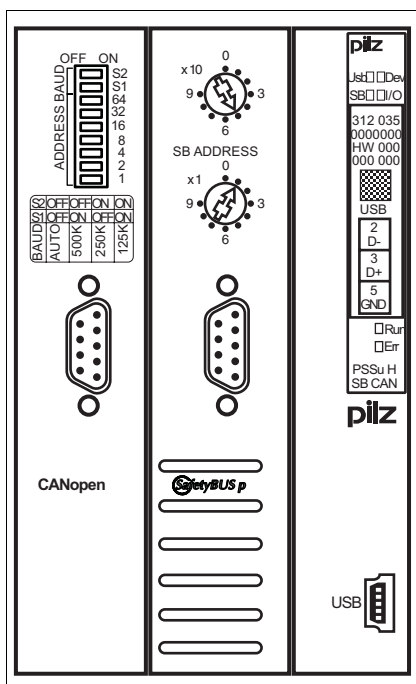
interface

- The interface enables standard data to be exchanged with a master controller.
- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please refer to the Installation Manual for **SafetyBUS p**.
- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **CANopen**.

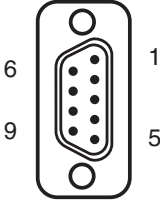
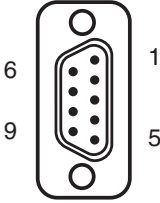
Front view



Head modules

PSSu H SB CAN(-T)

Connection

SafetyBUS p	Layout	
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 fibre-optic couplers from Pilz 9: n.c.	
CANopen	Layout	
Male 9-pin D-SUB connector	1: n.c. 2: CAN_L 3: CAN_GND 4: n.c. 5: CAN_SHLD 6: GND ⁽¹⁾ 7: CAN_H 8: n.c. 9: n.c.	
USB	Layout	
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground	
► n.c. = not connected	► ⁽¹⁾ Not required for operation	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0224h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	320 mA
FO connection's current consumption	120 mA
Module's power consumption without FO connection	1.60 W
FO connection's power consumption	0.60 W
Max. power dissipation of the module	1.60 W
Potential isolation between module supply and CANopen	700 V
Potential isolation between module supply and SafetyBUS p	700 V
SafetyBUS p	
Application range	Failsafe applications
Device address	32d ... 95d

Head modules

PSSu H SB CAN(-T)

SafetyBUS p	
Max. transmission rate	500 kBit/s
Cable runs	3,500 m
Transmission type	differential two-wire cable
Connection	Male 9-pin D-SUB connector
CANopen	
Application range	Standard applications Failsafe applications with local enable principle
Device type	Slave
Station address	1 .. 127d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	5 Byte
Transmission rates	1 MBit/s, 10 kbit/s, 100 kBit/s, 125 kBit/s, 20 kbit/s, 250 kBit/s, 50 kbit/s, 500 kBit/s, 800 kbit/s
Set via	automatic/DIP switch
Connection	Male 9-pin D-SUB connector
Protocol	CANopen Standard 4,0
Operating modes	Slave Mode
Certification	CiA
Description file	PSSuCO.eds
Manufacturer's ID	0189h
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC

Head modules

PSSu H SB CAN(-T)

Mechanical data

Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g
	250 g coated version (-T)

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.88E-09	20

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

Order reference

Description	Order no.
PSSu H SB CAN (Head module with SafetyBUS p interface and CANopen interface)	312 035
PSSu H SB CAN-T (Head module with SafetyBUS p interface and CANopen interface, coated version)	314 035

Head modules PSSu H SB IBSe



Head module to connect the PSSuniversal system to **SafetyBUS p** and **INTERBUS**

Approvals

	PSSu H SB IBSe
	◆
	◆

Module features

- ▶ **SafetyBUS p** interface for
 - Failsafe inputs/outputs
- ▶ **INTERBUS**-Interface for
 - Standard inputs/outputs
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - **SafetyBUS p** status
 - USB status
 - Status of the **INTERBUS** interface
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)
 - All standard modules (PSSu E S...)

- ▶ Non-safety-related applications with
 - **INTERBUS**

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyBUS p** interface
- ▶ Potentially isolated **INTERBUS** interface
- ▶ When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

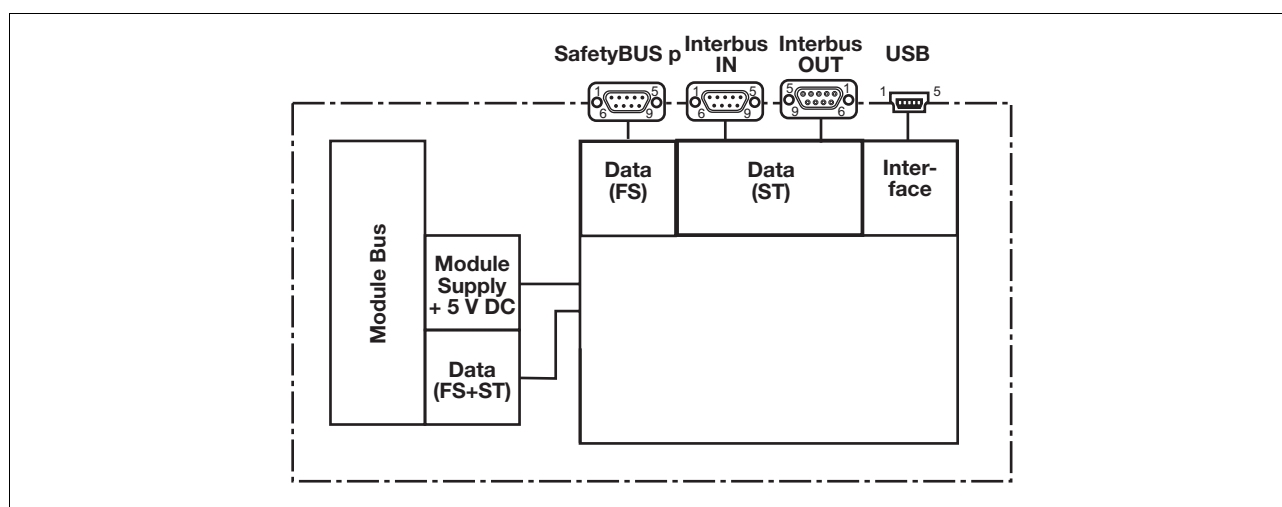
Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

The module is designed for use in:

- ▶ Safety-related applications with
 - **SafetyBUS p**

Block diagram



Head modules PSSu H SB IBSe

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output

modules; it processes these signals and passes them on to a master controller.

Interfaces

- ▶ **SafetyBUS p** interface
 - The **SafetyBUS p** interface enables data to be transferred safely between the PSSuniversal and a master controller.
 - The device address of the **SafetyBUS p** is set via two rotary switches.
 - If a fault occurs, the module switches off the connected fail-safe output modules.
- ▶ **INTERBUS** interface
 - The **INTERBUS** interface ena-

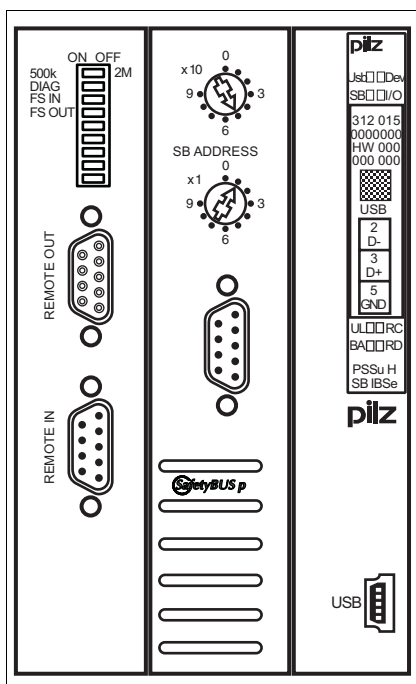
bles standard data to be exchanged with a master controller.

- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please refer to the Installation Manual for **SafetyBUS p**.
- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **INTERBUS**.

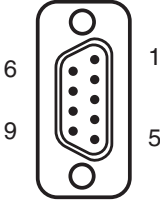
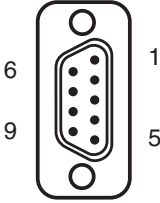
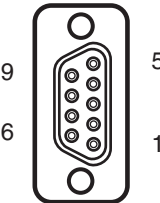
Front view



Head modules

PSSu H SB IBSe

Connection

SafetyBUS p	Layout	
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 fibre-optic couplers from Pilz 9: n.c.	
INTERBUS IBS IN	Layout	
Male 9-pin D-SUB connector conforms to the guidelines of the INTERBUS User Group	1: DO 2: DI 3: GND 4: GND 5: n.c. 6: DO- 7: DI- 8: + 5 V 9: n.c.	
INTERBUS IBS OUT	Layout	
Female 9-pin D-SUB connector conforms to the guidelines of the INTERBUS User Group	1: DO 2: DI 3: GND 4: GND 5: + 5 V 6: DO- 7: DI- 8: + 5 V 9: n.c.	
USB	Layout	
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground	

► n.c. = not connected

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Head modules

PSSu H SB IBSe

Technical details	
Application range	Standard/Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0223h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	620 mA
FO connection's current consumption	120 mA
Module's power consumption without FO connection	3.10 W
FO connection's power consumption	0.60 W
Max. power dissipation of the module	3.10 W
Potential isolation between module supply and INTERBUS	700 V
Potential isolation between module supply and SafetyBUS p	700 V
SafetyBUS p	
Application range	Failsafe applications
Device address	32d ... 95d
Max. transmission rate	500 kBit/s
Cable runs	3,500 m
Transmission type	differential two-wire cable
Connection	Male 9-pin D-SUB connector
INTERBUS	
Application range	Standard applications
Device type	Slave
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	4 Byte
Transmission rates	2 MBit/s, 500 kBit/s
Set via	DIP switch
Connection	Male 9-pin D-SUB connector/female 9-pin D-SUB connector
Protocol	INTERBUS-Protokoll
Operating modes	Slave Mode
Manufacturer's ID	248h
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms

Head modules PSSu H SB IBSe

Environmental data

Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Mechanical data

Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.88E-09	20

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

Order reference

Description	Order no.
PSSu H SB IBSe (Head module with SafetyBUS p interface and INTERBUS inter- face via copper cable)	312 015

Head modules PSSu H SB IBSO



Head module to connect the PSSuniversal system to **SafetyBUS p** and **INTERBUS**

Approvals

	PSSu H SB IBSO
	◆
	◆

Module features

- ▶ **SafetyBUS p** interface for
 - Failsafe inputs/outputs
- ▶ **INTERBUS**-Interface for
 - Standard inputs/outputs
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ Optical **INTERBUS** interface to connect fibre-optic cables (FOC)
- ▶ LEDs for:
 - System status
 - **SafetyBUS p** status
 - USB status
 - Status of the **INTERBUS** interface
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)
 - All standard modules (PSSu E S...)

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

The module is designed for use in:

- ▶ Safety-related applications with
 - **SafetyBUS p**
- ▶ Non-safety-related applications with
 - **INTERBUS**

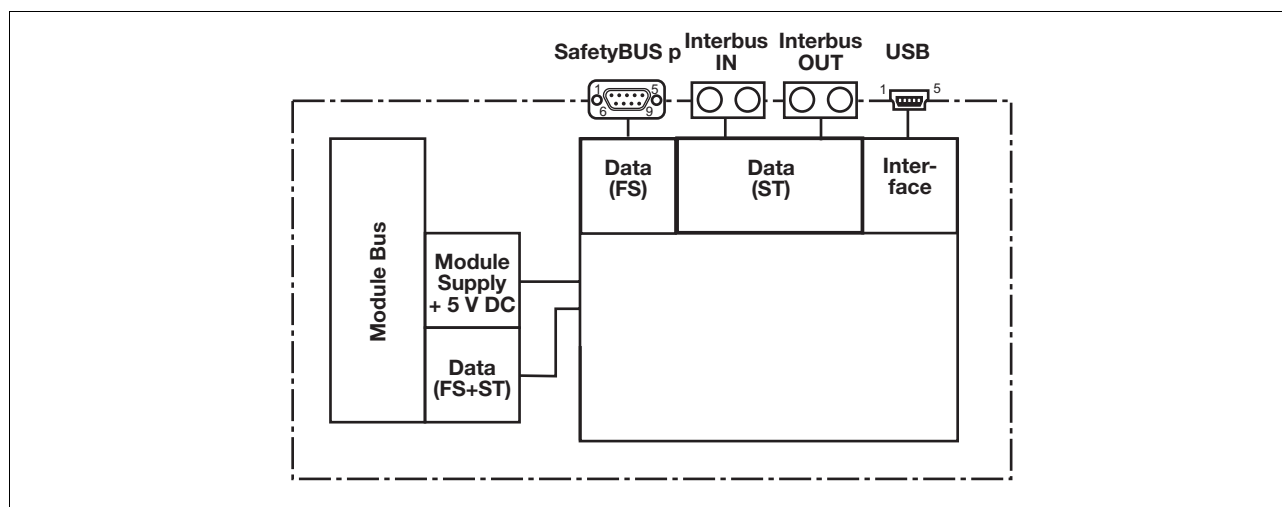
Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyBUS p** interface
- ▶ Potentially isolated **INTERBUS** interface
- ▶ When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

3.2

Block diagram



3.2-26

Head modules

PSSu H SB IBSO

Technical details	
Application range	Standard/Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0225h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	480 mA
FO connection's current consumption	120 mA
Module's power consumption without FO connection	2.40 W
FO connection's power consumption	0.60 W
Max. power dissipation of the module	2.40 W
Potential isolation between module supply and INTERBUS	700 V
Potential isolation between module supply and SafetyBUS p	700 V
SafetyBUS p	
Application range	Failsafe applications
Device address	32d ... 95d
Max. transmission rate	500 kBit/s
Cable runs	3,500 m
Transmission type	differential two-wire cable
Connection	Male 9-pin D-SUB connector
INTERBUS	
Application range	Standard applications
Device type	Slave
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	4 Byte
Transmission rates	2 MBit/s, 500 kBit/s
Set via	DIP switch
Connection	F-SMA connector
Protocol	INTERBUS-Protokoll
Operating modes	Slave Mode
Manufacturer's ID	248h
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms

Head modules PSSu H SB IBSO

Environmental data

Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Mechanical data

Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.88E-09	20

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

Order reference

Description	Order no.
PSSu H SB IBSO (Head module with SafetyBUS p interface and INTERBUS inter- face via fibre-optic cable)	312 020

Head modules
PSSu H DP(-T)

Function description

- Module supply
- ▶ The module supply provides the module with voltage.
- Decentralised input/output
- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
 - ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
 - ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.

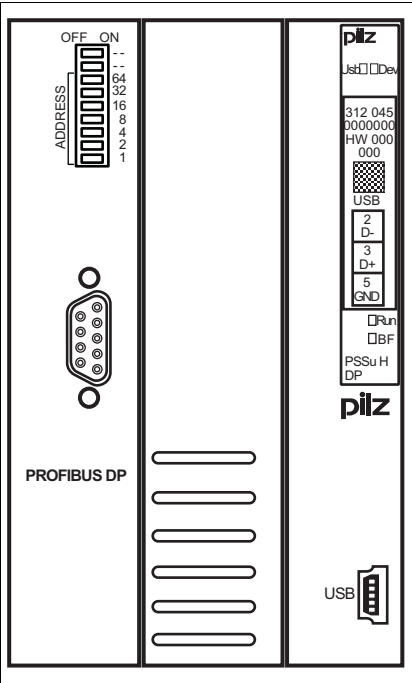
Interfaces

- ▶ **PROFIBUS DP** interface
 - The **PROFIBUS DP** interface enables standard data to be exchanged with a master controller.
- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **PROFIBUS DP**.

Front view



Connection

PROFIBUS DP	Layout	
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.	
USB	Layout	
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground	

- ▶ n.c. = not connected

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Head modules

PSSu H DP(-T)

Technical details	
Application range	Standard
Module's device code	0201h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	430 mA
Module's power consumption without FO connection	2.15 W
Max. power dissipation of the module	2.15 W
Potential isolation between module supply and PROFIBUS DP	700 V
PROFIBUS DP	
Application range	Standard applications
Device type	Slave
Station address	0 ... 126d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	64 Byte
Transmission rates	1.5 MBit/s, 12 MBit/s, 185.5 kBit/s, 19.2 kBit/s, 3 MBit/s, 45.45 kBit/s, 500 kBit/s, 6 MBit/s, 9.6 kBit/s, 93.75 kBit/s
Set via	automatic
Connection	Female 9-pin D-SUB connector
Protocol	DPV0
Operating modes	AutoBaud, Freeze Mode, Set Slave Address, Sync Mode
Certification	PNO
Description file	PILZ0A94.GSD PILZ092F.GSD coated version (-T)
Manufacturer's ID	0A94h 092Fh coated version (-T)
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms

Head modules PSSu H DP(-T)

Environmental data

Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Mechanical data

Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	155 g

Order reference

Description	Order no.
PSSu H DP (Head module with PROFIBUS DP interface)	312 045
PSSu H DP-T (Head module with PROFIBUS DP interface, coated version)	314 045

Head modules PSSu H DN(-T)



Head module to connect the PSSuniversal system to **DeviceNet**

Approvals

	PSSu H DN
	◆

Module features

- ▶ **DeviceNet**-Interface for switching
 - Standard inputs/outputs
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - USB status
 - Status of the **DeviceNet** interface
- ▶ Coated version of the module: **PSSu H DN-T**: for increased environmental requirements
- ▶ Electronic modules that can be used for input/output:
 - All standard modules (PSSu E S...)

Module description

The module is designed for use in:

- ▶ Non-safety-related applications with
 - **DeviceNet**

The module **PSSu H DN-T** is suitable for use where there are increased environmental requirements (see Technical Details).

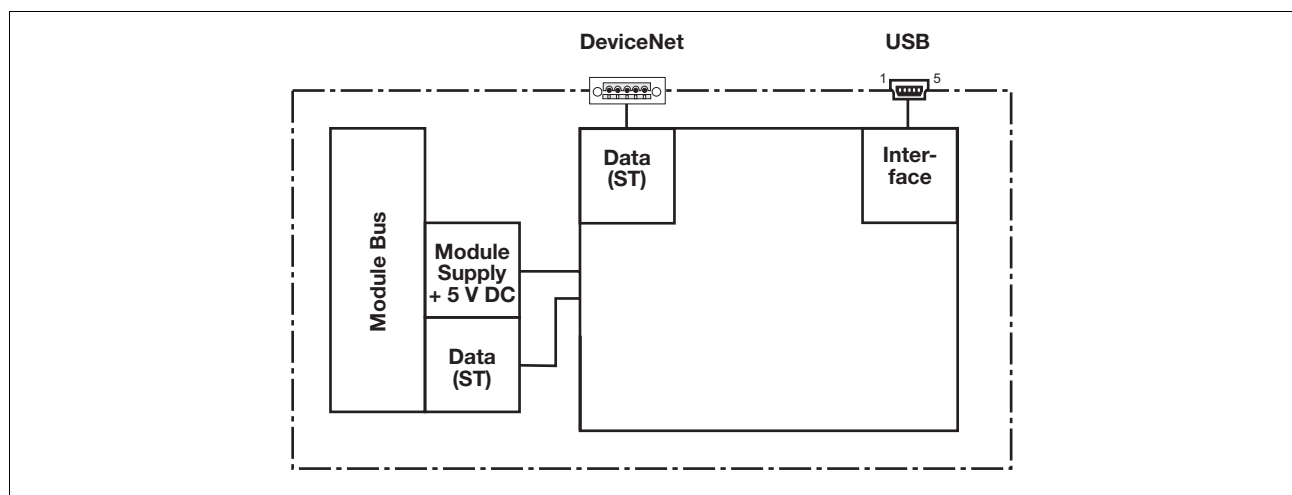
Integrated protection mechanisms

The module has the following protection mechanisms:

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

3.2

Block diagram



Head modules

PSSu H DN(-T)

Function description

- Module supply
- ▶ The module supply provides the module with voltage.
- Decentralised input/output
- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
 - ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
 - ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.

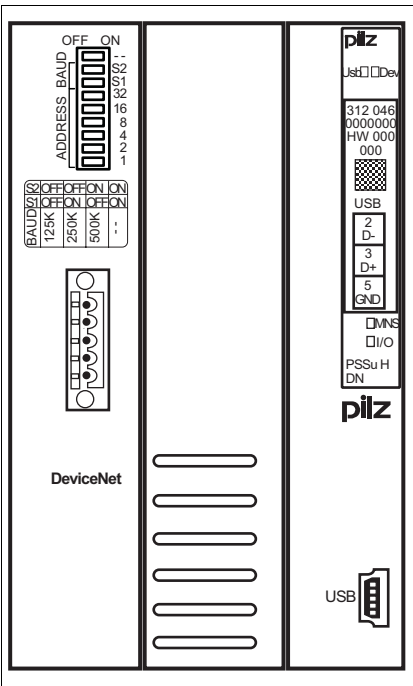
Interfaces

- ▶ **DeviceNet** interface
 - The **DeviceNet** interface enables standard data to be exchanged with a master controller.
- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **DeviceNet**.

Front view



Connection

DeviceNet	Layout
5-pin Combicon plug-in connector	1: V- 2: CAN_Low 3: Shield 4: CAN_High 5: V+



USB	Layout
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground



▶ n.c. = not connected

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Head modules

PSSu H DN(-T)

Technical details	
Application range	Standard
Module's device code	0202h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	270 mA
Module's power consumption without FO connection	1.35 W
Max. power dissipation of the module	1.35 W
Potential isolation between module supply and DeviceNet	700 V
DeviceNet	
Application range	Standard applications
Device type	Slave
Station address	0 ... 63d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	6 Byte
Transmission rates	125 kBit/s, 250 kBit/s, 500 kBit/s
Set via	DIP switch
Connection	5-pin Combicon plug-in connector
Protocol	Group 2 Only Device
External supply (DC)	24 V
Certification	ODVA
Description file	PSSu.EDS
Manufacturer's ID	181d
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-40 - 70 °C coated version (-T)
	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Head modules

PSSu H DN(-T)

Mechanical data

Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	155 g

Order reference

Description	Order no.
PSSu H DN (Head module with DeviceNet interface)	312 046
PSSu H DN-T (Head module with DeviceNet interface, coated version)	314 046

Head modules PSSu H CAN(-T)



Head module to connect the PSSuniversal system to **CANopen**

Approvals

	PSSu H CAN
	◆

Module features

- ▶ **CANopen**-Interface for switching
 - Standard inputs/outputs
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - USB status
 - Status of the **CANopen** interface
- ▶ Coated version of the module: **PSSu H CAN-T**: for increased environmental requirements
- ▶ Electronic modules that can be used for input/output:
 - All standard modules (PSSu E S...)

Module description

The module is designed for use in:

- ▶ Non-safety-related applications with
 - **CANopen**

The module **PSSu H CAN-T** is suitable for use where there are increased en-

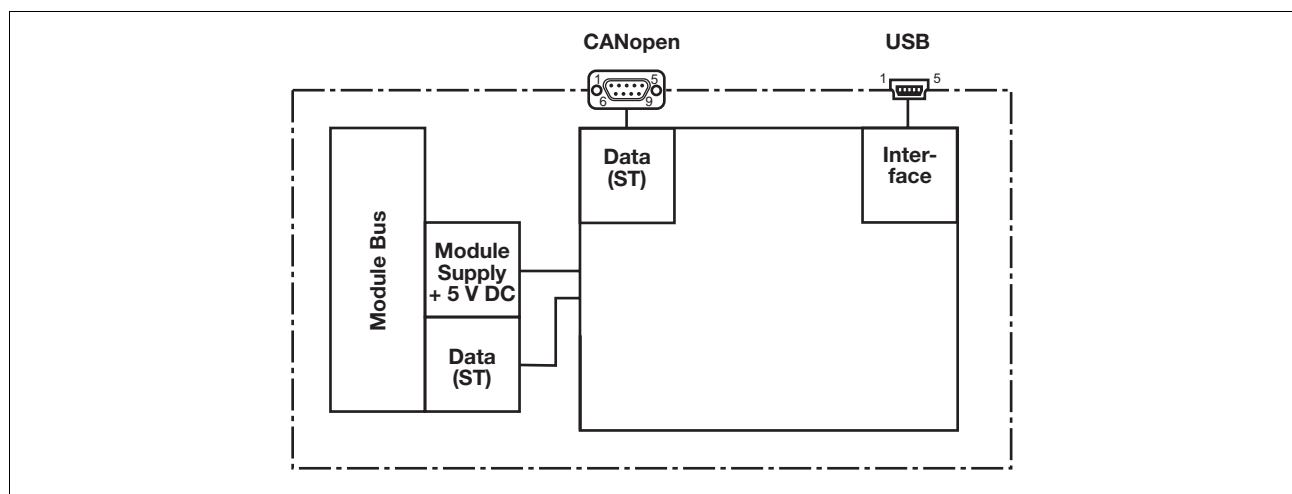
vironmental requirements (see Technical Details).

Integrated protection mechanisms

The module has the following protection mechanisms:

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

Block diagram



Head modules

PSSu H CAN(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.

Interfaces

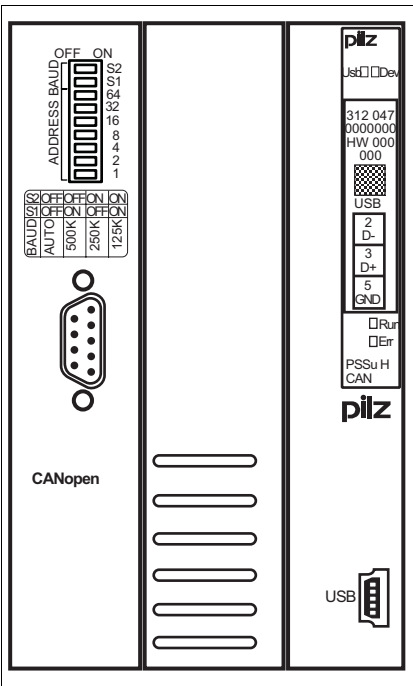
- ▶ **CANopen** interface
 - The **CANopen** interface enables standard data to be exchanged with a master controller.

- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

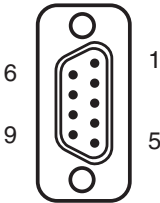
Wiring

- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **CANopen**.

Front view



Connection

CANopen	Layout
Male 9-pin D-SUB connector	1: n.c. 2: CAN_L 3: CAN_GND 4: n.c. 5: CAN_SHLD 6: GND ⁽¹⁾ 7: CAN_H 8: n.c. 9: n.c.
	
USB	Layout
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground
	
▶ n.c. = not connected	▶ ⁽¹⁾ Not required for operation

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Head modules

PSSu H CAN(-T)

Technical details	
Application range	Standard
Module's device code	0204h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	270 mA
Module's power consumption without FO connection	1.35 W
Max. power dissipation of the module	1.35 W
Potential isolation between module supply and CANopen	700 V coated version (-T)
CANopen	
Application range	Standard applications
Device type	Slave
Station address	1 .. 127d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	5 Byte
Transmission rates	1 MBit/s, 10 kbit/s, 100 kBit/s, 125 kBit/s, 20 kbit/s, 25 kbit/s, 250 kBit/s, 50 kbit/s, 500 kBit/s, 800 kbit/s
Set via	automatic/DIP switch
Connection	Female 9-pin D-SUB connector
Protocol	CANopen Standard 4.0
Operating modes	Slave Mode
Certification	CiA
Description file	PSSuCO.eds
Manufacturer's ID	0189h
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-40 - 70 °C coated version (-T)
	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Head modules PSSu H CAN(-T)

Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	155 g
	250 g coated version (-T)

Order reference	
Description	Order no.
PSSu H CAN (Head module with CANopen interface)	312 047
PSSu H CAN-T (Head module with CANopen interface, coated version)	314 047

Head modules

PSSu H IBS_e



Head module to connect the PSSuniversal system to **INTERBUS**

Module features

- ▶ **INTERBUS**-Interface for switching
 - Standard inputs/outputs
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ LEDs for:
 - System status
 - USB status
 - Status of the **INTERBUS** interface
- ▶ Electronic modules that can be used for input/output:
 - All standard modules (PSSu E S...)

Module description

The module is designed for use in:

- ▶ Non-safety-related applications with
 - **INTERBUS**

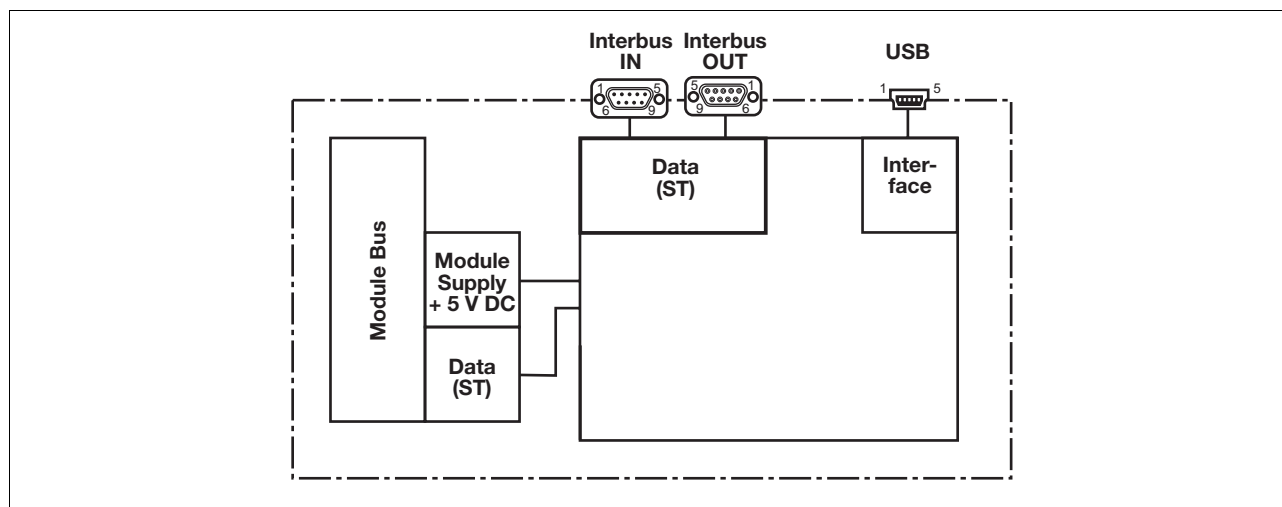
Integrated protection mechanisms

The module has the following protection mechanisms:

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

3.2

Block diagram



Head modules PSSu H IBS_e

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.

Interfaces

▶ **INTERBUS** interface

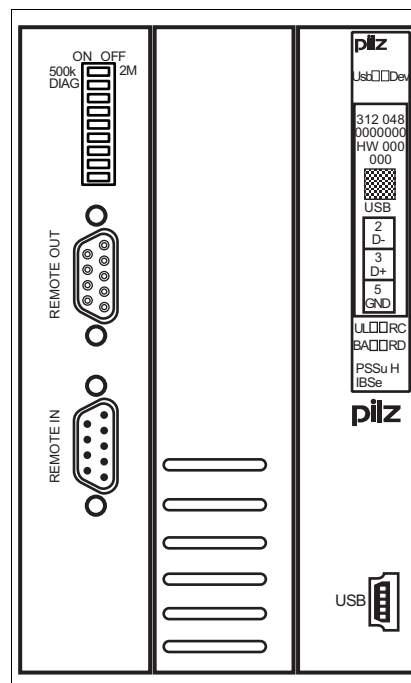
- The **INTERBUS** interface enables standard data to be exchanged with a master controller.

- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **INTERBUS**.

Front view



Connection

INTERBUS IBS IN	Layout	
Male 9-pin D-SUB connector conforms to the guidelines of the INTERBUS User Group	1: DO 2: DI 3: GND 4: GND 5: n.c. 6: DO- 7: DI- 8: + 5 V 9: n.c.	
INTERBUS IBS OUT	Layout	
Female 9-pin D-SUB connector conforms to the guidelines of the INTERBUS User Group	1: DO 2: DI 3: GND 4: GND 5: + 5 V 6: DO- 7: DI- 8: + 5 V 9: n.c.	
USB	Layout	
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground	

- ▶ n.c. = not connected

Head modules

PSSu H IBS_e

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0203h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	620 mA
Module's power consumption without FO connection	3.10 W
Max. power dissipation of the module	3.10 W
Potential isolation between module supply and INTERBUS	700 V
INTERBUS	
Application range	Standard applications
Device type	Slave
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	4 Byte
Transmission rates	2 MBit/s, 500 kBit/s
Set via	DIP switch
Connection	Male 9-pin D-SUB connector/female 9-pin D-SUB connector
Protocol	INTERBUS-Protokoll
Operating modes	Slave Mode
Manufacturer's ID	248h
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Head modules PSSu H IBSe

Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Order reference	
Description	Order no.
PSSu H IBSe (Head module with INTERBUS interface via copper cable)	312 048

Head modules PSSu H IBSO



Head module to connect the PSSuniversal system to **INTERBUS**

Module features

- ▶ **INTERBUS**-Interface for switching
 - Standard inputs/outputs
- ▶ USB port for connection to a PC for
 - Commissioning
 - Service
- ▶ Optical **INTERBUS** interface to connect fibre-optic cables (FOC)
- ▶ LEDs for:
 - System status
 - USB status
 - Status of the **INTERBUS** interface
- ▶ Electronic modules that can be used for input/output:
 - All standard modules (PSSu E S...)

Module description

The module is designed for use in:

- ▶ Non-safety-related applications with
 - **INTERBUS**

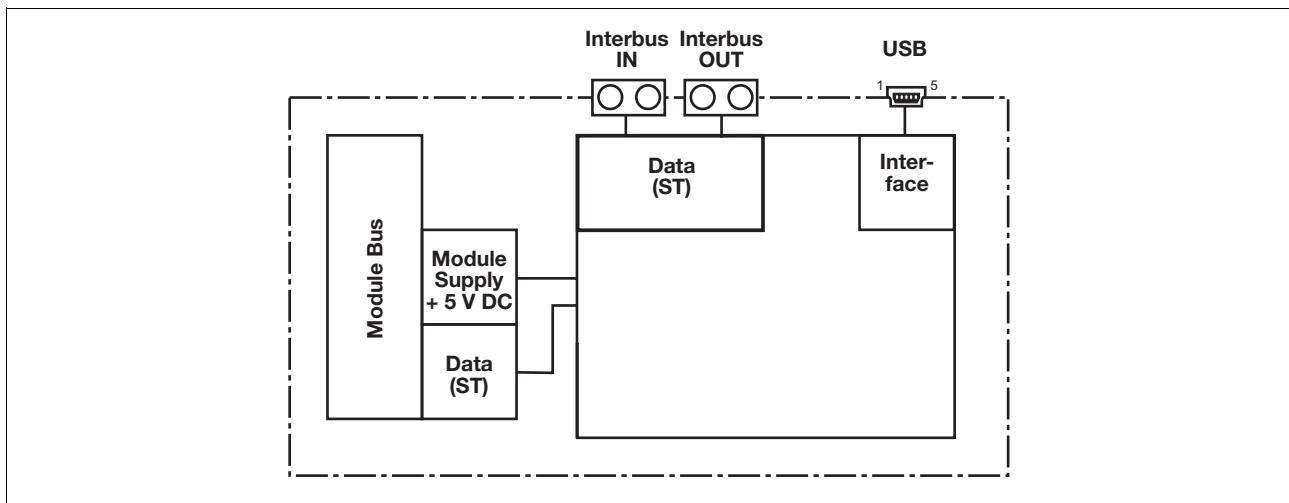
Integrated protection mechanisms

The module has the following protection mechanisms:

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

3.2

Block diagram



Head modules PSSu H IBSO

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.

Interfaces

▶ **INTERBUS** interface

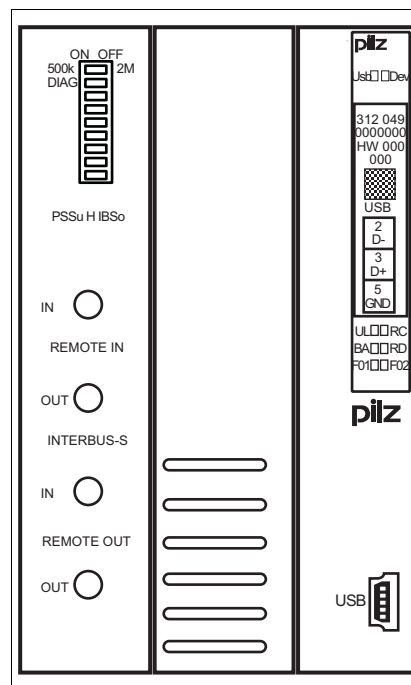
- The **INTERBUS** interface enables standard data to be exchanged with a master controller.

- ▶ A USB port enables communication with a PC for commissioning, diagnostics and updating the firmware status.

Wiring

- ▶ Please note the specification of the USB port.
- ▶ Please refer to the Installation Manual for **INTERBUS**.

Front view



Connection

INTERBUS IBS IN	Layout
F-SMA connector	IN: Receive data
Fibre-optic cable	OUT: Send data
INTERBUS IBS OUT	Layout
F-SMA connector	IN: Receive data
Fibre-optic cable	OUT: Send data
USB	Layout
Mini-B USB connector	1: n.c.
	2: D- USB Data –
	3: D+ USB Data +
	4: n.c.
	5: GND Ground



- ▶ n.c. = not connected

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Head modules

PSSu H IBSO

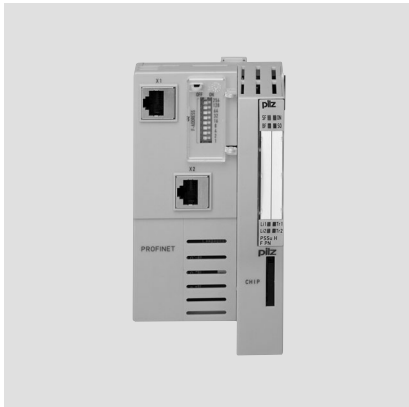
Technical details	
Application range	Standard
Module's device code	0205h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption without FO connection	480 mA
Module's power consumption without FO connection	2.40 W
Max. power dissipation of the module	2.40 W
Potential isolation between module supply and INTERBUS	700 V
INTERBUS	
Application range	Standard applications
Device type	Slave
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Maximum data length of the fieldbus interface: Diagnostics	4 Byte
Transmission rates	2 MBit/s, 500 kBit/s
Set via	DIP switch
Connection	F-SMA connector
Protocol	INTERBUS-Protokoll
Operating modes	Slave Mode
Manufacturer's ID	248h
USB	
Connection	Mini-B connector
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Head modules

PSSu H IBSO

Order reference	
Description	Order no.
PSSu H IBSO (Head module with INTERBUS interface via fibre-optic cable)	312 049

Head modules PSSu H F PN



Head module to connect the PSSuniversal system to **PROFIsafe**

Approvals

	PSSu H F PN
	◆
	◆
	◆

Module features

- ▶ **PROFINET** interface with PROFIsafe profile
- ▶ LEDs for:
 - System status
 - **PROFINET** status
 - **PROFIsafe** status
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)
 - All standard modules (PSSu E S...)

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **PROFINET** interface

Module description

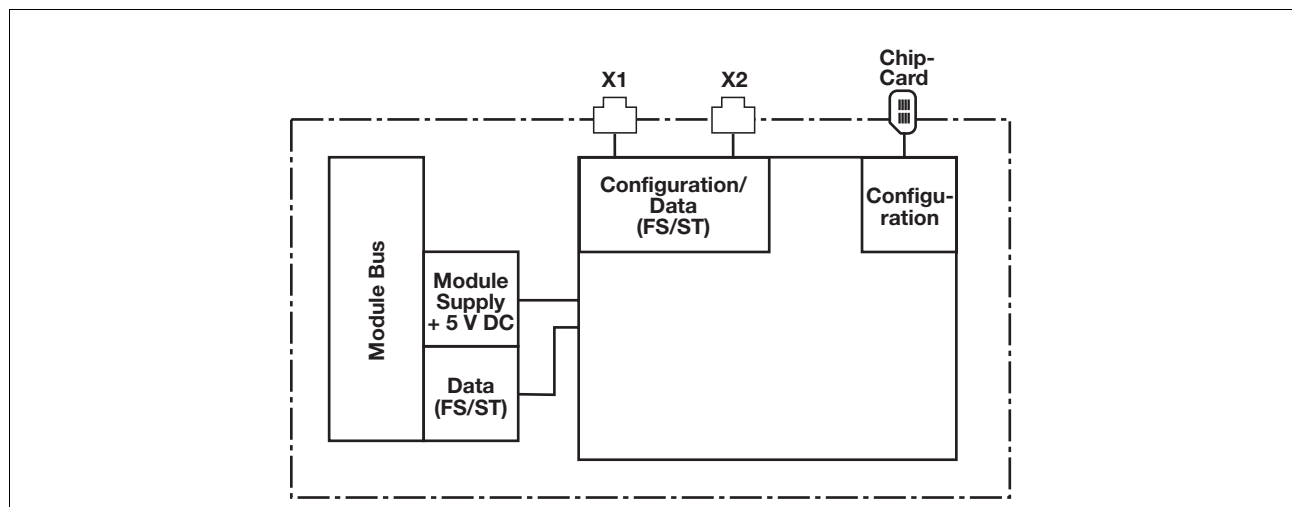
The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

The module is designed for use in:

- ▶ Safety-related applications with
 - **PROFINET** with PROFIsafe profile
- ▶ Non-safety-related applications with
 - **PROFINET**

3.2

Block diagram



Head modules PSSu H F PN

Function description

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a master controller; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a master controller.

Interfaces

- ▶ PROFINET interface with PROFIsafe profile
 - The PROFINET interface enables standard data to be exchanged with a master controller.

- The PROFINET interface with PROFIsafe profile enables data to be transferred safely between the PSSuniversal and a master controller.
- If a fault occurs, the module switches off the connected fail-safe output modules.
- The station address is set via a DIP switch.

All the project data is stored in the head module. The project data can also be stored on a chip card.

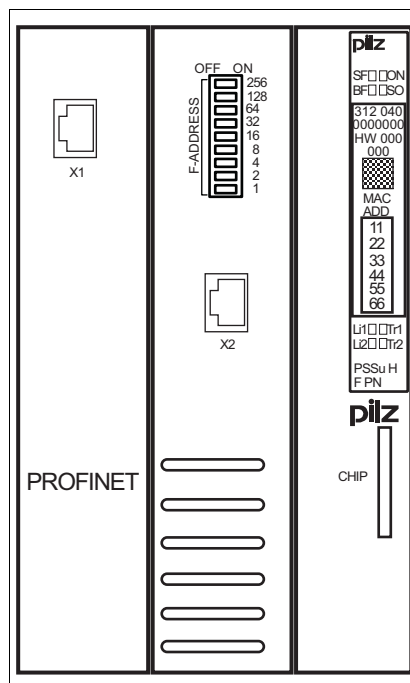
Module supply

- ▶ The module supply provides the module with voltage.

Wiring

- ▶ Please refer to the Installation Manual for PROFINET with PROFIsafe profile.

Front view

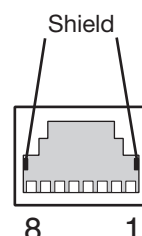


Connection

X1

Female RJ45 connector in accordance with the guidelines of the PROFINET User Group (PNO)

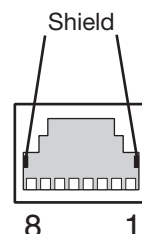
8-core CAT-5 Ethernet patch cable



X2

Female RJ45 connector in accordance with the guidelines of the PROFINET User Group (PNO)

8-core CAT-5 Ethernet patch cable



INFORMATION

With the plug in connection please note that the data cable and connector have a limited mechanical load capacity. Appropriate design measures should be used to ensure that the plug-in connection is insensitive to increased mechanical stress (e.g. through shock, vibration). Such meas-

ures include fixed routing und strain relief, for example. We also recommend the use of an angled RJ45 connector.

Head modules

PSSu H F PN

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0226h No. 312040 0229h No. 312043
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption	500 mA
Module's power consumption	2.50 W
Max. power dissipation of the module	2.50 W
PROFINET IO	
Application range	Standard applications Failsafe applications
Device type	Slave
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Transmission rates	100 MBit/s
Set via	automatic
Connection	RJ45
Certification	PNO
Manufacturer's ID	092Fh
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	25g 6 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC

Head modules PSSu H F PN

Mechanical data

Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.88E-09	20

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

Order reference

Description	Order no.
PSSu H F PN (Head module with PROFIsafe interface)	312 043

Head modules PSSu H S PN



Head module to connect the PSSuniversal system to **PROFINET IO**

Approvals

	PSSu H S PN
	◆

Module features

- ▶ **PROFINET** interface
- ▶ LEDs for:
 - System status
 - **PROFINET** status
- ▶ Electronic modules that can be used for input/output:
 - All standard modules (PSSu E S...)

Module description

The module is designed for use in:

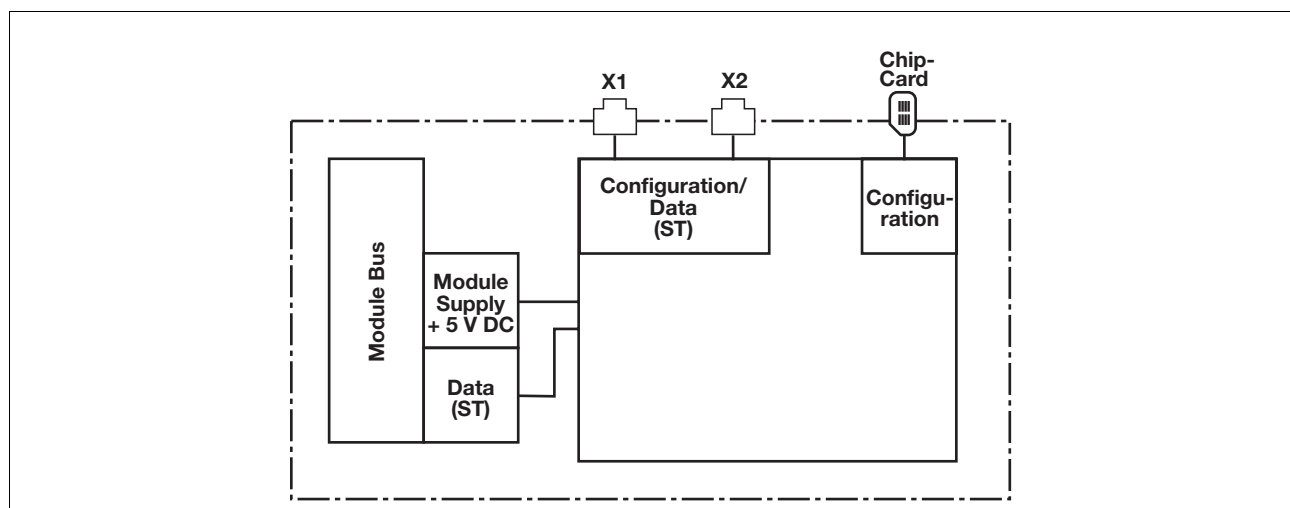
- ▶ Non-safety-related applications with
 - **PROFINET IO**

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Potentially isolated **PROFINET IO** interface
- ▶ When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

Block diagram



Head modules PSSu H S PN

Function description

Decentralised input/output

- ▶ The head module enables the PSSuniversal to be used as a modular, decentralised input/output module.
- ▶ The head module receives signals from a higher level control system; it processes these signals and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals and passes them on to a higher level control system.

Interfaces

- ▶ The PROFINET interface enables standard data to be exchanged with a higher level control system.

All the project data is stored in the head module. The project data can also be stored on a chip card.

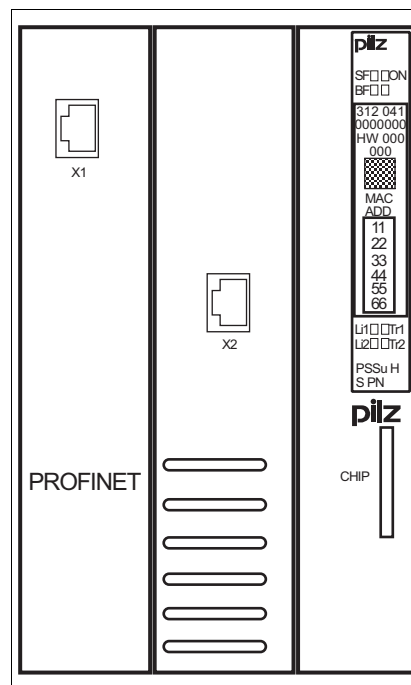
Module supply

- ▶ The module supply provides the module with voltage.

Wiring

- ▶ Please refer to the Installation Manual for PROFINET.

Front view

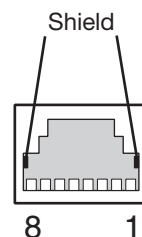


Connection

X1

Female RJ45 connector in accordance with the guidelines of the PROFINET User Group (PNO)

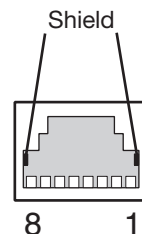
8-core CAT-5 Ethernet patch cable



X2

Female RJ45 connector in accordance with the guidelines of the PROFINET User Group (PNO)

8-core CAT-5 Ethernet patch cable



INFORMATION

With the plug in connection please note that the data cable and connector have a limited mechanical load capacity. Appropriate design measures should be used to ensure that the plug-in connection is insensitive to increased mechanical stress (e.g. through shock, vibration). Such meas-

ures include fixed routing und strain relief, for example. We also recommend the use of an angled RJ45 connector.

Head modules

PSSu H S PN

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0206h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.9 - 5.1 V
Current and power consumption from module supply	
Module's current consumption	500 mA
Module's power consumption	2.50 W
Max. power dissipation of the module	2.50 W
PROFINET IO	
Application range	Standard applications
Device type	Slave
Maximum data length of the fieldbus interface: Input	64 Byte
Maximum data length of the fieldbus interface: Output	64 Byte
Transmission rates	100 MBit/s
Set via	automatic
Connection	RJ45
Certification	PNO
Manufacturer's ID	092Fh
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	25g 6 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	170 g

Head modules

PSSu H S PN

Order reference	
Description	Order no.
PSSu H S PN (Head module with PROFINET interface)	312 041

Head modules

PSSu H FS SN SD(-T)



Head module to connect the decentralised system PSSu I/O to SafetyNET p

Approvals

	PSSu H FS SN SD
	◆
	◆
	◆

Module features

The head module belongs to the performance class "Decentralised system PSSu I/O". It can be used to connect a PSSu system to SafetyNET p. The head module has the following features:

- ▶ 2 free switch ports for connection to SafetyNET p
- ▶ Standard module bus for standard I/O modules
- ▶ Safety module bus for safety I/O modules
- ▶ SD card used to store the device project and the naming data
- ▶ Supply voltage
 - Integrated supply voltage for periphery supply and module supply
 - Infeed for C-rail supply
 - Module supply is buffered for 20 ms if the supply voltage is interrupted
 - Plug-in connection terminals (either spring-loaded terminal or screw terminal)
- ▶ Status LEDs
- ▶ Coated version of the module: **PSSu H FS SN SD-T**: for increased environmental requirements
- ▶ Supports FS and ST modules

Module description

The module is suitable for use in safety and non-safety-related applications with **SafetyNET p**.

The module **PSSu H FS SN SD-T** is suitable for use where there are increased environmental requirements (see Technical Details).

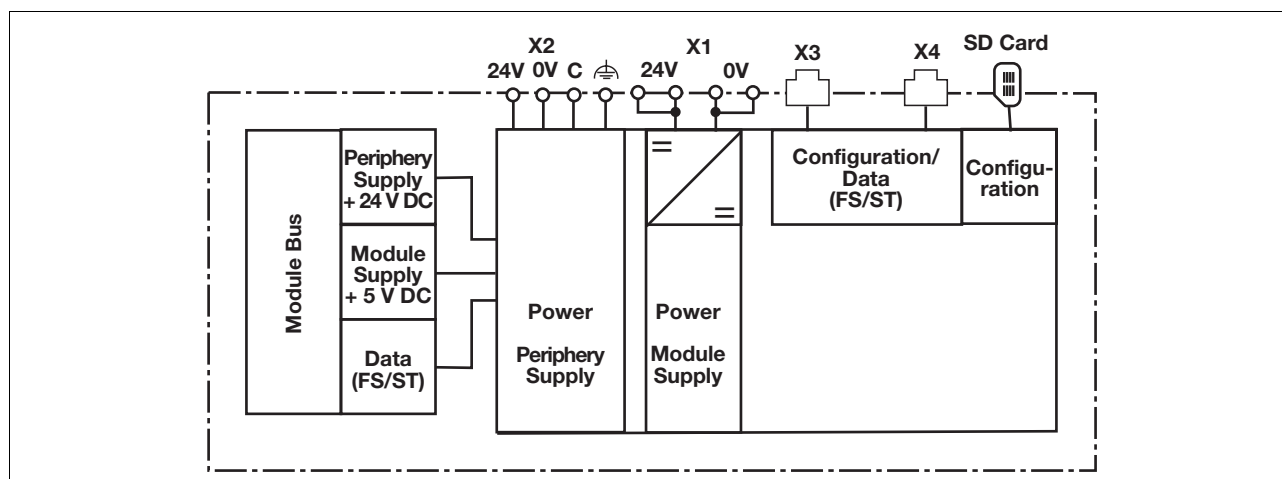
Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyNET p** interface
- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
 - 20 ms voltage buffer if the supply voltage is interrupted
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

3.2

Block diagram



Head modules

PSSu H FS SN SD(-T)

Function description

The head module belongs to the performance class "Decentralised system PSSu I/O". It enables the PSSuniversal to be used as a modular, decentralised input/output module:

- ▶ PSSu system without control functionality
- ▶ Electronic modules and/or compact modules must be added to the head module

- ▶ I/Os are controlled via SafetyNET p by means of a control system (e.g. PSSu PLC)

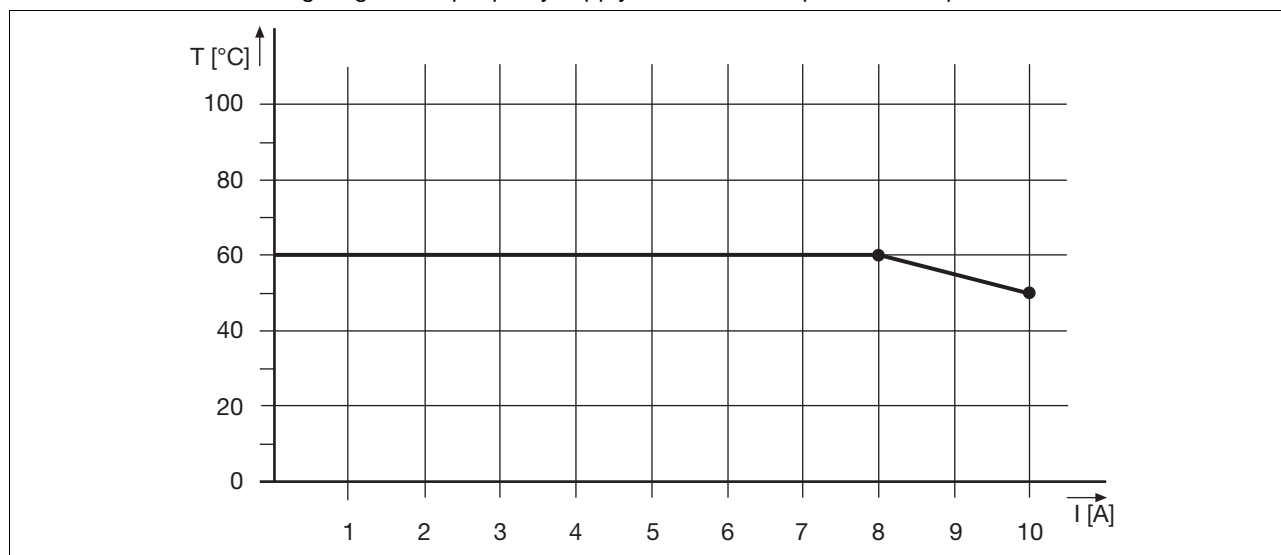
The product provides the module supply and periphery supply for the modules on the module bus:

- ▶ Module supply
Supply voltage for subsequent module (right-hand side)
- ▶ Periphery supply
Supply voltage for sensors, actuators and test pulses

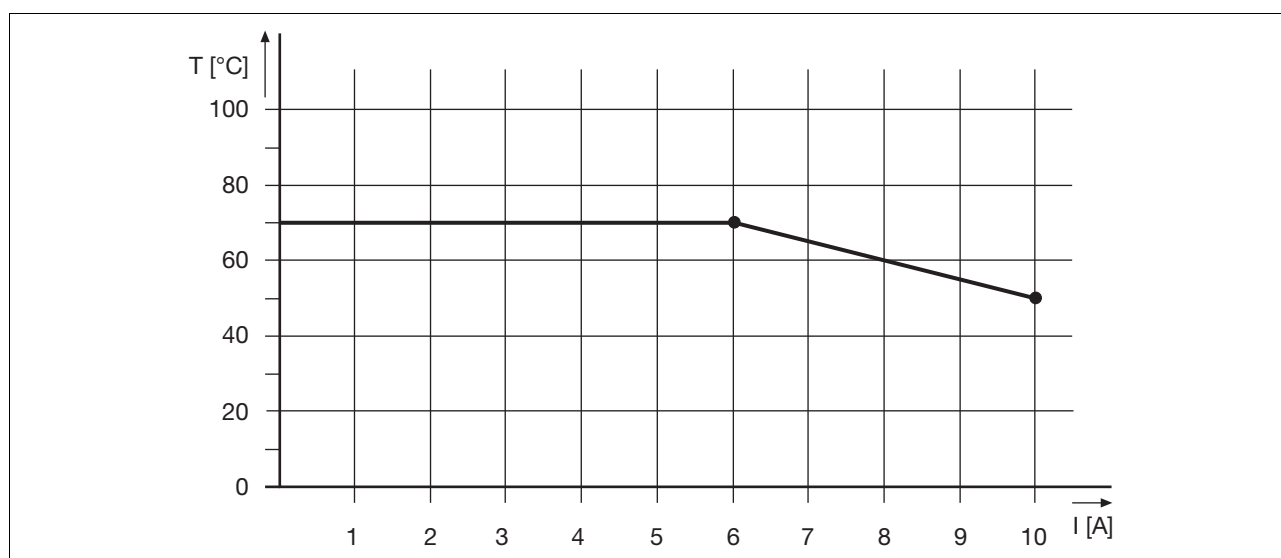
- ▶ C-rail
Infeed of the permitted additional supplies for the C-rail; a detailed description of how to use the C-rail can be found in the "PSS 4000 System Description".

When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

PSSu H FS SN SD: Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



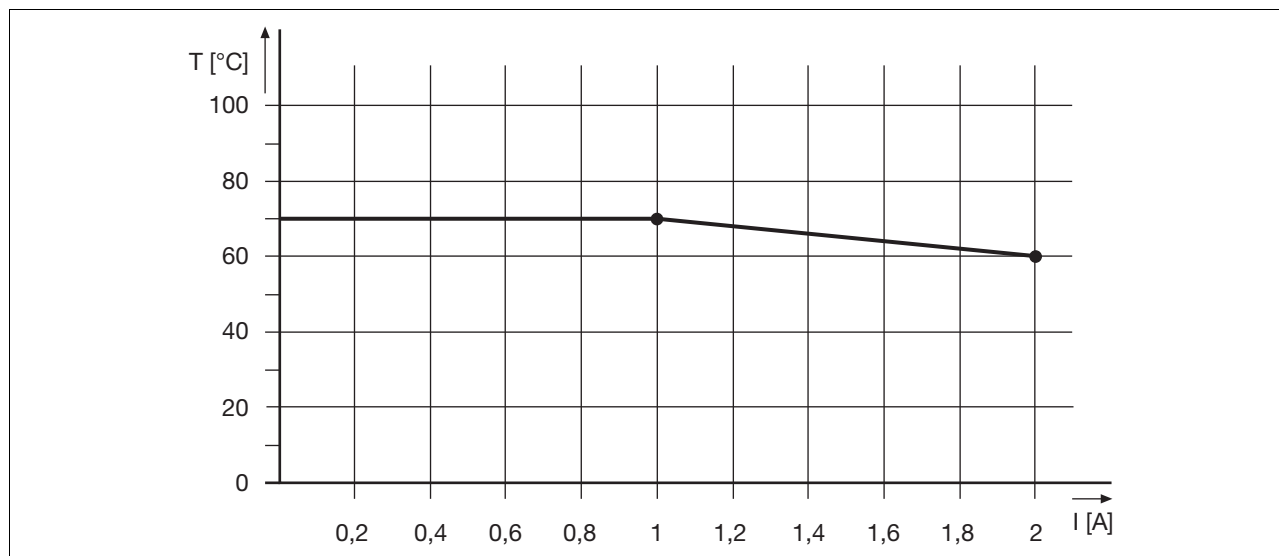
PSSu H FS SN SD-T: Derating diagram for periphery supply and C-rail: Permitted ambient temperature T dependent on load current I



Head modules

PSSu H FS SN SD(-T)

PSSu H FS SN SD-T: Derating diagram for infeed for module supply: Permitted ambient temperature T dependent on load current I



SafetyNET p

Functions

- ▶ The SafetyNET p interface enables I/Os to be controlled by means of a higher level control system (e.g. PSSu PLC).
- ▶ The head module receives signals from a higher level control system and forwards them to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules and forwards them to a higher level control system.
- ▶ If a fault occurs, the module switches the connected failsafe outputs to a safe condition.

MAC address

- ▶ The MAC address is a factory-set default. It can be found on the labelling strip on the front of the module.

INFORMATION

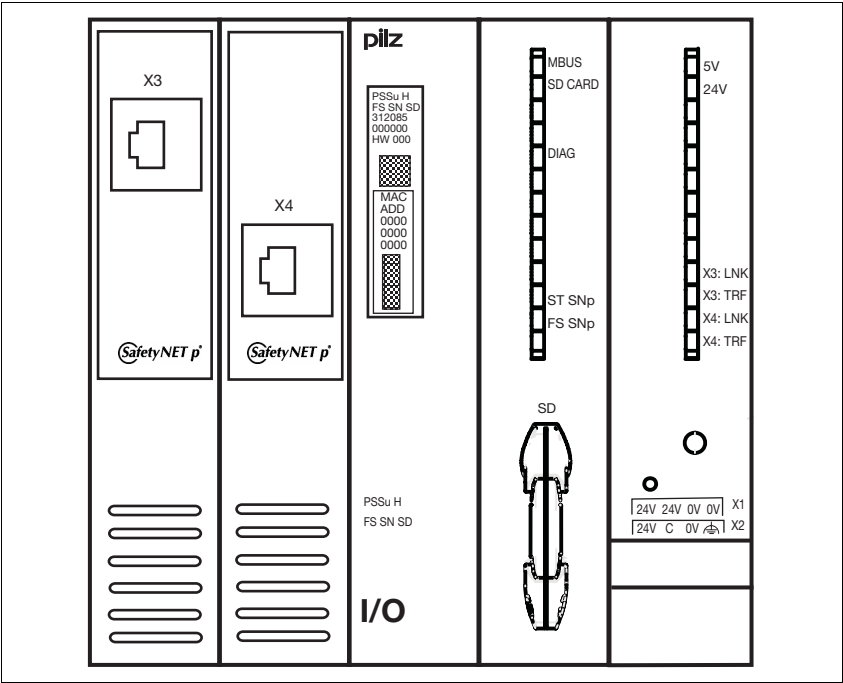
Further information on SafetyNET p can be found in the "PSS 4000 System Description".

Wiring

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

Head modules
PSSu H FS SN SD(-T)

Front view



Connection

SafetyNET p is an Ethernet interface.
Further information can be found in the
PSS 4000 System Description.

SafetyNET p	Layout	X3, X4
RJ45 female connector	1: TD+ (yellow) 2: TD- (orange) 3: RD+ (white) 4: n.c. 5: n.c. 6: RD- (blue) 7: n.c. 8: n.c.	

► n.c. = not connected

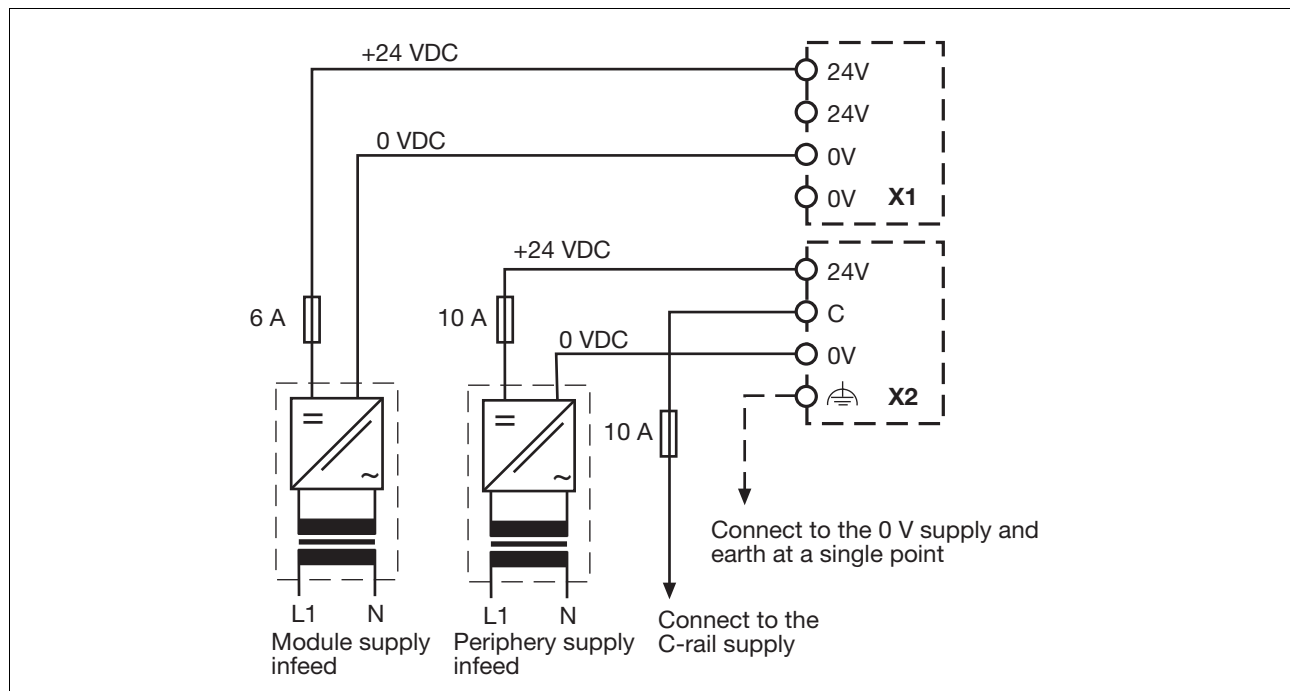
Module supply	Terminal configuration		X1
4-pin female connector	24V	+24 V infeed for module supply	
	0V	0 V infeed for module supply	

Head modules

PSSu H FS SN SD(-T)

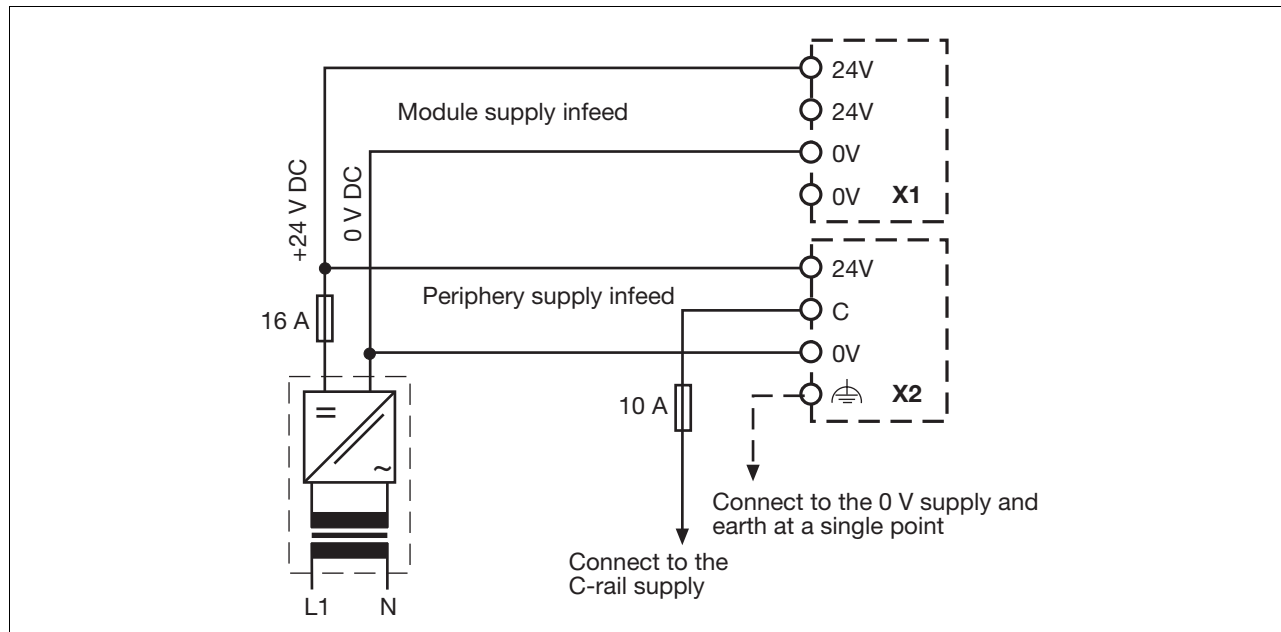
Periphery supply	Terminal configuration		X2
4-pin female connector	24V:	+24 V infeed for periphery supply	
	C	C-rail supply	
	0V	0 V infeed for periphery supply	
		Functional earth 	

Separate power supplies for module supply and periphery supply:



Head modules PSSu H FS SN SD(-T)

Common power supply for module supply and periphery supply:



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Electrical data	
Infeed for voltage	Module Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	16.0 W
Max. continuous current that the external power supply must provide	1.0 A
Inrush current that the external power supply must provide	4.0 A
Infeed for voltage	Periphery Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply 5 V DC
Voltage tolerance	-2 %/+3 %
Current load capacity	2.0 A
Buffer in the case of supply interruptions in accordance with	EN 61131-2, EN 61496-1
Short circuit-proof	yes
Potential isolation between Module Supply and Periphery Supply	3050 V
CPU	
Real-time clock for time and date, buffered	
Resolution	1 s
Removable data medium	
Type	SD card

Head modules

PSSu H FS SN SD(-T)

SafetyNET p	
Application range	Standard/Failsafe
Number	2
Connection	RJ45
Transmission rates	10 MBit/s, 100 MBit/s
Set via	automatic
Max. number of ST-Tx- and ST-Rx connections in SafetNET p	64
Max. number of FS-Tx- and FS-Rx connections im SafetNET p	64
Max. number of variables with elementary ST data types in SafetyNET p	15000
Max. number of variables with elementary FS data types in SafetyNET p	10000
Max. number of process data in SafetyNET p per ST-Tx- and ST-Rx connection	249 Byte
Max. number of process data in SafetyNET p per FS-Tx- and FS-Rx connection	116 Byte
IP address (set automatically from)	169.254.X.Y
Environmental data	
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Bottom	PC
Cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG
Torque setting with screw terminals	0.50 Nm
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 2.50 mm ² , 24 - 12 AWG
Stripping length	9 mm

Head modules

PSSu H FS SN SD(-T)

Mechanical data

Dimensions	
Height	125.6 mm
Width	130.0 mm
Depth	83.7 mm
Weight	335 g

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	4.14E-09	20

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

The standards current on **2009-07** apply.

Order reference

Description	Order no.
PSSu H FS SN SD (Head module with SafetyNET p interface)	312 085
PSSu H FS SN SD-T (Head module with SafetyNET p interface, coated version)	314 085
PSSu A Con 1/4 S (2 x screw terminals)	313 110
PSSu A Con 2/8 C (2 x spring-loaded terminals)	313 111

Head modules

PSSu H PLC1 FS SN SD(-T)



Head module to connect the "Control system PSSu PLC" to SafetyNET p.

Approvals

	PSSu H PLC1 FS SN SD
	◆
	◆
	◆

Module features

The head module belongs to the performance class "Control system PSSu PLC". It can be used to connect a PSSu system to SafetyNET p. The head module has the following features:

- ▶ 2 free switch ports for connection to SafetyNET p
- ▶ One FS resource and one ST resource
- ▶ SD card used to store the device project and the naming data
- ▶ Reset button
 - For warm reset
 - To transfer the naming data and/or device project from the SD card to the device memory
- ▶ Supply voltage
 - Integrated supply voltage for periphery supply and module supply
 - Infeed for C-rail supply
 - Module supply is buffered for 20 ms if the supply voltage is interrupted
 - Plug-in connection terminals (either spring-loaded terminal or screw terminal)
- ▶ Status LEDs
- ▶ Coated version of the module: **PSSu H PLC1 FS SN SD-T**: for increased environmental requirements
- ▶ Supports FS and ST modules

Module description

The module is suitable for use in safety and non-safety-related applications, with and without **SafetyNET p**. The module **PSSu H PLC1 FS SN SD-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

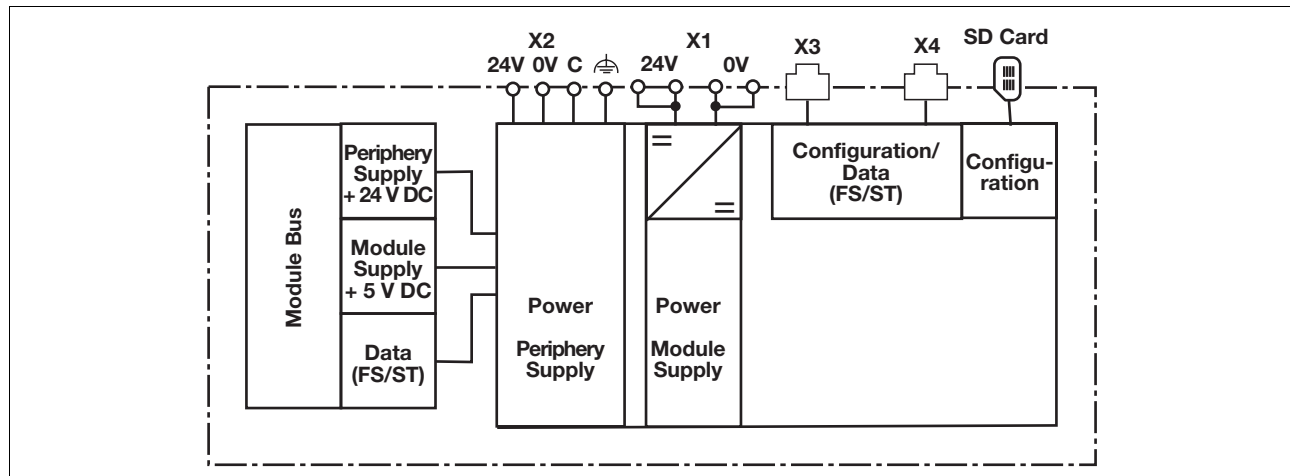
The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyNET p** interface
- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
 - 20 ms voltage buffer if the supply voltage is interrupted
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

Head modules

PSSu H PLC1 FS SN SD(-T)

Block diagram



Function description

The head module is a programmable logic controller (PLC), which can be used in safety-related and non-safety-related applications. The control system has memory areas for the operating system, the data and the device project with the user program.

The head module has a non-volatile memory for the non-volatile variables. User programs can be programmed in the main IEC 61131-3 languages.

For safety-related applications, the processor section is designed with multi-channel diversity.

The control system communicates with the input and output modules via the local module bus. SafetyNET p is also available.

LEDs provide information on the status of the control system and indicate any errors.

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

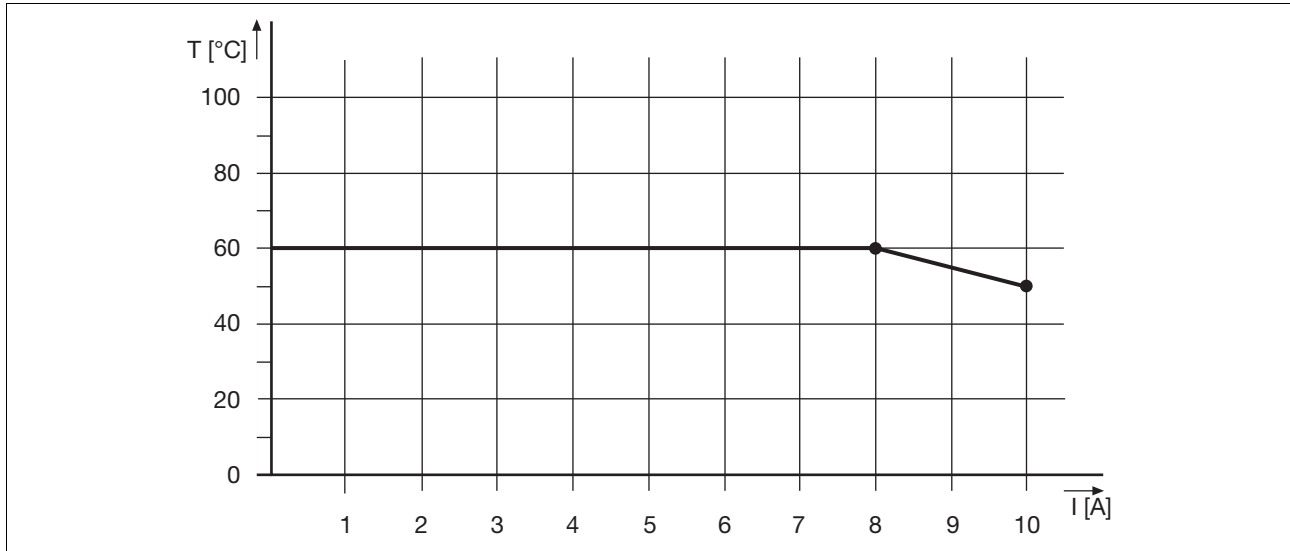
- ▶ Module supply
Supply voltage for subsequent module (right-hand side)
- ▶ Periphery supply
Supply voltage for sensors, actuators and test pulses
- ▶ C-rail
Infeed of the permitted additional supplies for the C-rail; a detailed description of how to use the C-rail can be found in the "PSS 4000 System Description".

When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

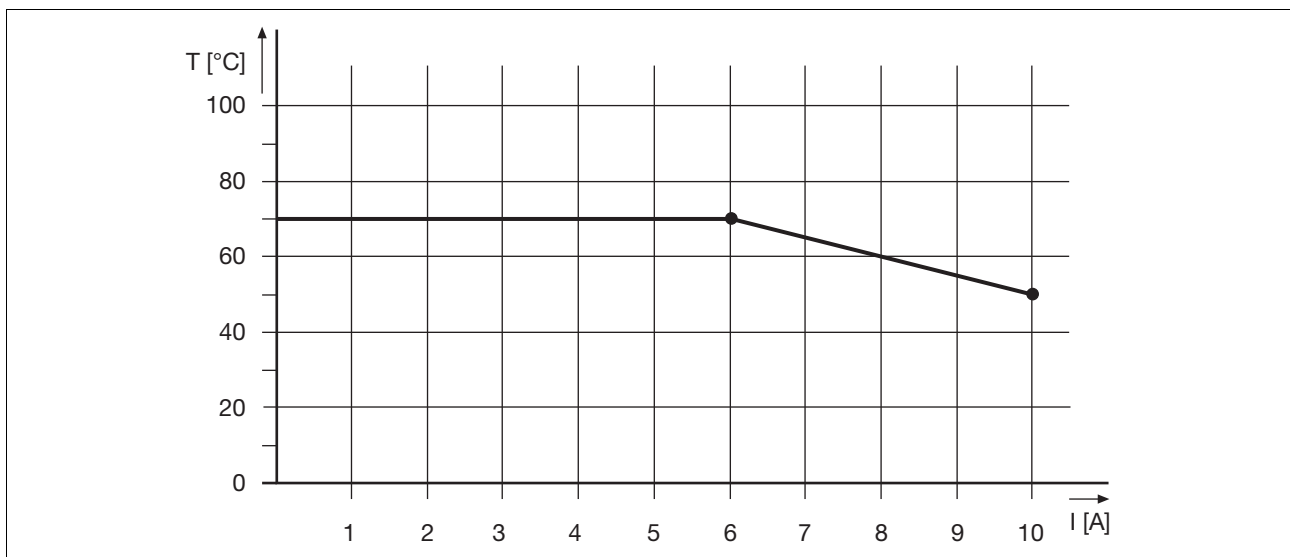
Head modules

PSSu H PLC1 FS SN SD(-T)

PSSu H PLC1 FS SN SD: Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



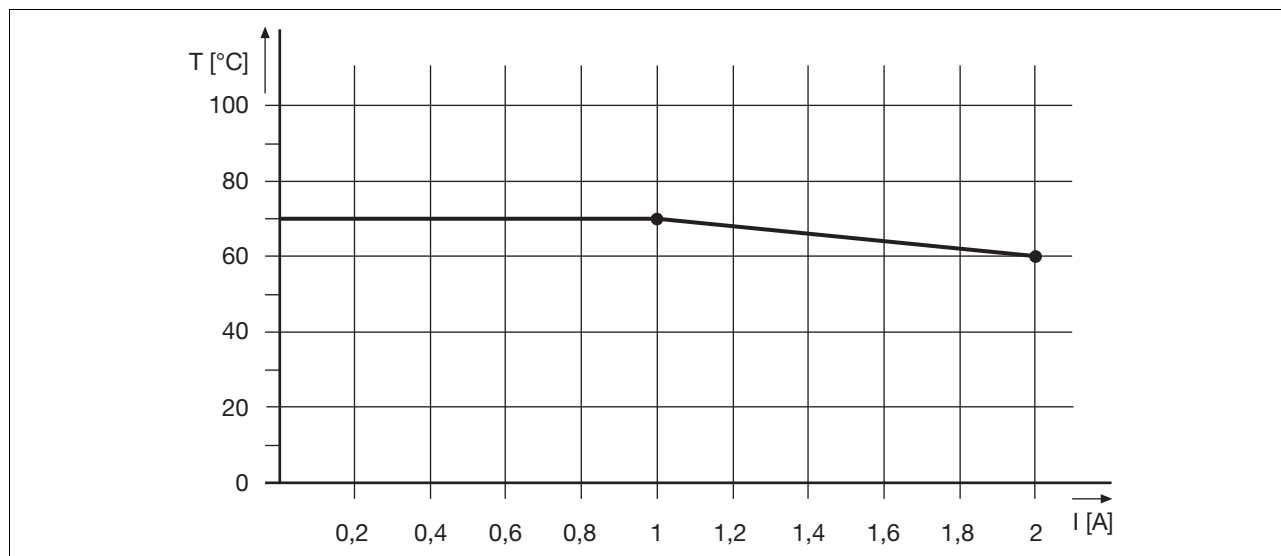
PSSu H PLC1 FS SN SD-T: Derating diagram for periphery supply and C-rail: Permitted ambient temperature T dependent on load current I



Head modules

PSSu H PLC1 FS SN SD(-T)

PSSu H PLC1 FS SN SD-T: Derating diagram for infeed for module supply: Permitted ambient temperature T dependent on load current I



3.2

SafetyNET p

Functions

- ▶ The SafetyNET p interface enables safety-related and non-safety-related data transfer between the PSSu system and other network subscribers.
- ▶ The head module receives signals from other network subscribers; it processes these signals in the user program and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals in the user program and passes them on to the other network subscribers.
- ▶ If a fault occurs, the module switches the connected failsafe outputs to a safe condition.

MAC address

- ▶ The MAC address is a factory-set default. It can be found on the labelling strip on the front of the module.

INFORMATION

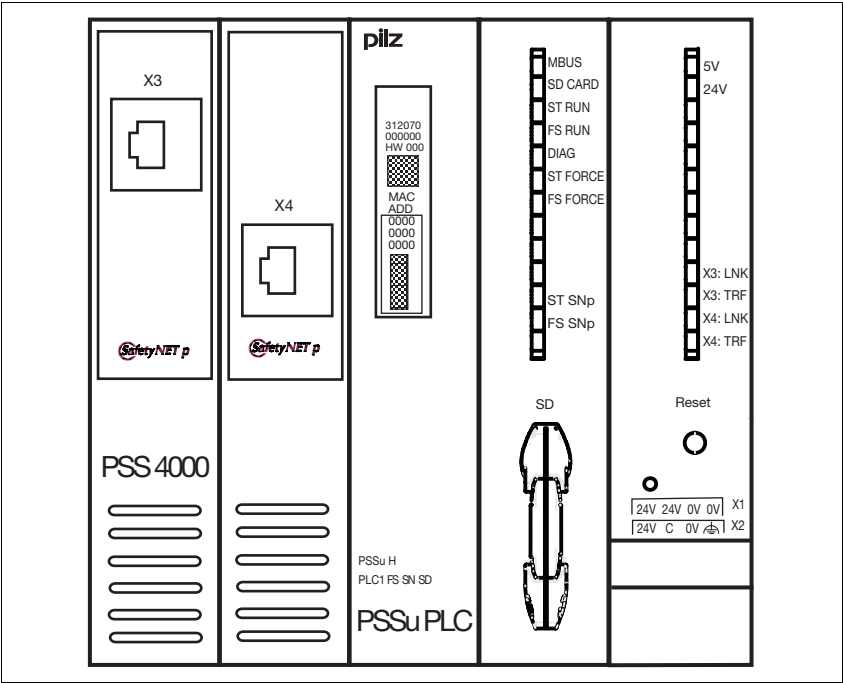
Further information on SafetyNET p can be found in the "PSS 4000 System Description".

Wiring

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

Head modules
PSSu H PLC1 FS SN SD(-T)

Front view



Connection

SafetyNET p is an Ethernet interface.
Further information can be found in the
PSS 4000 System Description.

SafetyNET p	Layout	X3, X4
RJ45 female connector	1: TD+ (yellow) 2: TD- (orange) 3: RD+ (white) 4: n.c. 5: n.c. 6: RD- (blue) 7: n.c. 8: n.c.	

► n.c. = not connected

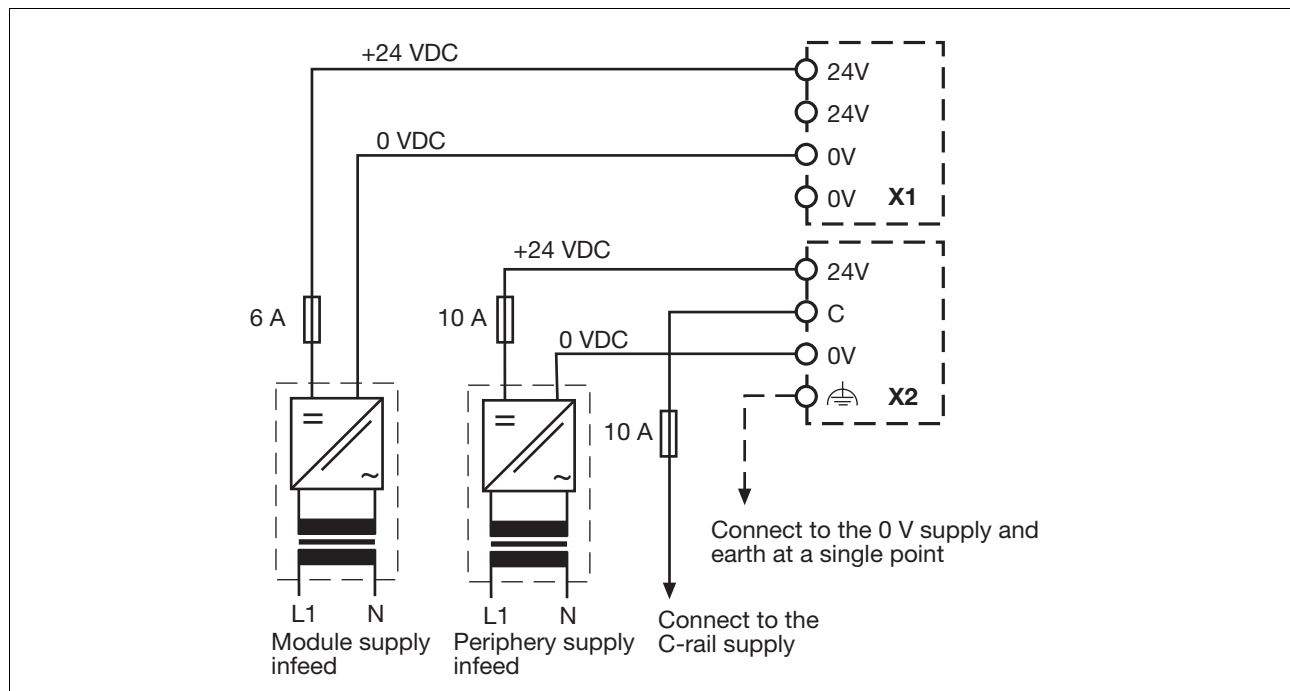
Module supply	Terminal configuration		X1
4-pin female connector	24V	+24 V infeed for module supply	
	0V	0 V infeed for module supply	

Head modules

PSSu H PLC1 FS SN SD(-T)

Periphery supply	Terminal configuration		X2
4-pin female connector	24V:	+24 V infeed for periphery supply	
	C	C-rail supply	
	0V	0 V infeed for periphery supply	
		Functional earth 	

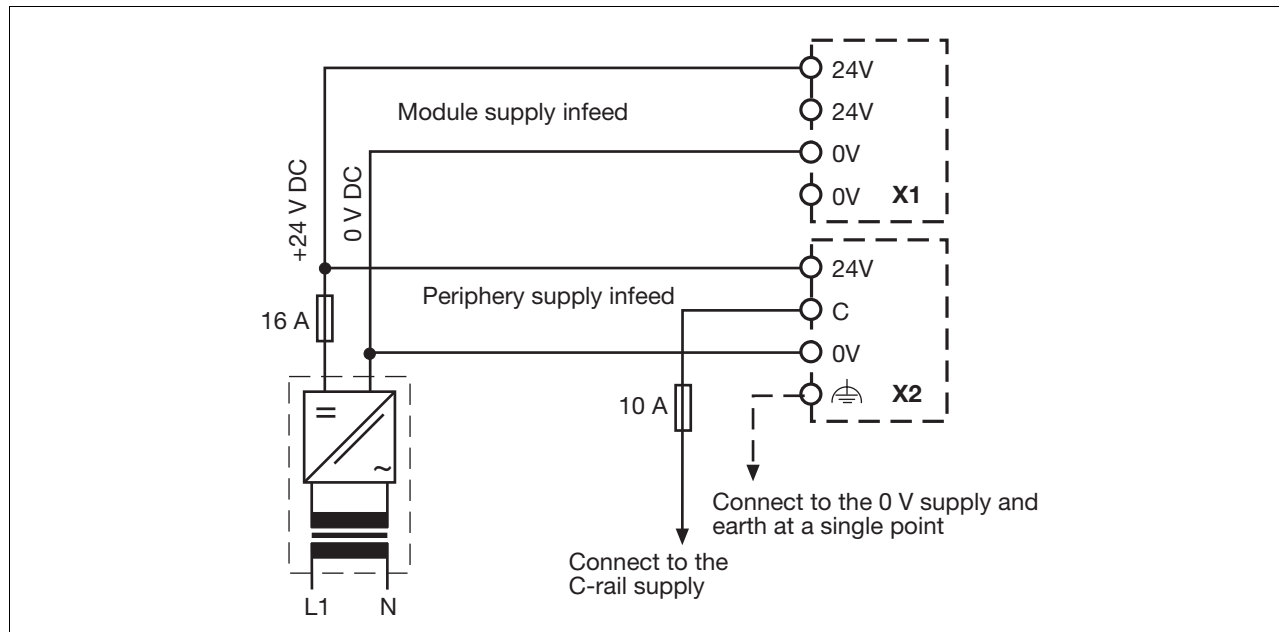
Separate power supplies for module supply and periphery supply:



Head modules

PSSu H PLC1 FS SN SD(-T)

Common power supply for module supply and periphery supply:



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Electrical data	
Infeed for voltage	Module Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	16.0 W
Max. continuous current that the external power supply must provide	1.0 A
Inrush current that the external power supply must provide	4.0 A
Infeed for voltage	Periphery Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply 5 V DC
Voltage tolerance	-2 %/+3 %
Current load capacity	2.0 A
Buffer in the case of supply interruptions in accordance with	EN 61131-2, EN 61496-1
Short circuit-proof	yes
Potential isolation between Module Supply and Periphery Supply	3050 V
CPU	
Real-time clock for time and date, buffered	
Resolution	1 s
Max. number of FS tasks	9
Max. number of ST tasks	9

Head modules

PSSu H PLC1 FS SN SD(-T)

CPU	
Min. period length of FS tasks	6 ms
Min. period length of ST tasks	2 ms
Module's overall RAM memory	128 MB
Memory for device project	2 MB
Non-volatile FS memory	382 kB
Non-volatile ST memory	128 kB
Removable data medium	
Type	SD card
SafetyNET p	
Application range	Standard/Failsafe
Number	2
Connection	RJ45
Transmission rates	10 MBit/s, 100 MBit/s
Set via	automatic
Max. number of ST-Tx- and ST-Rx connections in SafetyNET p	64
Max. number of FS-Tx- and FS-Rx connections in SafetyNET p	64
Max. number of variables with elementary ST data types in SafetyNET p	15000
Max. number of variables with elementary FS data types in SafetyNET p	10000
Max. number of process data in SafetyNET p per ST-Tx- and ST-Rx connection	249 Byte
Max. number of process data in SafetyNET p per FS-Tx- and FS-Rx connection	116 Byte
Max. number of SafetyNET p subscribers	infinite
IP address (set automatically from)	169.254.X.Y
Environmental data	
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Head modules

PSSu H PLC1 FS SN SD(-T)

Mechanical data	
Housing material	
Bottom	PC
Cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG
Torque setting with screw terminals	0.50 Nm
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 2.50 mm ² , 24 - 12 AWG
Stripping length	9 mm
Dimensions	
Height	125.6 mm
Width	130.0 mm
Depth	83.7 mm
Weight	335 g

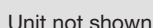
Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	4.14E-09	20

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

The standards current on **2009-07** apply.

Order reference	
Description	Order no.
PSSu H PLC1 FS SN SD (Head module with SafetyNET p interface)	312 070
PSSu H PLC1 FS SN SD-T (Head module with SafetyNET p interface, coated version)	314 070
PSSu A Con 1/4 S (2 x screw terminals)	313 110
PSSu A Con 2/8 C (2 x spring-loaded terminals)	313 111

PSSu H PLC1 FS DP SN SD



Approvals

	PSSu H PLC1 FS DP SN SD
	◆
	◆
	◆

- ▶ 1 free switch ports for connection to SafetyNET p
- ▶ PROFIBUS DP interface
- ▶ One FS resource and one ST resource
- ▶ SD card used to store the device project and the naming data
- ▶ Reset button
 - For warm reset
 - To transfer the naming data and/or device project from the SD card to the device memory
- ▶ Supply voltage
 - Integrated supply voltage for periphery supply and module supply
 - Infeed for C-rail supply
 - Module supply is buffered for 20 ms if the supply voltage is interrupted
 - Plug-in connection terminals (either spring-loaded terminal or screw terminal)
- ▶ Status LEDs
- ▶ Supports FS and ST modules

- ▶ Safety-related applications with
 - SafetyNET p
 - PROFIBUS DP with local enable principle
- ▶ Non-safety-related applications with
 - PROFIBUS DP
 - SafetyNET p

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyNET p** interface
- ▶ Potentially isolated PROFIBUS DP interface
- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
 - 20 ms voltage buffer if the supply voltage is interrupted
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

The diagram illustrates the SafetyNET p interface for a PROFIBUS DP station. It shows the connection between the SafetyNET p components and the PROFIBUS DP network. The SafetyNET p components include a Power Peripheral Supply, a Power Module Supply, and three data/configuration blocks: Data (ST), Config./Data (FS/ST), and Configuration. The PROFIBUS DP network is represented by a dashed line with terminals for 24V, 0V, C, and a ground symbol. The connections are as follows:

- Power Peripheral Supply:** Connected to the 24V, 0V, and C terminals.
- Power Module Supply:** Connected to the 24V and 0V terminals.
- Data (ST):** Connected to the PROFIBUS DP network.
- Config./Data (FS/ST):** Connected to the PROFIBUS DP network.
- Configuration:** Connected to the PROFIBUS DP network.

Head modules

PSSu H PLC1 FS DP SN SD

Function description

The head module is a programmable logic controller (PLC), which can be used in safety-related and non-safety-related applications. The control system has memory areas for the operating system, the data and the device project with the user program.

The head module has a non-volatile memory for the non-volatile variables. User programs can be programmed in the main IEC 61131-3 languages.

For safety-related applications, the processor section is designed with multi-channel diversity.

The control system communicates with the input and output modules via the local module bus. SafetyNET p is also available.

LEDs provide information on the status of the control system and indicate any errors.

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

- ▶ Module supply
Supply voltage for subsequent module (right-hand side)
- ▶ Periphery supply
Supply voltage for sensors, actuators and test pulses
- ▶ C-rail
Infeed of the permitted additional supplies for the C-rail; a detailed description of how to use the C-rail can be found in the "PSS 4000 System Description".

When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

SafetyNET p

Functions

- ▶ The SafetyNET p interface enables safety-related and non-safety-related data transfer between the PSSu system and other network subscribers.
- ▶ The head module receives signals from other network subscribers; it processes these signals in the user program and passes them on to the connected input/output modules.
- ▶ The head module receives signals from the connected input/output modules; it processes these signals in the user program and passes them on to the other network subscribers.
- ▶ If a fault occurs, the module switches the connected failsafe outputs to a safe condition.

MAC address

- ▶ The MAC address is a factory-set default. It can be found on the labelling strip on the front of the module.

INFORMATION

Further information on SafetyNET p can be found in the "PSS 4000 System Description".

PROFIBUS DP

PROFIBUS is an open fieldbus standard whose communication has been defined in the international standards IEC 61158 and IEC 61784. Further specifications have been made by the PROFIBUS User Group in guidelines.

These guidelines are provided by PROFIBUS International (see www.profibus.com)

The following limits apply for the data length of the process data:

- ▶ Receive data: max. 244 Bytes
- ▶ Send data: max. 244 Bytes
- ▶ Diagnostic data max. 244 Bytes
- ▶ Configuration data: max. 64 Bytes

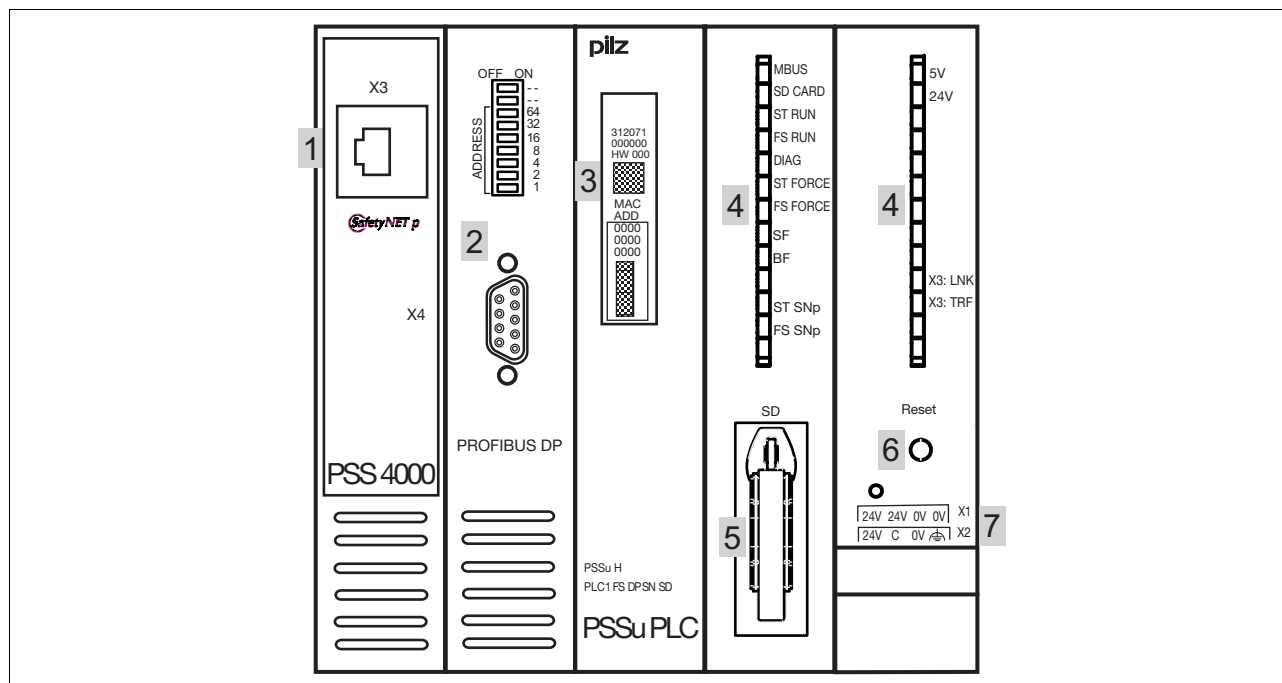
Wiring

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

Head modules

PSSu H PLC1 FS DP SN SD

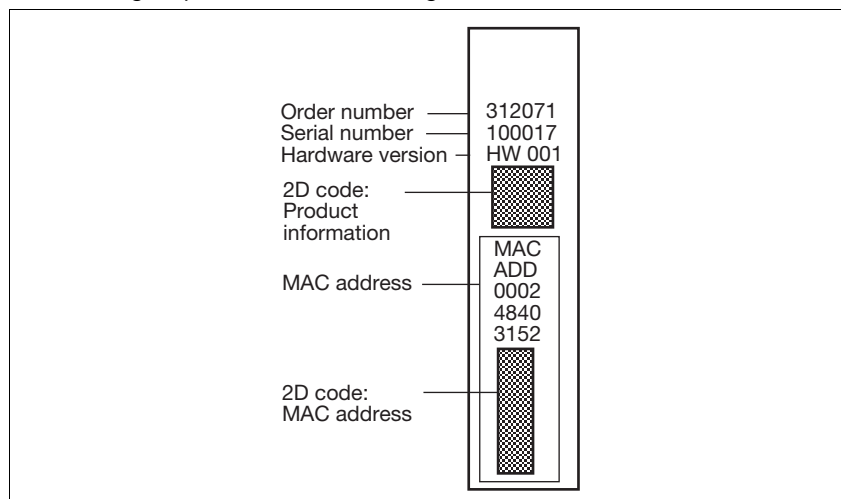
Front view



Key:

- ▶ 1: SafetyNET p interface
- ▶ 2: PROFIBUS-DP interface
- ▶ 3: Labelling strip (see below for details)
- ▶ 4: Status LEDs
- ▶ 5: SD card
- ▶ 6: Reset button
- ▶ 7: Supply voltage connection (module and periphery supply)

The labelling strip contains the following information:



Head modules

PSSu H PLC1 FS DP SN SD

Connection

SafetyNET p is an Ethernet interface.
Further information can be found in the
PSS 4000 System Description.

SafetyNET p	Layout	X3, X4
RJ45 female connector	1: TD+ (yellow) 2: TD- (orange) 3: RD+ (white) 4: n.c. 5: n.c. 6: RD- (blue) 7: n.c. 8: n.c.	
▶ n.c. = not connected		The head module can be incorporated into the PROFIBUS as slave.

PROFIBUS DP	Layout
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	

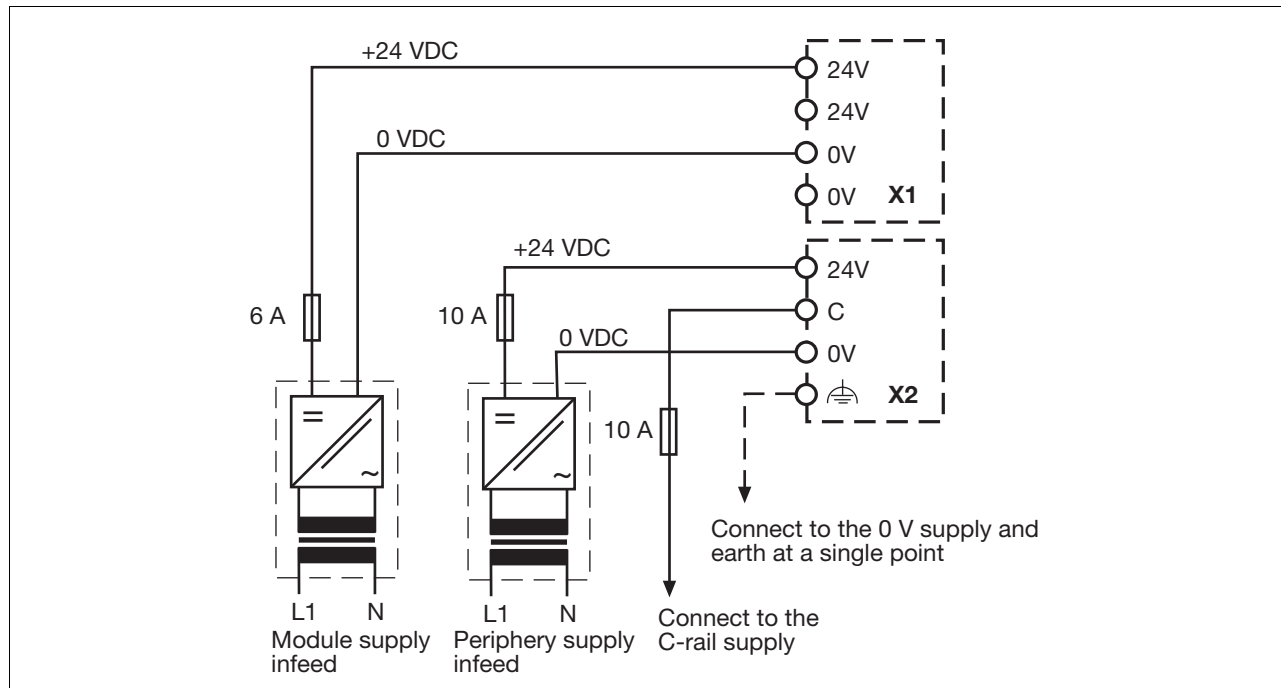
Module supply	Terminal configuration		X1
4-pin female connector	24V	+24 V infeed for module supply	
	0V	0 V infeed for module supply	

Periphery supply	Terminal configuration		X2
4-pin female connector	24V:	+24 V infeed for periphery supply	
	C	C-rail supply	
	0V	0 V infeed for periphery supply	
		Functional earth 	

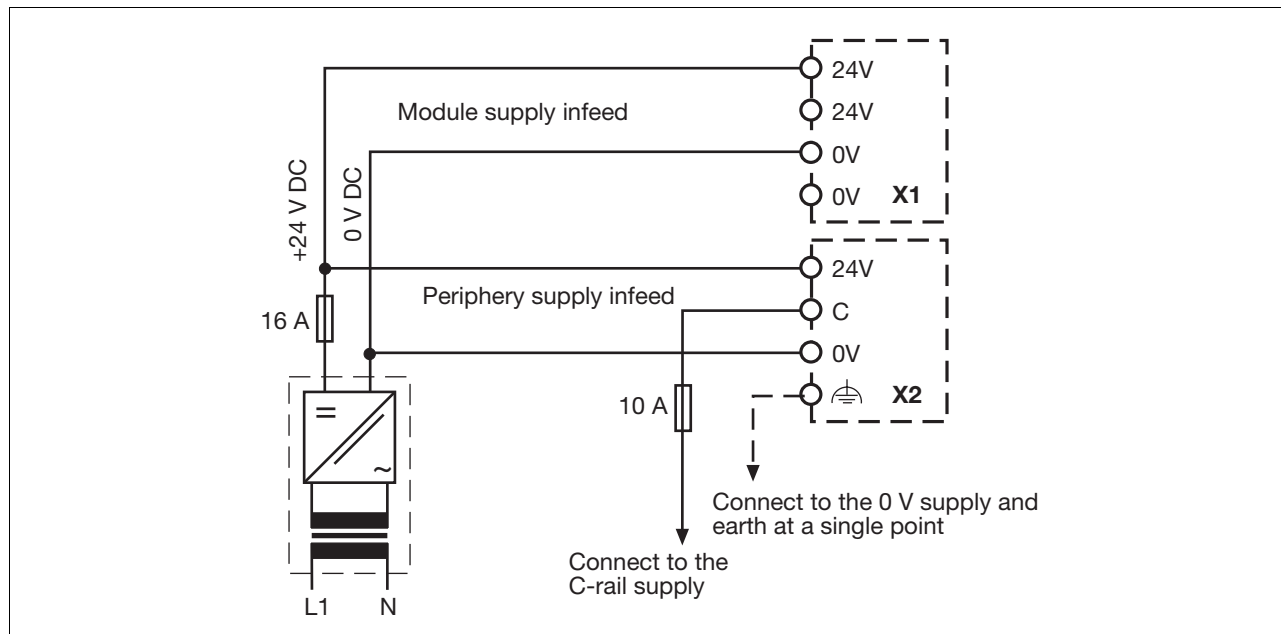
Head modules

PSSu H PLC1 FS DP SN SD

Separate power supplies for module supply and periphery supply:



Common power supply for module supply and periphery supply:



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Head modules

PSSu H PLC1 FS DP SN SD

Technical details

Application range	Standard/Failsafe
Electrical data	
Infeed for voltage	Module Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	16.1 W
Max. continuous current that the external power supply must provide	1.0 A
Inrush current that the external power supply must provide	4.0 A
Infeed for voltage	Periphery Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply
Voltage	5 V DC
Voltage tolerance	-2 %/+3 %
Current load capacity	2.0 A
Buffer in the case of supply interruptions in accordance with Short circuit-proof	EN 61131-2, EN 61496-1 yes
Potential isolation between Module Supply and Periphery Supply	3050 V
Potential isolation between module supply and PROFIBUS DP	700 V
CPU	
Real-time clock for time and date, buffered	
Resolution	1 s
Max. number of FS tasks	9
Max. number of ST tasks	9
Min. period length of FS tasks	6 ms
Min. period length of ST tasks	2 ms
Module's overall RAM memory	128 MB
Memory for device project	2 MB
Non-volatile FS memory	382 kB
Non-volatile ST memory	128 kB
Removable data medium	
Type	SD card
SafetyNET p	
Application range	Standard/Failsafe
Number	1
Connection	RJ45
Transmission rates	10 MBit/s, 100 MBit/s
Set via	automatic
Max. number of ST-Tx- and ST-Rx connections in SafetyNET p	64
Max. number of FS-Tx- and FS-Rx connections in SafetyNET p	64
Max. number of variables with elementary ST data types in SafetyNET p	15000
Max. number of variables with elementary FS data types in SafetyNET p	10000
Max. number of process data in SafetyNET p per ST-Tx- and ST-Rx connection	249 Byte
Max. number of process data in SafetyNET p per FS-Tx- and FS-Rx connection	116 Byte
Max. number of SafetyNET p subscribers	infinite
IP address (set automatically from)	169.254.X.Y

Head modules

PSSu H PLC1 FS DP SN SD

PROFIBUS DP	
Application range	Standard applications Failsafe applications with local enable principle
Device type	Slave
Station address	0 ... 126d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	244 Byte
Maximum data length of the fieldbus interface: Output	244 Byte
Maximum data length of the fieldbus interface: Diagnostics	244 Byte
Transmission rates	1.5 MBit/s, 12 MBit/s, 185.5 kBit/s, 19.2 kBit/s, 3 MBit/s, 45.45 kBit/s, 500 kBit/s, 6 MBit/s, 9.6 kBit/s, 93.75 kBit/s
Set via	automatic
Connection	Female 9-pin D-SUB connector
Protocol	DPV0
Operating modes	AutoBaud, Freeze Mode, Set Slave Address, Sync Mode
Certification	PNO
Description file	Pilz0CB0.gsd
Manufacturer's ID	0CB0h
Environmental data	
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Bottom	PC
Cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG
Torque setting with screw terminals	0.50 Nm
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 2.50 mm ² , 24 - 12 AWG
Stripping length	9 mm
Dimensions	
Height	125.6 mm
Width	130.0 mm
Depth	83.7 mm
Weight	405 g

Head modules

PSSu H PLC1 FS DP SN SD

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	4.14E-09	20

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

The standards current on **2009-07** apply.

Order reference	
Description	Order no.
PSSu H PLC1 FS DP SN SD (Head module with SafetyNET p and PROFIBUS-DP interface)	312 071
PSSu A Con 1/4 S (2 x screw terminals)	313 110
PSSu A Con 2/8 C (2 x spring-loaded terminals)	313 111

Voltage supply

Voltage supply

Contents	Page
Voltage supply	
PSSu E F PS(-T)	3.3-2
PSSu E F PS1(-T)	3.3-12
PSSu E F PS-P(-T)	3.3-22
PSSu E F BSW(-T)	3.3-28

Voltage supply PSSu E F PS(-T)



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

Module features

- ▶ Power supply for max. **1.5 A**
- ▶ The module supply is not buffered if the supply voltage is interrupted
- ▶ Separate infeed for periphery supply
- ▶ Separate infeed for module supply
- ▶ Infeed for C-rail supply
- ▶ LEDs for:
 - Module supply
 - Periphery supply
 - Module error
- ▶ Application range depends on the base module
- ▶ Coated version of the module: **PSSu E F PS-T**: for increased environmental requirements

Module description

The module 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 a head module, if the head module does not have an integrated supply voltage)
- ▶ Supply module to refresh the module supply and periphery supply
- ▶ Supply module to form supply groups

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

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

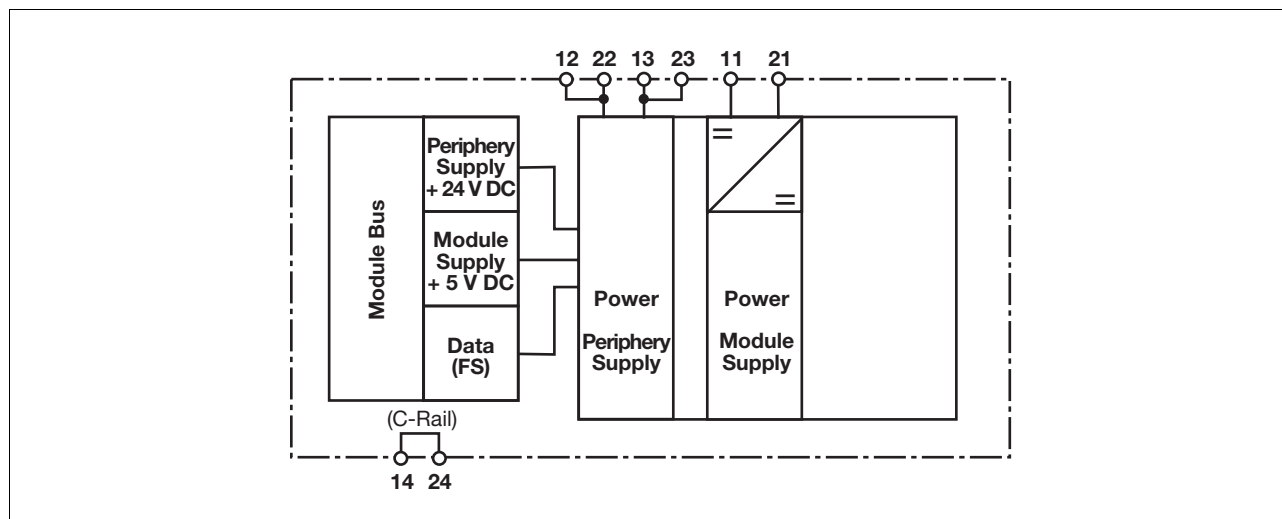
The module registers the following errors:

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

Approvals

	PSSu E F PS
	◆
	◆
	◆

Block diagram



Voltage supply PSSu E F PS(-T)

Function description

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

- ▶ **Module supply**
Supply voltage for subsequent module (right-hand side)
- ▶ **Periphery supply**
Supply voltage for sensors, actuators and test pulses
- ▶ **C-rail**
Infeed of the permitted additional supplies for the C-rail; a detailed

description of how to use the C-rail can be found in the system description.

When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

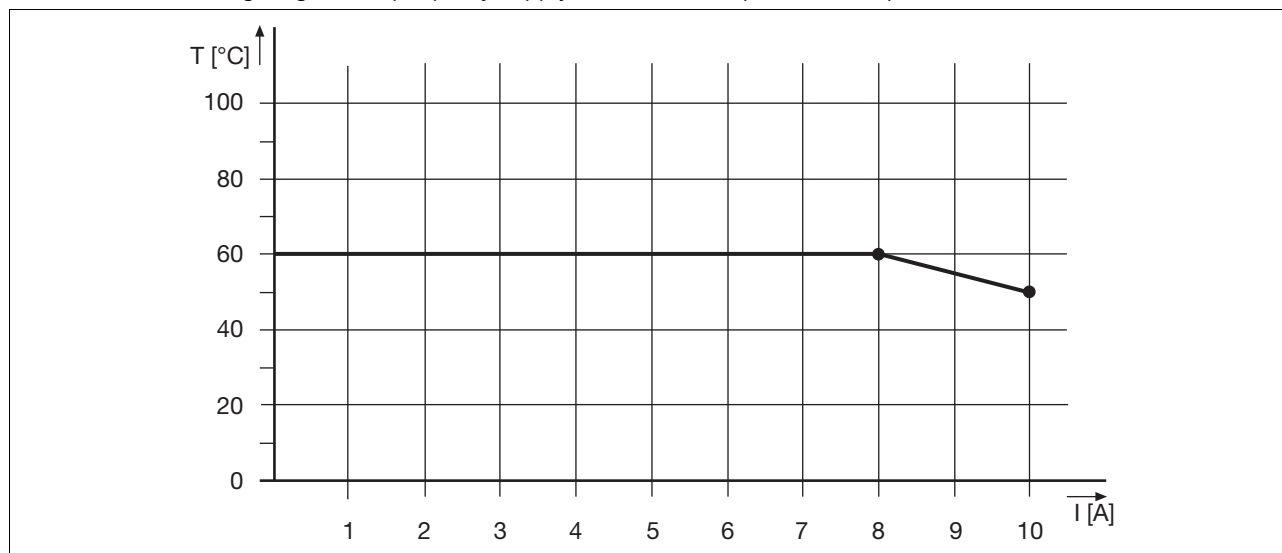
The module enables

- ▶ The module supply and periphery supply to be refreshed:
The relevant base module interrupts the connection to the incom-

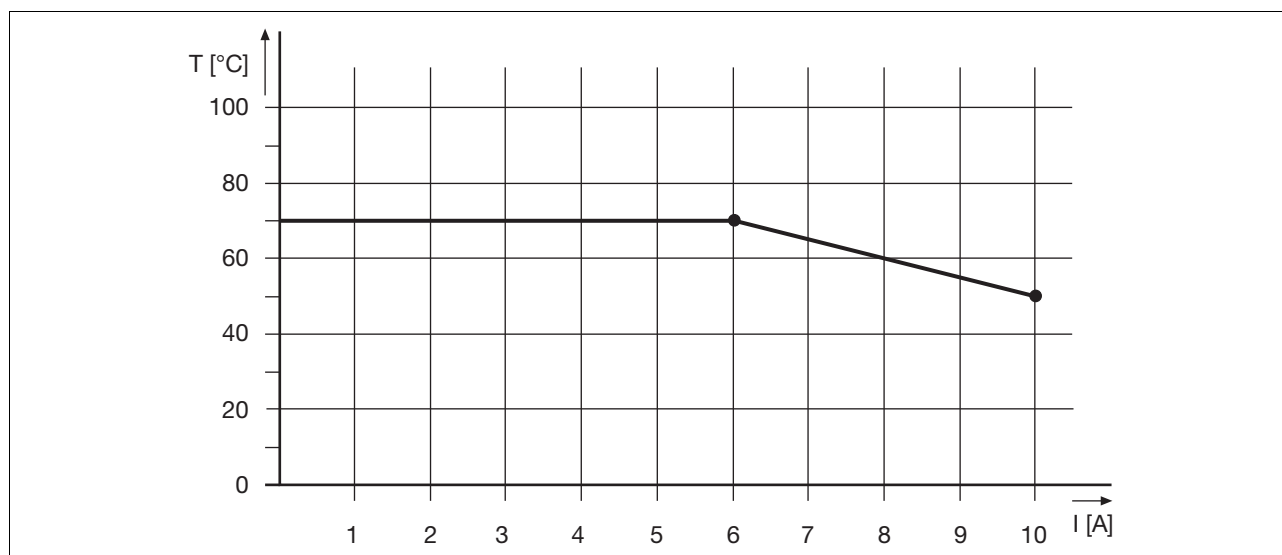
ing (left-hand) module supply, periphery supply and C-rail on the module bus. The 0 V supply on the module supply is connected to the left and right.

- ▶ **Supply groups to be formed**
The relevant base module interrupts the connection to the incoming (left-hand) periphery supply and C-rail on the module bus. Each supply group requires its own supply module.

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

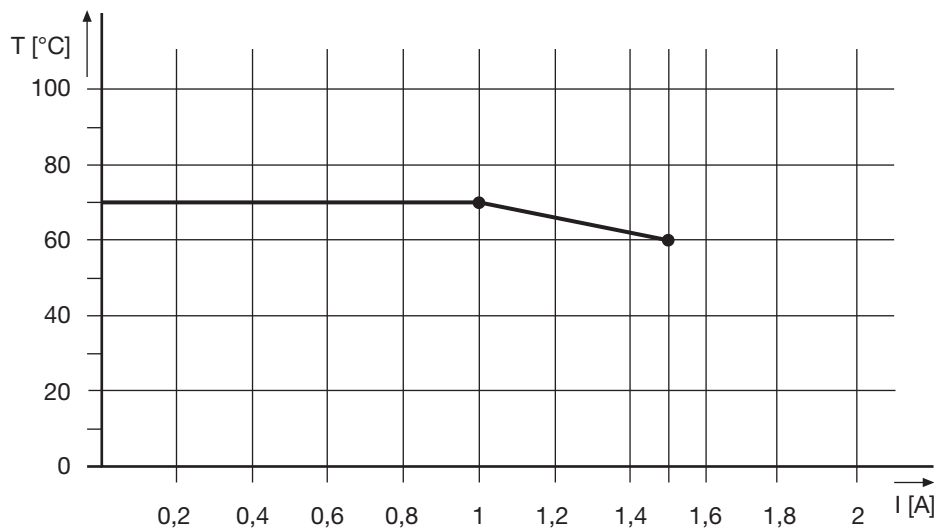


PSSu E F PS-T: Derating diagram for periphery supply and C-rail: Permitted ambient temperature T dependent on load current I



Voltage supply PSSu E F PS(-T)

PSSu E F PS-T: Derating diagram for module supply: Permitted ambient temperature T dependent on load current I

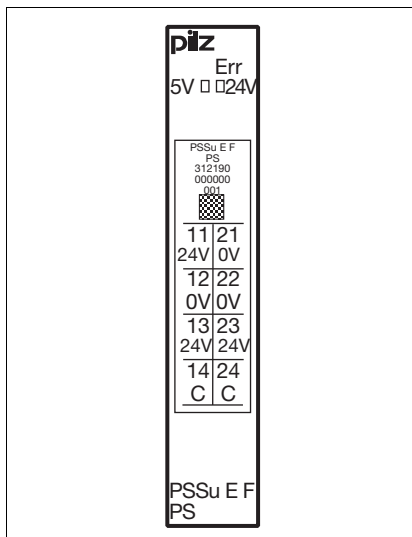


Voltage supply PSSu E F PS(-T)

Wiring

Front view

- ▶ Please refer to the technical details regarding the requirements of the supply voltages.
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the periphery supply on the module bus is 10 A. Please refer to the derating diagram.
- ▶ The maximum current load for the C-rail is 10 A. Please refer to the derating diagram.
- ▶ Permitted infeed at the C-rail:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... +30 VDC
 - - 48 VAC ... + 48 VAC
- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm²:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.



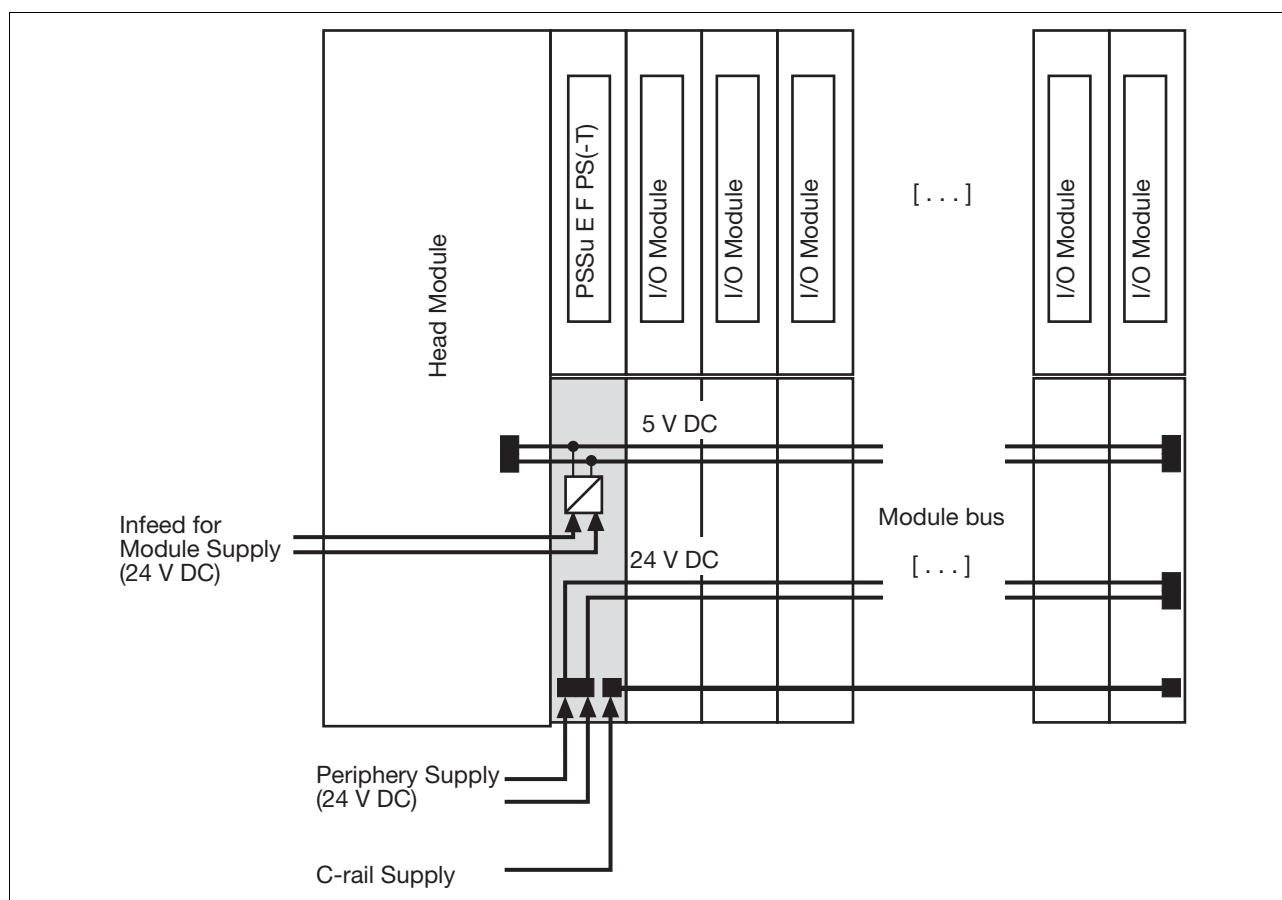
Voltage supply PSSu E F PS(-T)

Terminal configuration

- For use as a general supply module, supplying a head module and subsequent modules

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

3.3

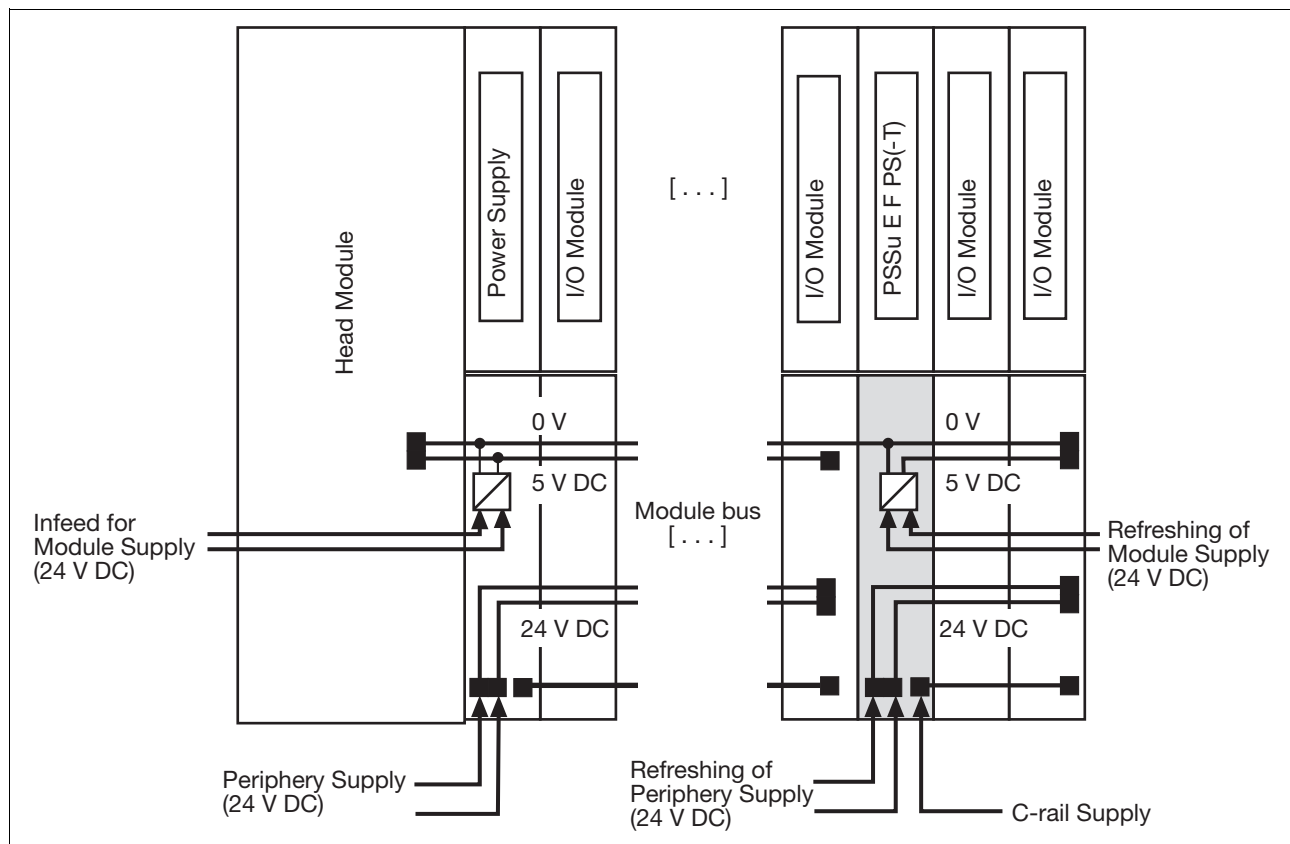


Voltage supply PSSu E F PS(-T)

- ▶ For use as a supply module to refresh the module supply and periphery supply
- ▶ For use as a supply module to form supply groups
- To interrupt the incoming periphery supply and C-rail
- To provide subsequent modules with the module supply, periphery supply and C-rail supply
- ▶ With these base modules the supply module cannot be used as the first module after the head module.

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

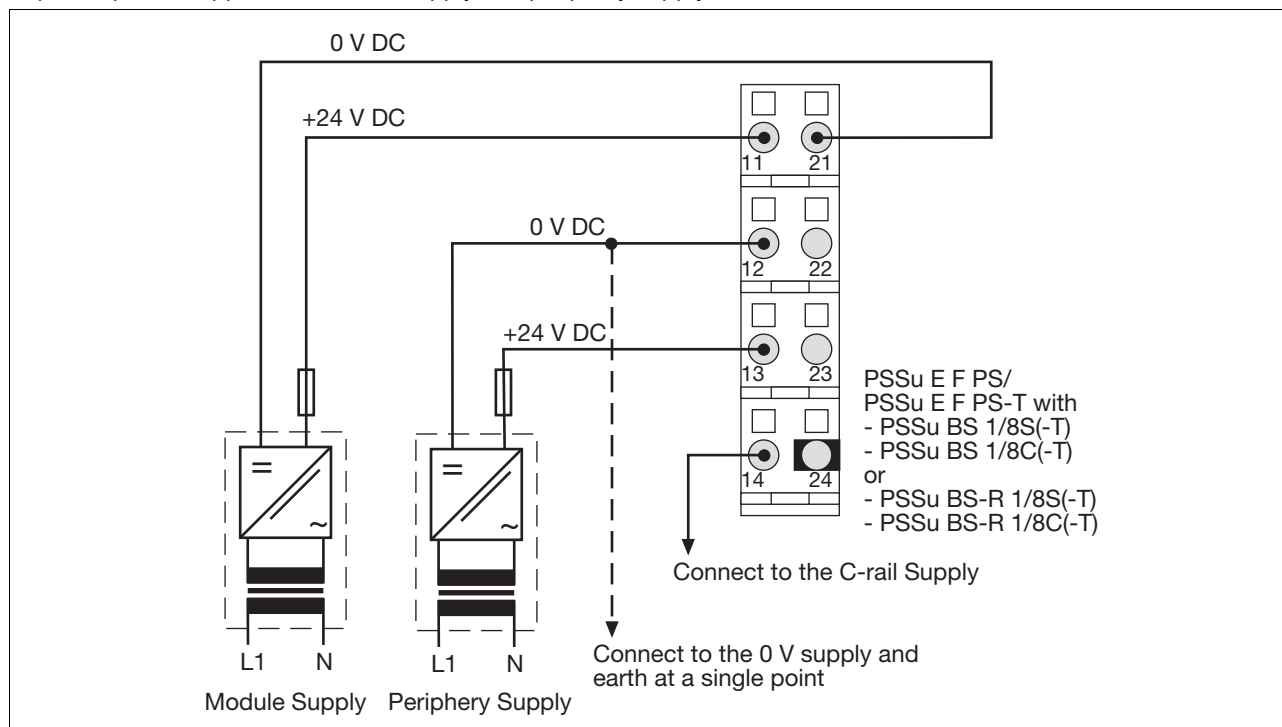
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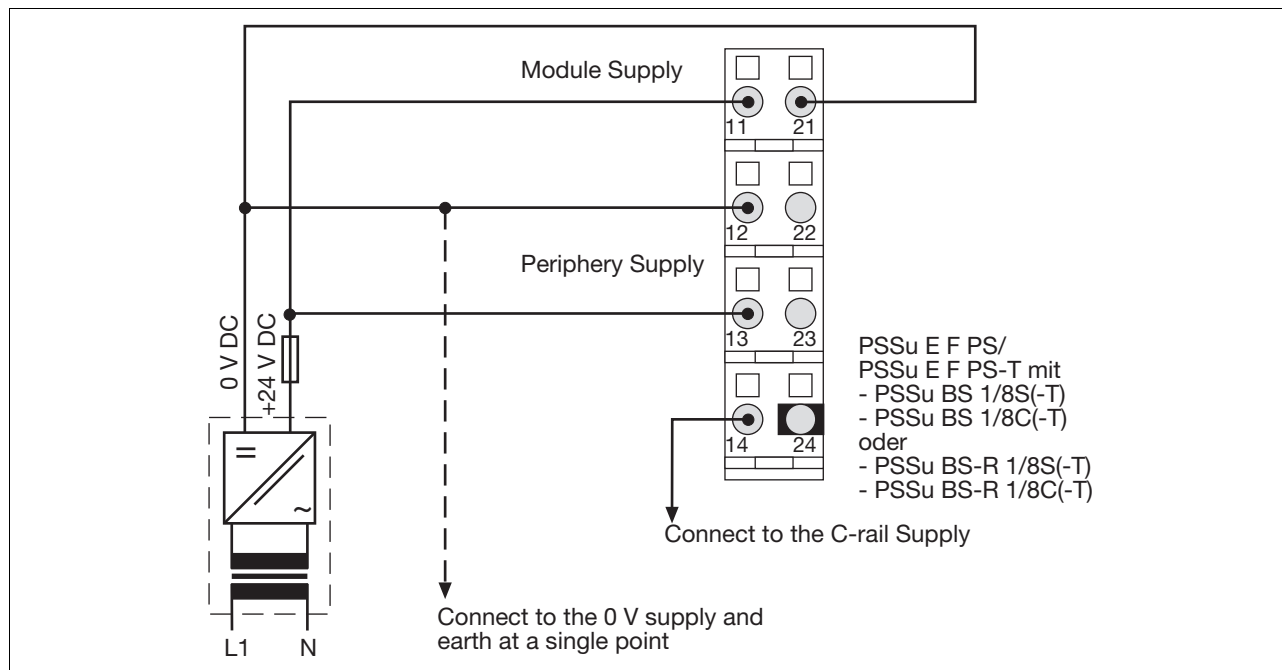
Voltage supply PSSu E F PS(-T)

Connection

Separate power supplies for module supply and periphery supply



Common power supply for module supply and periphery supply



Voltage supply

PSSu E F PS(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Module's device code	0801h
Support in system environment A	
from FS firmware version for other head modules	4
from ST firmware version for other head modules	5
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	6
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Infeed for	Module Supply
Voltage	24 V
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	9.0 W
Max. continuous current that the external power supply must provide	0.6 A
Inrush current that the external power supply must provide	4.0 A
Module's current consumption	23 mA
Module's power consumption	0.12 W
Infeed for	Periphery Supply
Voltage	24 V
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply
Voltage	5 V
	DC
Voltage tolerance	-2 %/+3 %
Current load capacity	1.5 A
Short circuit-proof	yes
Potential isolation between Module Supply and Periphery Supply	3050 V
Max. power dissipation of the module	1.50 W
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
	-40 - 70 °C coated version (-T)
Max. Ambient temperature in accordance with UL 508	60 °C
Storage temperature	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4

Voltage supply PSSu E F PS(-T)

Environmental data

Vibration to **EN 60068-2-6**

Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)

Shock stress

EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)

Protection type in accordance with **EN 60529**

Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20

Airgap creepage in accordance with **EN 60664-1**

Overvoltage category	II
Pollution degree	2

Mechanical data

Housing material

Front	PC
Bottom	PC
Coding	PA

Dimensions

Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	38 g 40 g coated version (-T)

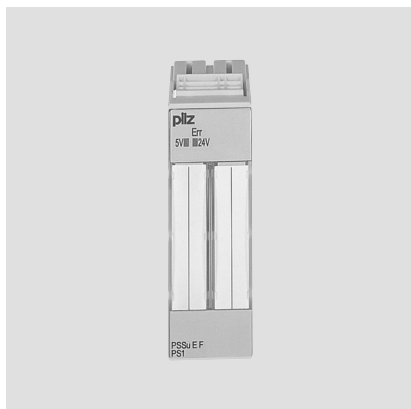
Mechanical coding

Type	B
Colour	yellow

Voltage supply PSSu E F PS(-T)

Order reference	
Description	Order no.
PSSu E F PS (Electronic module)	312 190
PSSu E F PS-T (Electronic module, coated version)	314 190
Base modules	Order no.
PSSu BS 1/8S (Base module with screw terminals, for use only as the first module after the head module)	312 650
PSSu BS 1/8S-T (Base module with screw terminals, for use only as the first module after the head module, coated version)	314 650
PSSu BS 1/8C (Base module with cage clamp terminals, for use only as the first module after the head module)	312 651
PSSu BS 1/8C-T (Base module with cage clamp terminals, for use only as the first module after the head module, coated version)	314 651
PSSu BS-R 1/8S (Base module with screw terminals, for use only to refresh the voltage and form supply groups)	312 652
PSSu BS-R 1/8S-T (Base module with screw terminals, for use only to refresh the voltage and form supply groups, coated version)	314 652
PSSu BS-R 1/8C (Base module with cage clamp terminals, for use only to refresh the voltage and form supply groups)	312 653
PSSu BS-R 1/8C-T (Base module with cage clamp terminals, for use only to refresh the voltage and form supply groups, coated version)	314 653

Voltage supply PSSu E F PS1(-T)



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

Module features

- ▶ Power supply for max. **2.0 A**
- ▶ When the supply voltage is interrupted, the module supply is buffered for 20 ms.
- ▶ Separate infeed for periphery supply
- ▶ Separate infeed for module supply
- ▶ Infeed for C-rail supply
- ▶ LEDs for:
 - Module supply
 - Periphery supply
 - Module error
- ▶ Application range depends on the base module
- ▶ Coated version of the module: **PSSu E F PS1-T**: for increased environmental requirements

Module description

The module 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 a head module, if the head module does not have an integrated supply voltage)
- ▶ Supply module to refresh the module supply and periphery supply
- ▶ Supply module to form supply groups

The module **PSSu E F PS1-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

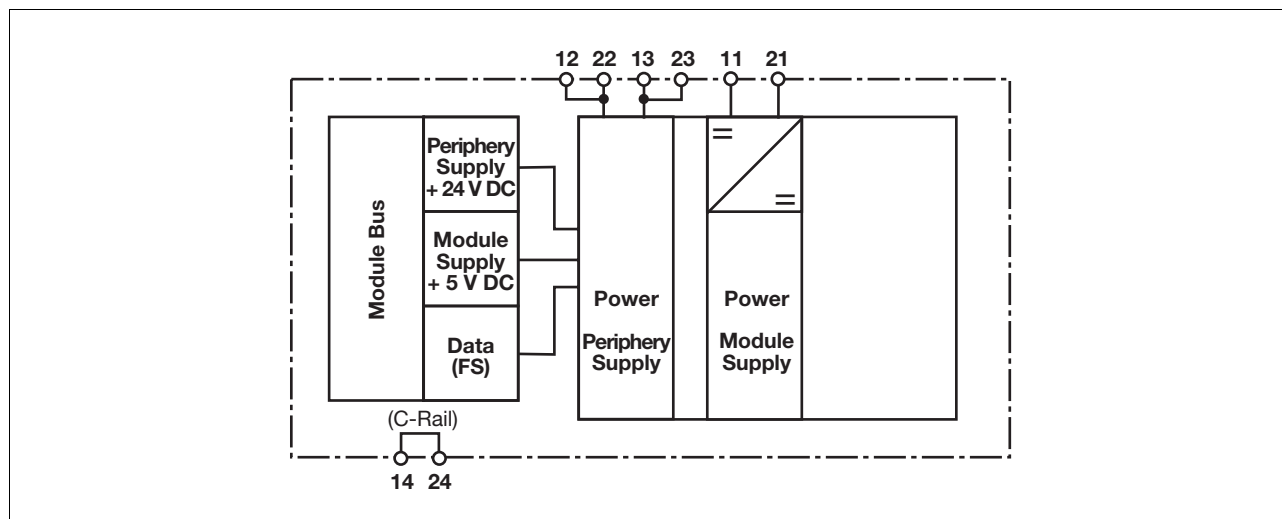
The module registers the following errors:

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

Approvals

	PSSu E F PS1
	◆
	◆
	◆

Block diagram



Voltage supply PSSu E F PS1(-T)

Function description

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

- ▶ **Module supply**
Supply voltage for subsequent module (right-hand side)
- ▶ **Periphery supply**
Supply voltage for sensors, actuators and test pulses
- ▶ **C-rail**
Infeed of the permitted additional supplies for the C-rail; a detailed

description of how to use the C-rail can be found in the system description.

When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

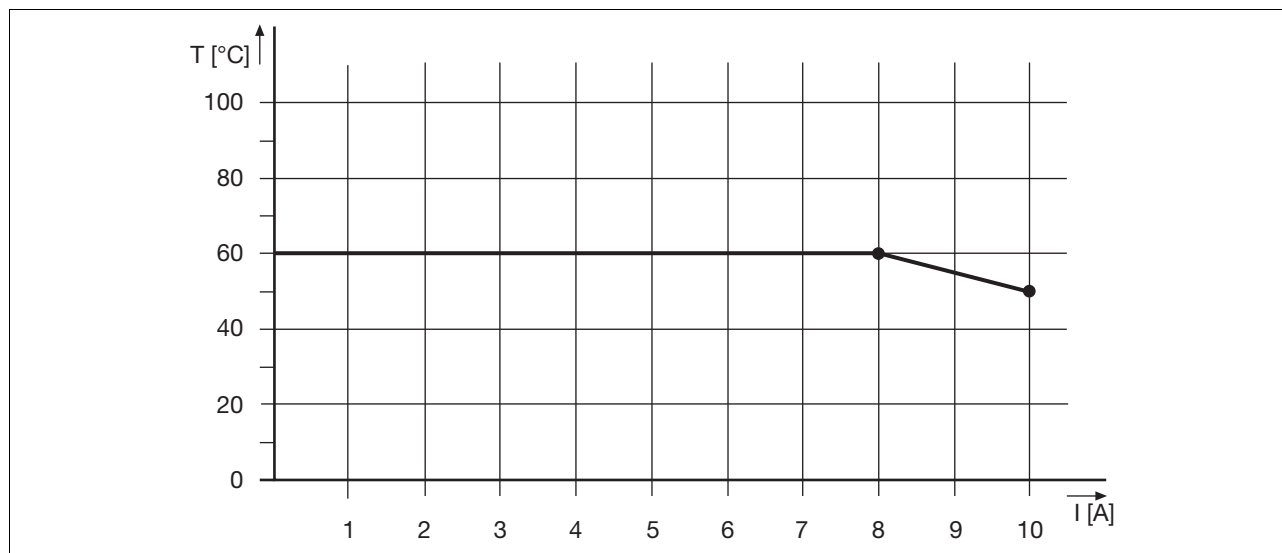
The module enables

- ▶ The module supply and periphery supply to be refreshed:

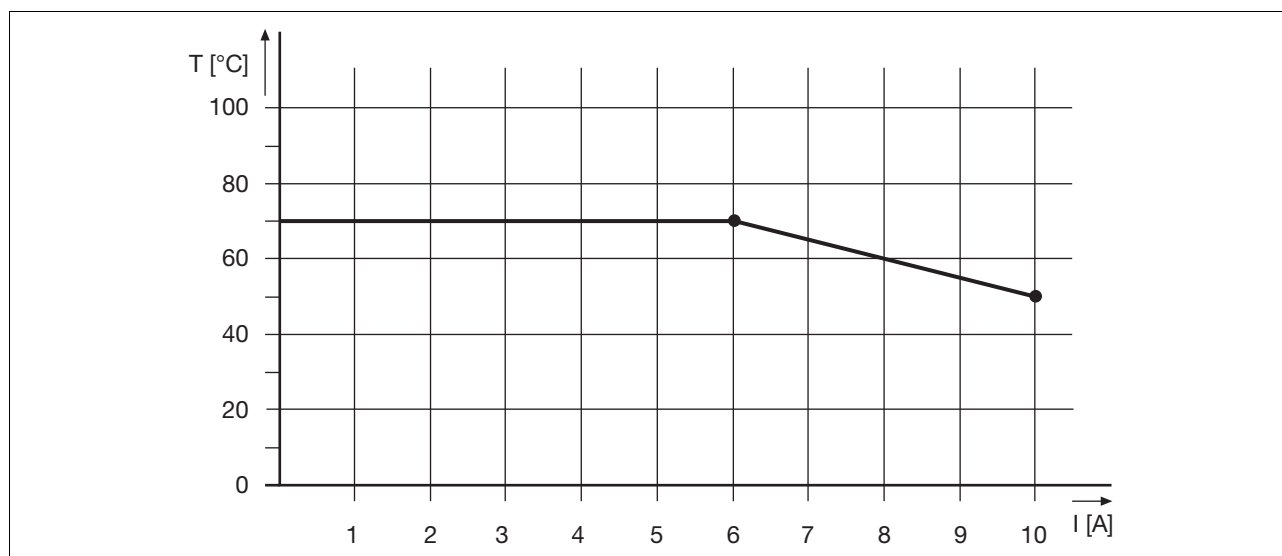
The relevant base module interrupts the connection to the incoming (left-hand) module supply, periphery supply and C-rail on the module bus. The 0 V supply on the module supply is connected to the left and right.

- ▶ **Supply groups to be formed**
The relevant base module interrupts the connection to the incoming (left-hand) periphery supply and C-rail on the module bus. Each supply group requires its own supply module.

PSSu E F PS1: Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I

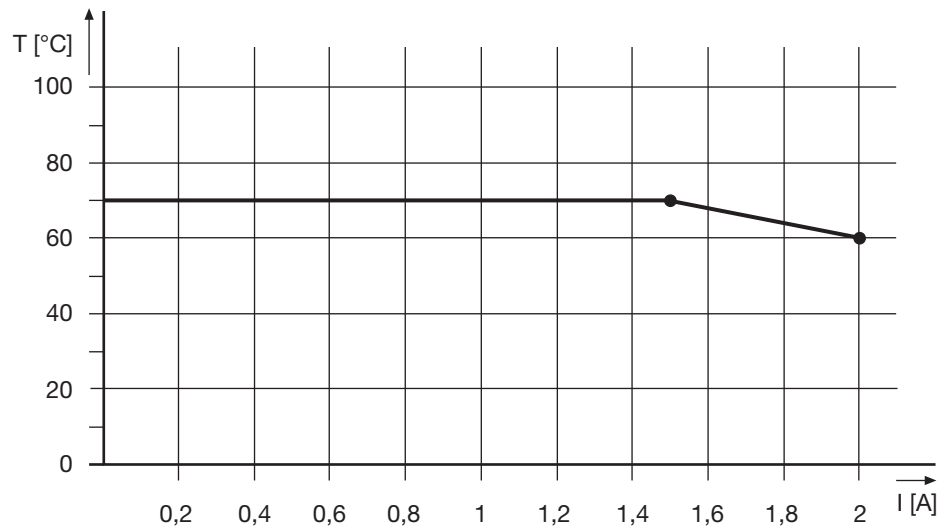


PSSu E F PS1-T: Derating diagram for periphery supply and C-rail: Permitted ambient temperature T dependent on load current I



Voltage supply PSSu E F PS1(-T)

PSSu E F PS1-T: Derating diagram for module supply: Permitted ambient temperature T dependent on load current I

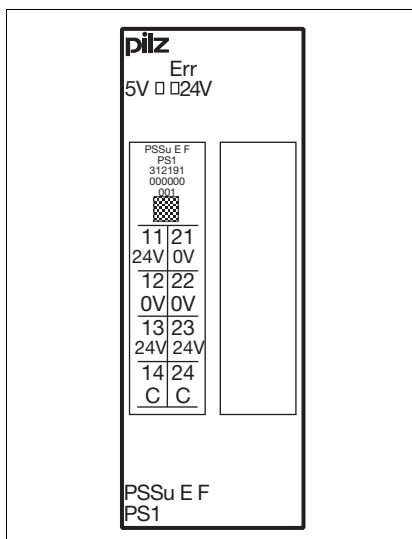


Voltage supply PSSu E F PS1(-T)

Wiring

Front view

- ▶ Please refer to the technical details regarding the requirements of the supply voltages.
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the periphery supply on the module bus is 10 A. Please refer to the derating diagram.
- ▶ The maximum current load for the C-rail is 10 A. Please refer to the derating diagram.
- ▶ Permitted infeed at the C-rail:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... +30 VDC
 - - 48 VAC ... + 48 VAC
- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm²:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

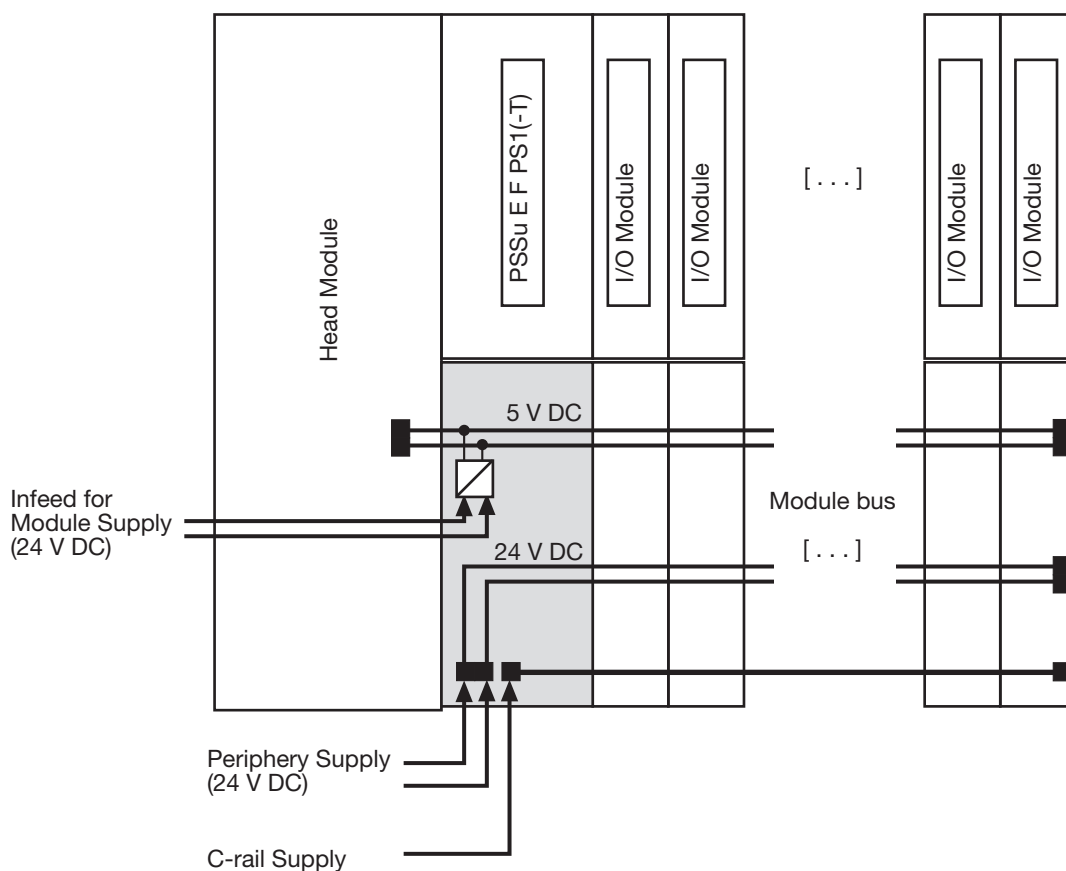


Voltage supply PSSu E F PS1(-T)

Terminal configuration

- For use as a general supply module, supplying the head module and subsequent modules

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

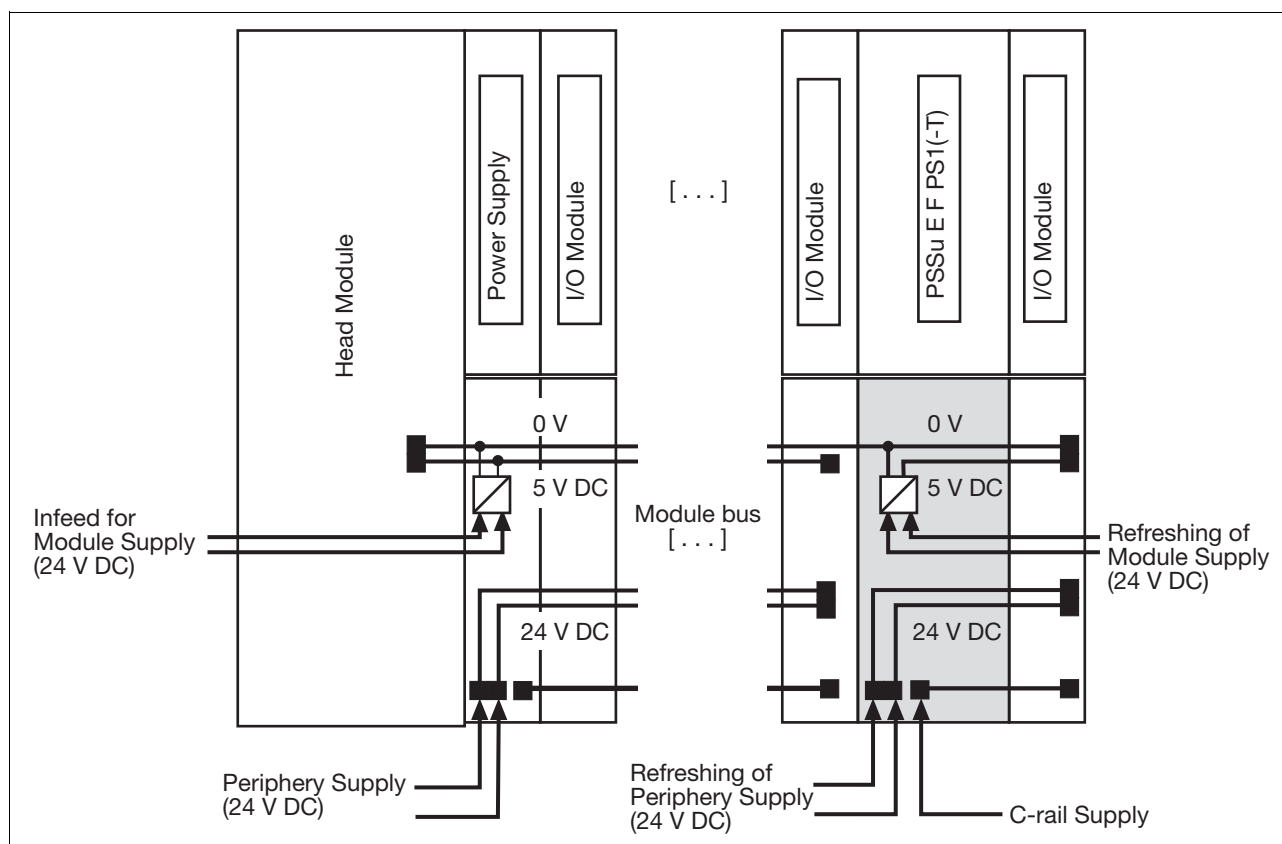


Voltage supply PSSu E F PS1(-T)

- ▶ For use as a supply module to refresh the module supply and periphery supply
- ▶ For use as a supply module to form supply groups
- To interrupt the incoming periphery supply and C-rail
- To provide subsequent modules with the module supply, periphery supply and C-rail supply
- ▶ With these base modules the supply module cannot be used as the first module after the head module.

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

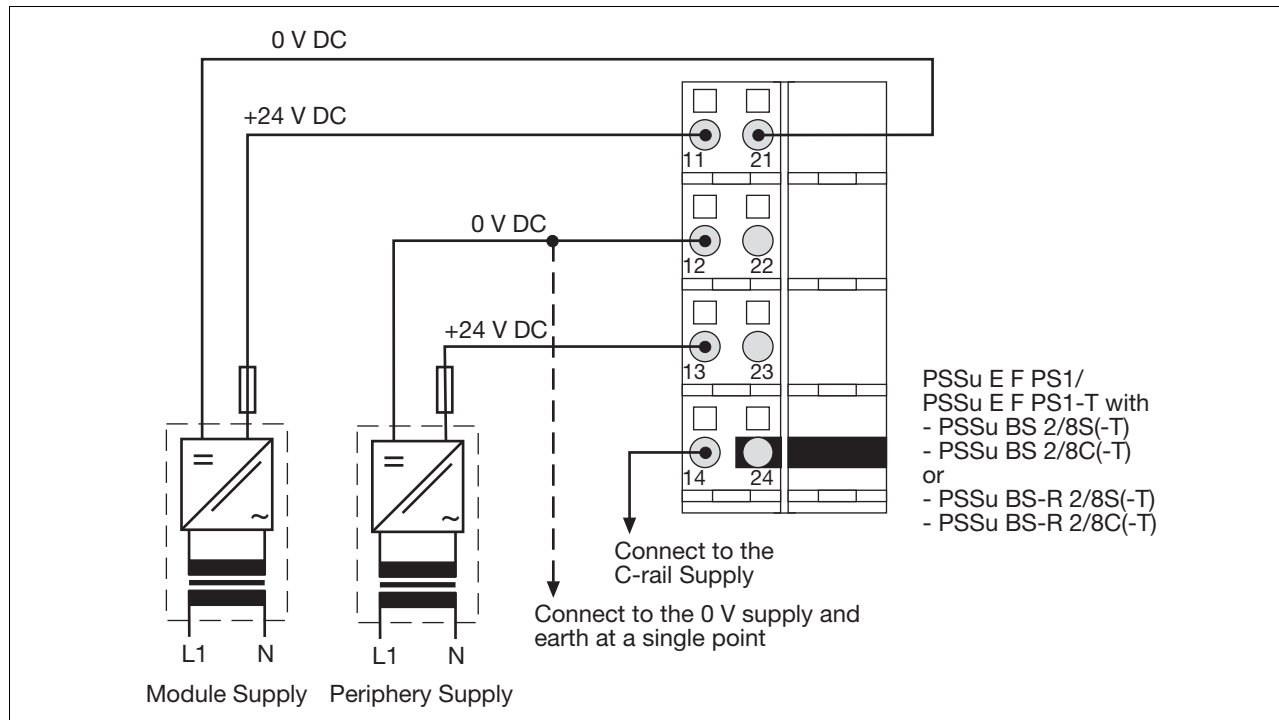
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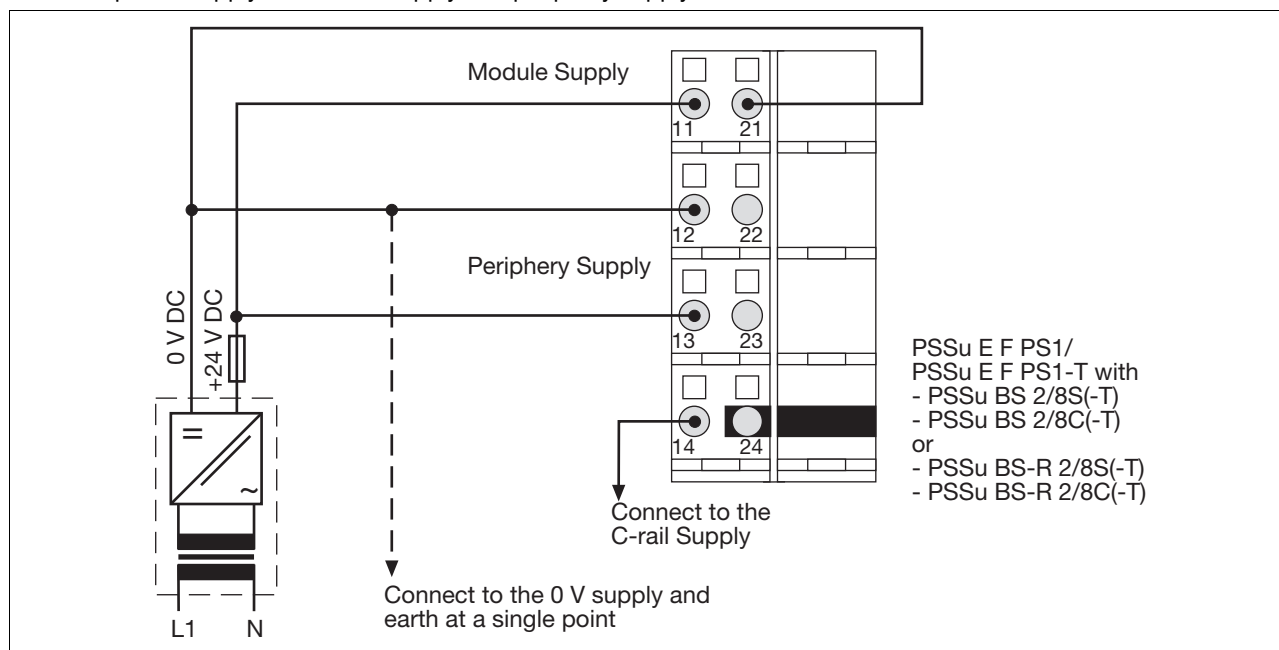
Voltage supply PSSu E F PS1(-T)

Connection

Separate power supplies for module supply and periphery supply



Common power supply for module supply and periphery supply



Voltage supply

PSSu E F PS1(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Module's device code	0800h
Support in system environment A	
from FS firmware version for other head modules	4
from ST firmware version for other head modules	5
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	6
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Infeed for	Module Supply
Voltage	24 V
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	12.0 W
Max. continuous current that the external power supply must provide	0.8 A
Inrush current that the external power supply must provide	4.0 A
Module's current consumption	23 mA
Module's power consumption	0.12 W
Infeed for	Periphery Supply
Voltage	24 V
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply
Voltage	5 V
	DC
Voltage tolerance	-2 %/+3 %
Current load capacity	2.0 A
Buffer in the case of supply interruptions in accordance with in accordance with	DIN V EN V 1954, EN61131-2, EN61496-1
Short circuit-proof	yes
Potential isolation between Module Supply and Periphery Supply	3050 V
Max. power dissipation of the module	2.50 W
	2.00 W coated version (-T)
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
	-40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)

Voltage supply

PSSu E F PS1(-T)

Environmental data	
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	62 g 64 g coated version (-T)
Mechanical coding	
Type	C
Colour	yellow

Voltage supply

PSSu E F PS1(-T)

Order reference

Description	Order no.
PSSu E F PS1 (Electronic module)	312 191
PSSu E F PS1-T (Electronic module, coated version)	314 191

Base modules	Order no.
PSSu BS 2/8S (Base module with screw terminals, for use only as the first module after the head module)	312 656
PSSu BS 2/8S-T (Base module with screw terminals, for use only as the first module after the head module, coated version)	314 656
PSSu BS 2/8C (Base module with cage clamp terminals, for use only as the first module after the head module)	312 657
PSSu BS 2/8C-T (Base module with cage clamp terminals, for use only as the first module after the head module, coated version)	314 657
PSSu BS-R 2/8S (Base module with screw terminals, for use only to refresh the voltage and form supply groups)	312 654
PSSu BS-R 2/8S-T (Base module with screw terminals, for use only to refresh the voltage and form supply groups, coated version)	314 654
PSSu BS-R 2/8C (Base module with cage clamp terminals, for use only to refresh the voltage and form supply groups)	312 655
PSSu BS-R 2/8C-T (Base module with cage clamp terminals, for use only to refresh the voltage and form supply groups, coated version)	314 655

Voltage supply PSSu E F PS-P(-T)



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

Approvals

	PSSu E F PS-P
	◆
	◆
	◆

Module features

- ▶ Infeed for periphery supply
- ▶ Infeed for C-rail supply
- ▶ LEDs for:
 - Periphery supply
 - Module error
- ▶ Coated version of the module: **PSSu E F PS-P-T**: for increased environmental requirements

Module description

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

The module be used as:

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

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

Integrated protection mechanisms

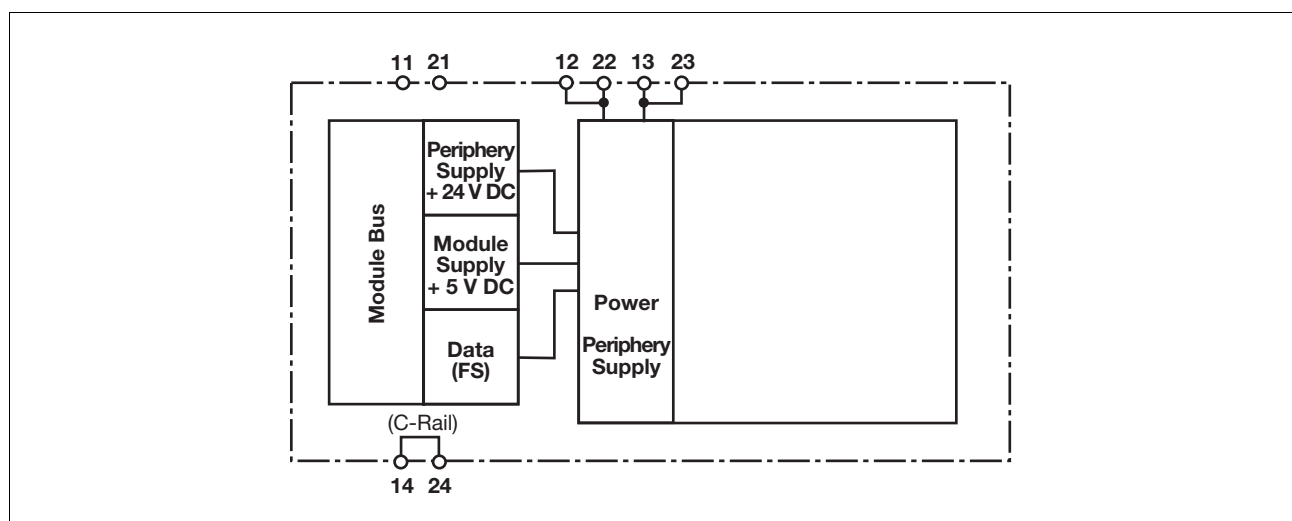
The module has the following protection mechanisms:

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

The module registers the following errors:

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

Block diagram



Voltage supply PSSu E F PS-P(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

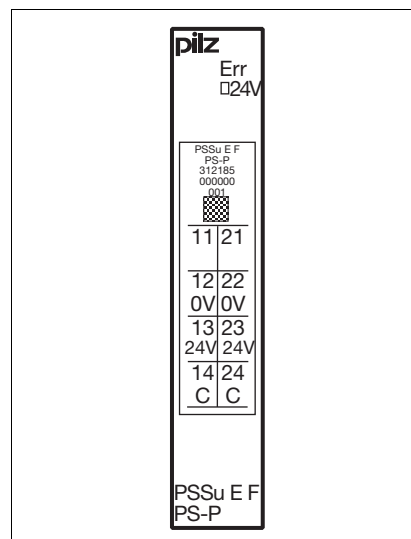
The product provides the periphery supply for the modules on the module bus:

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

Wiring

- ▶ Please refer to the technical details regarding the requirements of the supply voltages.
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the periphery supply on the module bus is 10 A. Please refer to the derating diagram.
- ▶ The maximum current load for the C-rail is 10 A. Please refer to the derating diagram.
- ▶ Permitted infeed at the C-rail:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... +30 VDC
 - - 48 VAC ... + 48 VAC
- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm²:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

Front view

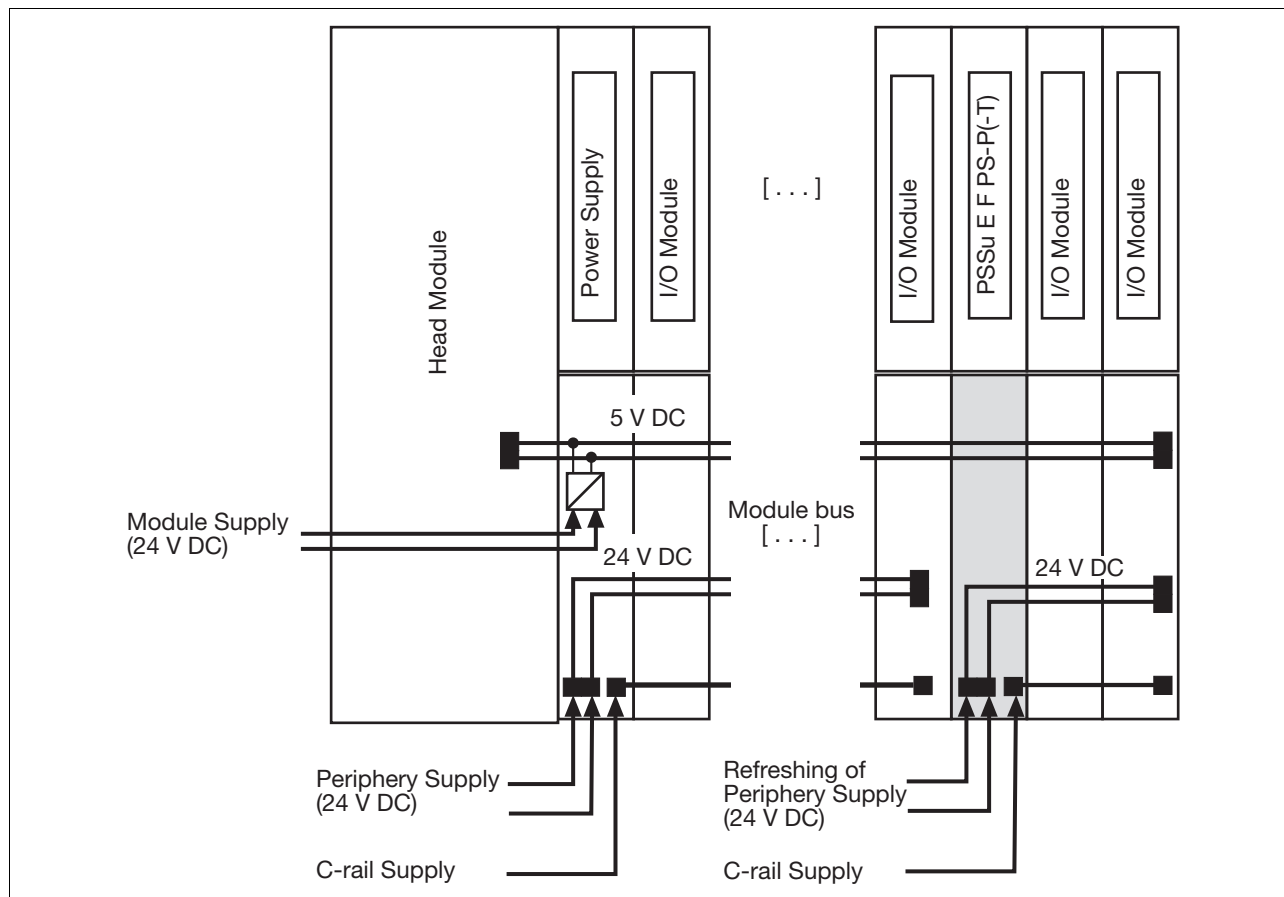


Voltage supply PSSu E F PS-P(-T)

Terminal configuration

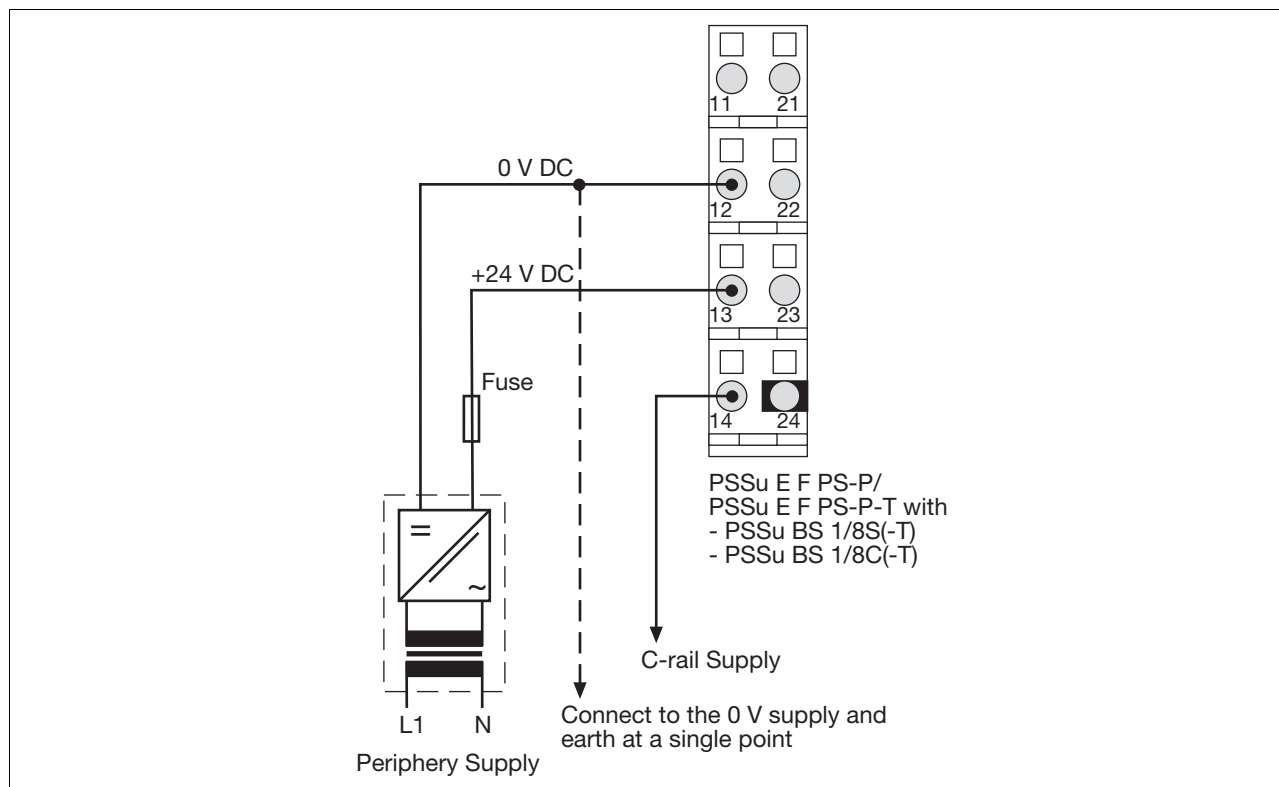
- Supply module
 - To refresh the periphery supply
- To interrupt the incoming periphery supply and C-rail
- To provide subsequent modules with the periphery supply and C-rail supply
- To form supply groups

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



Voltage supply PSSu E F PS-P(-T)

Connection



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Module's device code	0802h
Support in system environment A	
from FS firmware version for other head modules	4
from ST firmware version for other head modules	5
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	6
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Voltage	24 V
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	23 mA
Module's power consumption	0.12 W

Voltage supply

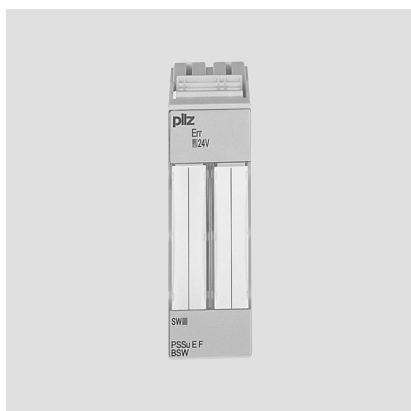
PSSu E F PS-P(-T)

Electrical data	
Infeed for	Periphery Supply
Voltage	24 V
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Max. power dissipation of the module	0.50 W
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Max. Ambient temperature in accordance with UL 508	60 °C
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	33 g 35 g coated version (-T)
Mechanical coding	
Type	A
Colour	yellow

Voltage supply PSSu E F PS-P(-T)

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

Voltage supply PSSu E F BSW(-T)



Electronic module to switch off the periphery supply for failsafe applications

Approvals

	PSSu E F BSW
	◆
	◆
	◆

Module features

- ▶ Infeed for periphery supply
- ▶ Infeed for C-rail supply
- ▶ Failsafe switching off of the periphery supply (block switching)
- ▶ LEDs for:
 - Switch status of periphery supply
 - Periphery supply
 - Module error
- ▶ Application range depends on the base module
- ▶ Coated version of the module: **PSSu E F BSW-T**: for increased environmental requirements

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**

The module may be used to switch off the periphery supply on standard modules.

- ▶ If the module is used to switch off modules of type PSSu E PD, Category 4 of EN 954-1 can be achieved.
- ▶ If the module is used to switch off standard output modules (e.g. PSSu E S 4DO 0.5 or PSSu E S 2DO 2), Category 3 of EN 954-1 can be achieved.

The module may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads

The module may **not** be used in combination with compact modules or modules with relay outputs in safety-related applications.

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

Integrated protection mechanisms

The module has the following protection mechanisms:

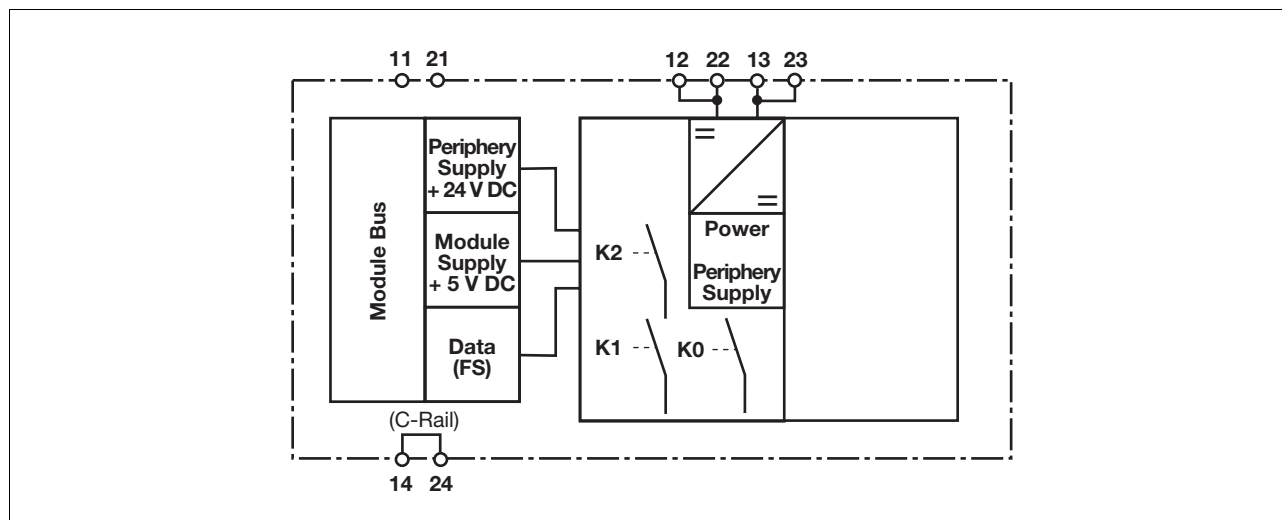
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)
- ▶ 2 relay contacts connected in series to feed the periphery supply: +24 V DC
- ▶ 1 relay contact to feed the periphery supply: 0 V DC
- ▶ Thermistor monitor

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error
- ▶ Temperatur error: Too warm
- ▶ Temperatur error: Too hot
- ▶ Relay control error
- ▶ Relay error
- ▶ Block switching output error
- ▶ Overvoltage error
- ▶ Undervoltage error
- ▶ Error in the overvoltage protection diodes

Voltage supply PSSu E F BSW(-T)

Block diagram



Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ Refreshing the periphery supply: The relevant base module interrupts the connection to the incoming (left-hand) periphery supply and C-rail on the module bus.
- ▶ Supply to the module bus:
 - Periphery supply for subsequent modules (right-hand side)
 - C-rail supply for subsequent modules (right-hand side)
- ▶ The module does not automatically switch off the periphery supply in the case of under or overvoltage. However, there will be a visual signal (LED "24 V") and a message will be sent to the head module (entry in the error stack).

Block switch function

- ▶ The module is used to switch off the periphery supply safely on standard modules that are arranged in blocks.
- ▶ Each output block requires its own block switching module.
- ▶ The periphery supply can be switched off via the controller's fail-safe user program.
- ▶ The periphery supply is switched off if a module error is detected.

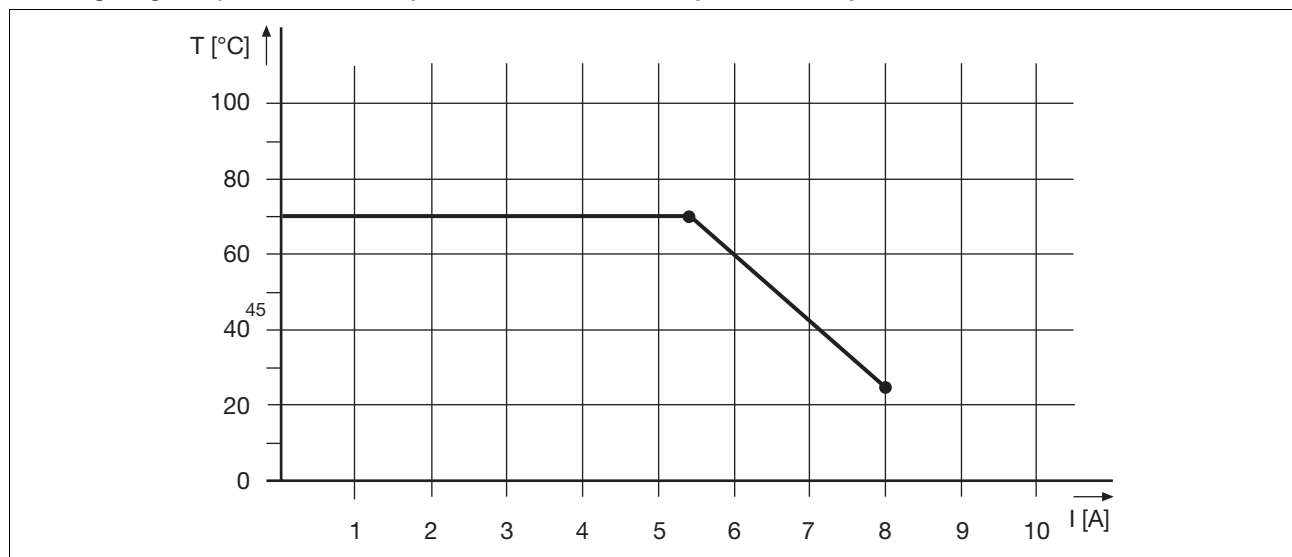
- ▶ A new supply voltage module or a terminating plate signifies the end of an output block.
- ▶ The relationship between the load current and the operating temperature is illustrated in the following derating diagram. The operating point should be below the characteristic curve.

Voltage supply PSSu E F BSW(-T)

Derating diagram (PSSu E F BSW): Permitted ambient temperature T dependent on load current I



Derating diagram (PSSu E F BSW-T): Permitted ambient temperature T dependent on load current I



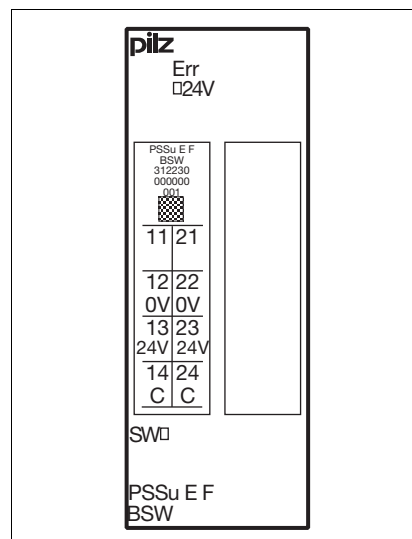
Voltage supply PSSu E F BSW(-T)

Wiring

- ▶ Please refer to the technical details regarding the requirements of the supply voltages.
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the C-rail is 10 A. Please refer to the derating diagram.
- ▶ Permitted infeed at the C-rail:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... +30 VDC
 - - 48 VAC ... + 48 VAC

- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm²:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.
- ▶ To prevent contact welding, a fuse should be connected before the periphery supply infeed (see Technical details).

Front view



Terminal configuration

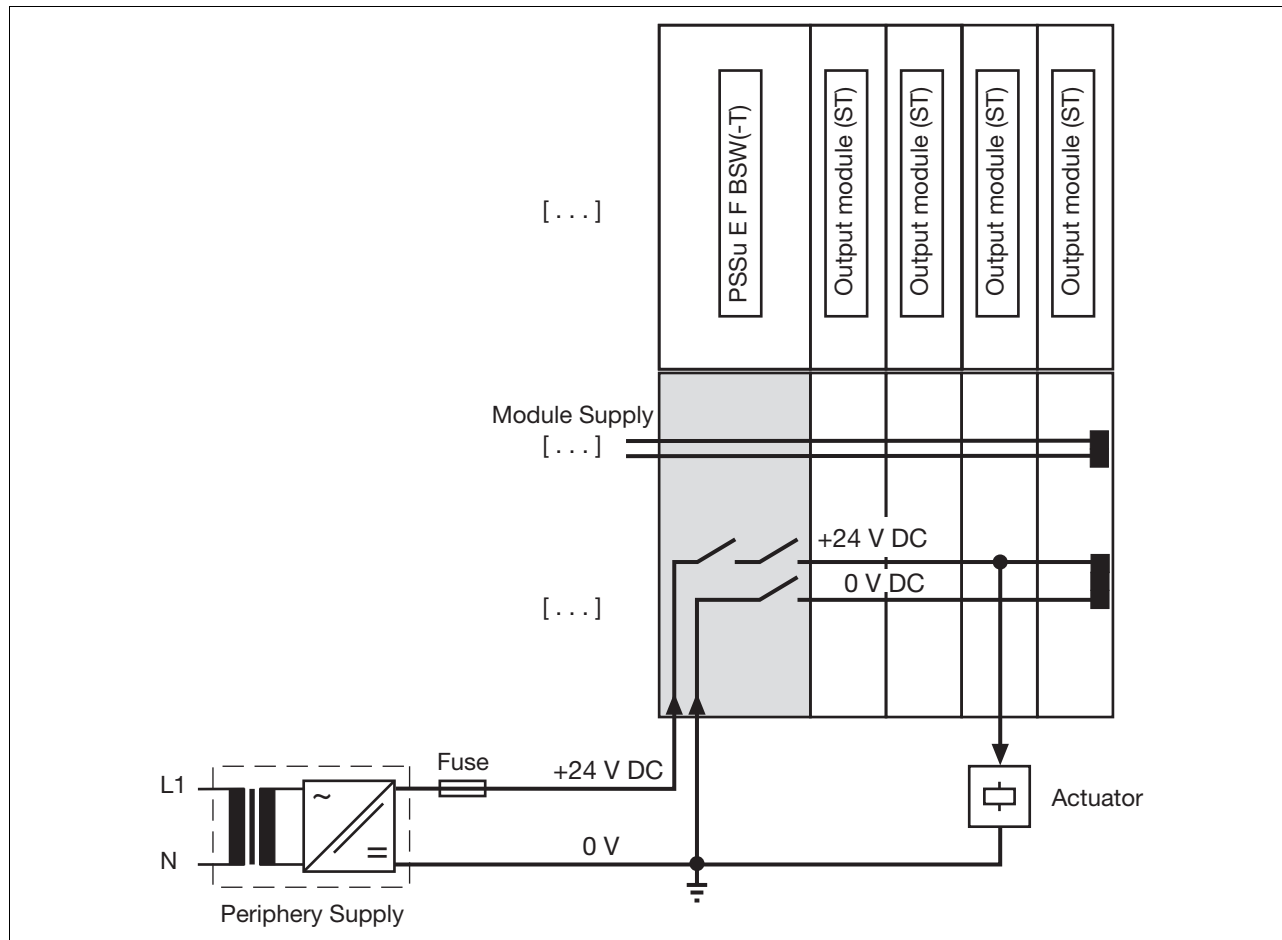
- ▶ Supply module
 - To switch on/off the periphery supply to input/output blocks (block switching)
- To interrupt the incoming (left-hand) periphery supply and C-rail supply
- To provide subsequent (right-

hand) modules with the periphery supply and C-rail supply

Base module	Terminal configuration	
Screw terminals: PSSu BS 2/8S PSSu BS 2/8S-T	11: Not connected 21: Not connected	
Cage clamp terminals: PSSu BS 2/8C PSSu BS 2/8C-T	12-22: 0 V periphery supply, interrupted to the left (12-22 linked within the base module)	
	13-23: +24 V periphery supply, interrupted to the left (13-23 linked within the base module)	
	14-24: C-rail supply, interrupted to the left (14-24 linked within the base module)	

Voltage supply PSSu E F BSW(-T)

Switching an earthed actuator



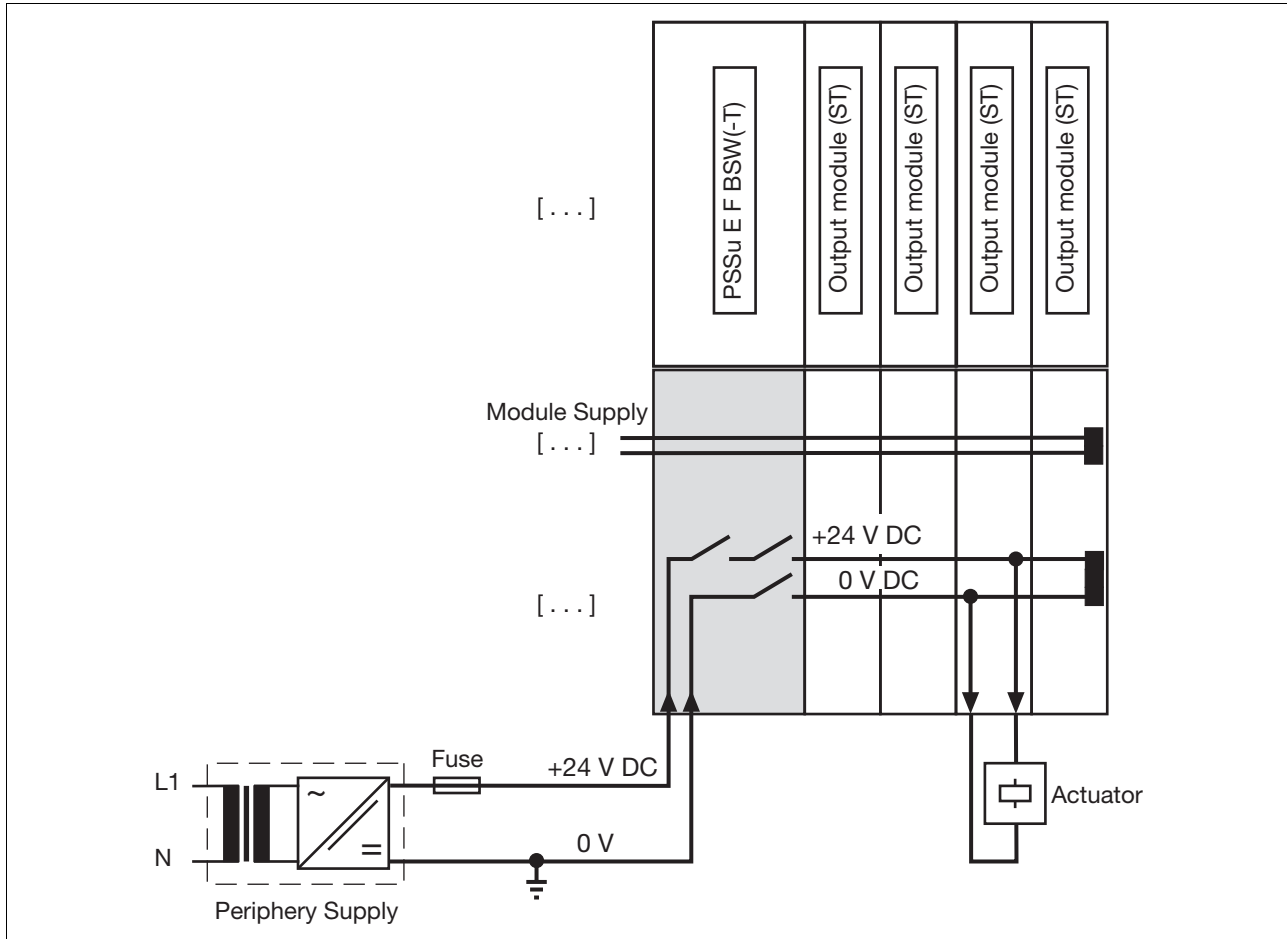
On earthed actuators, the actuator's 0 V connection must be connected to 0 V of the periphery supply (external supply voltage).

Reason: The switch (0 V periphery supply) in the PSSu E F BSW module is bridged when the actuator's earthed 0 V connection is connected to 0 V on the connected periphery supply. In this case, the PSSu E F BSW registers a short circuit between 0 V of the external supply voltage and 0 V of the connected periphery supply.

Error reaction: The PSSu will not start and all affected I/O-Groups (Safety-BUS p) remain in a STOP condition.

Voltage supply PSSu E F BSW(-T)

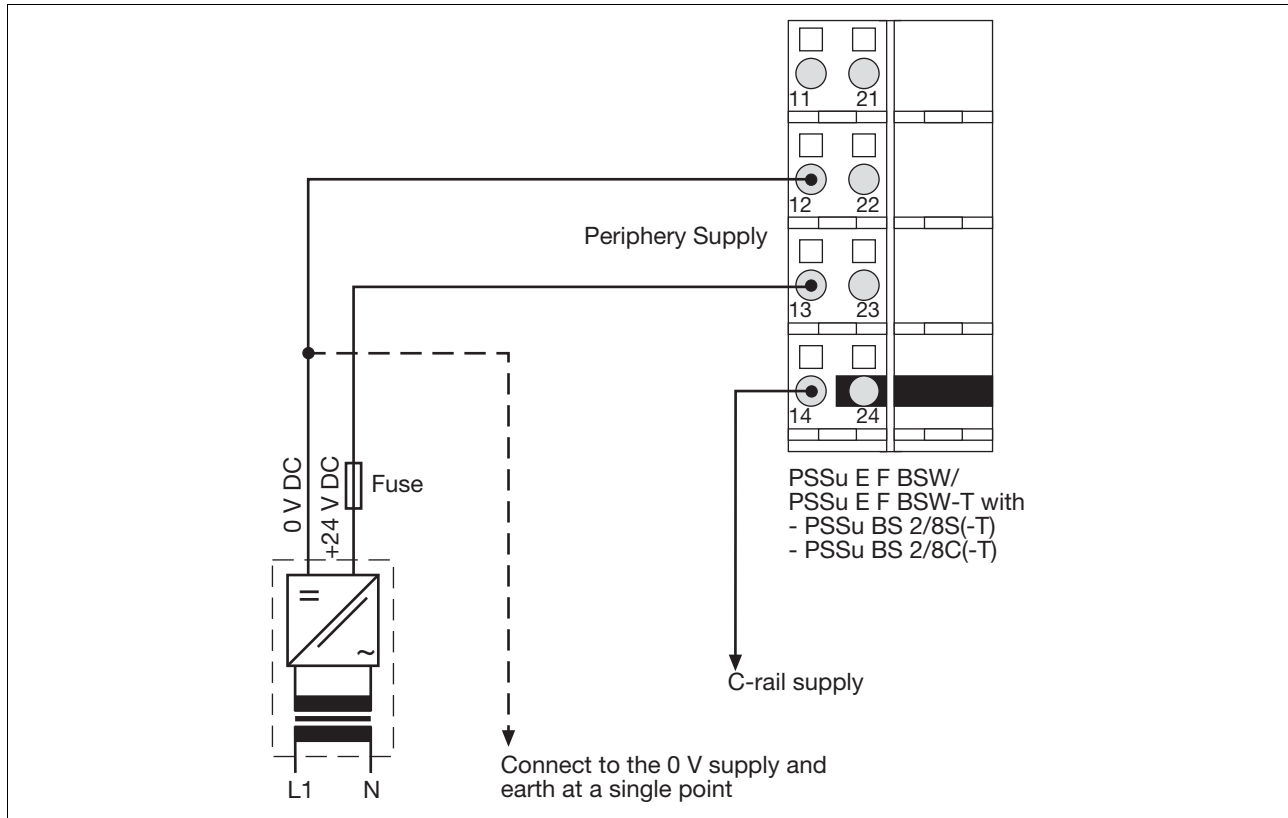
Switching a floating actuator



A floating actuator must be connected to the 0 V connection and to the 24 V connection of the connected periphery supply.

Voltage supply PSSu E F BSW(-T)

Connection



If you are using actuators for safety-related functions, it is essential that you note the following:

- ▶ A safety assessment must be made for each individual application.
- ▶ Input modules may not be used within an output block. If an error occurs, input modules could supply an external voltage which cannot be switched off.
- ▶ The position of each single actuator must be monitored, e.g. via an FS feedback loop with test pulses.
- ▶ To prevent contact welding, a fuse should be connected before the periphery supply infeed (see Technical details).
- ▶ The following applies for floating actuators:
All actuator masses must be fed back to the output modules.
- ▶ The following applies for earthed actuators:
The possibility of a short circuit to + 24 V of the external supply voltage must be excluded.

When using modules of type PSSu E PD in an output block, please note the following:

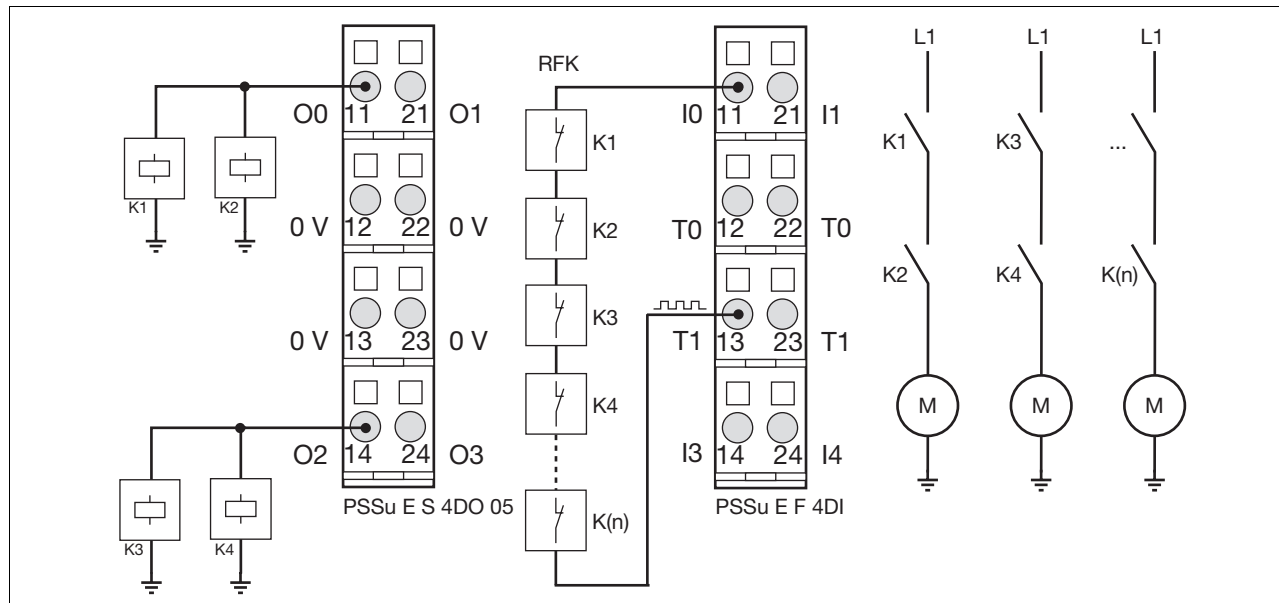
- ▶ Do not connect capacitive loads.
- ▶ During the power-up test, the relay contacts are tested with pulses of up to 60 ms.

Connection example

- ▶ Block switching with dual-channel operation and redundant actuator.
- ▶ The ST output module PSSu E S 4DO 0.5 belongs to the output block of the PSSu E F BSW module.
- ▶ The FS input module for forming the feedback loop (PSSu E F 4DI with test pulses) belongs to another supply group, which is not shut down.
- ▶ A maximum of Cat. 3 in accordance with EN 954-1 and SIL2 in accordance with EN IEC 61508 can be achieved.

Voltage supply PSSu E F BSW(-T)

Connection example for block switching:



Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Technical details	
Application range	Standard/Failsafe
Module's device code	0C02h
Number of FS output bits	1
Support in system environment A	
from FS firmware version for other head modules	4
from FS firmware version PSSu H F PN	1
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	330 mA
Module's power consumption	1.65 W
Max. power dissipation of the module	2.50 W
Infeed for	Periphery Supply
Voltage	24 VDC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	8.0 A
Module's current consumption with no load	40 mA
Module's power consumption with no load	0.96 W
Potential isolation between module supply and Periphery Supply	3050 V
Switching capability in accordance with UL 508	
240 V AC G. P.	3.0 A
24 V DC G. P. Resistive	3.0 A
24 V DC Pilot Duty	3.0 A

Voltage supply

PSSu E F BSW(-T)

Electrical data	
Contact fuse protection in accordance with	VDE 0660
Blow-out fuse, quick	10 A
Blow-out fuse, slow	6 A
Max. processing time for block switching when signal changes from "1" to "0"	120 ms
Max. processing time for block switching when signal changes from "0" to "1"	850 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Max. ambient temperature in accordance with UL 508	-40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	60 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
Max. operating height above sea level	no
EMC	yes coated version (-T)
Vibration to EN 60068-2-6	5000 m coated version (-T)
Frequency	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Max. acceleration	10 - 150 Hz
Shock stress	1g
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	89 g
Mechanical coding	
Type	I
Colour	yellow

Voltage supply

PSSu E F BSW(-T)

Order reference

Description	Order no.
PSSu E F BSW (Electronic module)	312 230
PSSu E F BSW-T (Electronic module, coated version)	314 230

Base modules	Order no.
PSSu BS 2/8S (Base module with screw terminals, for use only as the first module after the head module)	312 656
PSSu BS 2/8S-T (Base module with screw terminals, for use only as the first module after the head module, coated version)	314 656
PSSu BS 2/8C (Base module with cage clamp terminals, for use only as the first module after the head module)	312 657
PSSu BS 2/8C-T (Base module with cage clamp terminals, for use only as the first module after the head module, coated version)	314 657

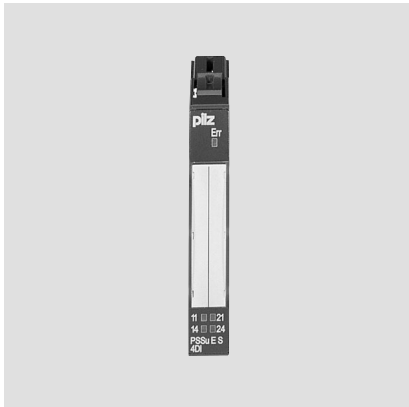
Digital input/output (standard)

Digital input/output (standard)

Contents	Page
Digital input/output (standard)	
PSSu E S 4DI(-T)	3.4-2
PSSu E S 4DI-D	3.4-8
PSSu E S 4DO 0.5(-T)	3.4-15
PSSu E S 4DO 0.5-(T)D	3.4-22
PSSu E S 2DO 2(-T)	3.4-29
PSSu E S 2DO 2-(T)D	3.4-35
PSSu E S 2DOR 2(-T)	3.4-41
PSSu E S 2DOR 10(-T)	3.4-48
PSSu K S 8DI 8DO 0.5(-T)	3.4-54
PSSu K S 16DI	3.4-63
PSSu K S 16DO 0.5	3.4-70

Digital input/output (standard)

PSSu E S 4DI(-T)



Electronic module with digital inputs for standard applications

Approvals

	PSSu E S 4DI
	◆

Module features

- ▶ **4** Digital inputs
- ▶ LEDs for:
 - Switch status of each input
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 4DI-T**: for increased environmental requirements

Module description

The module provides type 1 inputs in accordance with IEC 61131-2. It may be used as an input module for standard functions.

The module may be used for standard applications in system environment A and B.

The module **PSSu E S 4DI-T** is suitable for use where there are increased environmental requirements (see Technical Details).

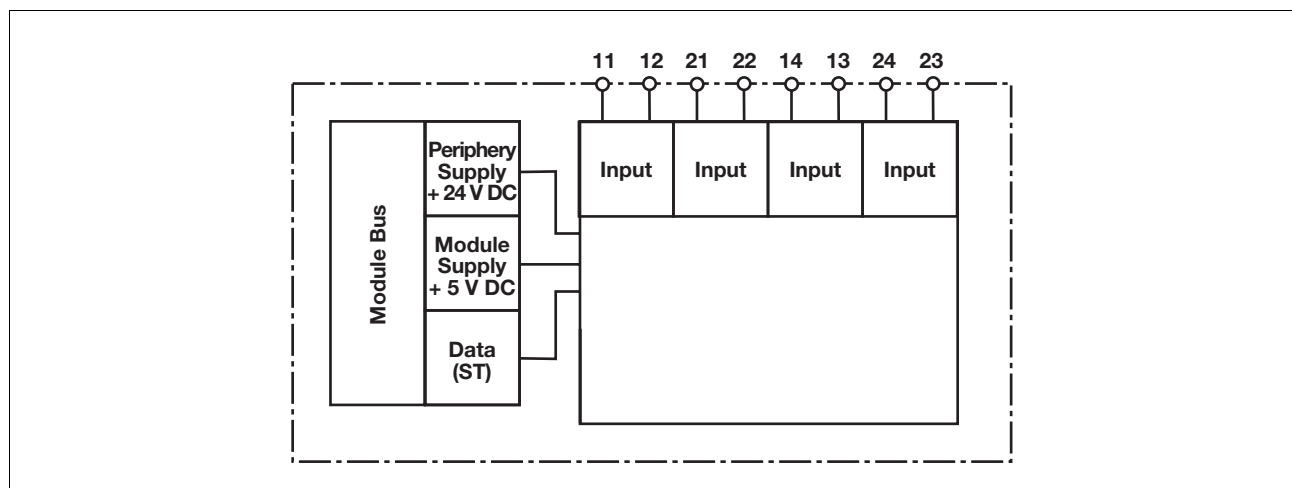
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Digital input/output (standard) PSSu E S 4DI(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The module routes the periphery supply from the module bus to the base module terminals.
- ▶ The periphery supply is used to supply the input devices.

- ▶ The module does not switch the periphery supply.

- ▶ The periphery supply has no current limitation.

Inputs

- ▶ The input status is signalled to the head module via the module bus.
- ▶ The inputs have input filters.

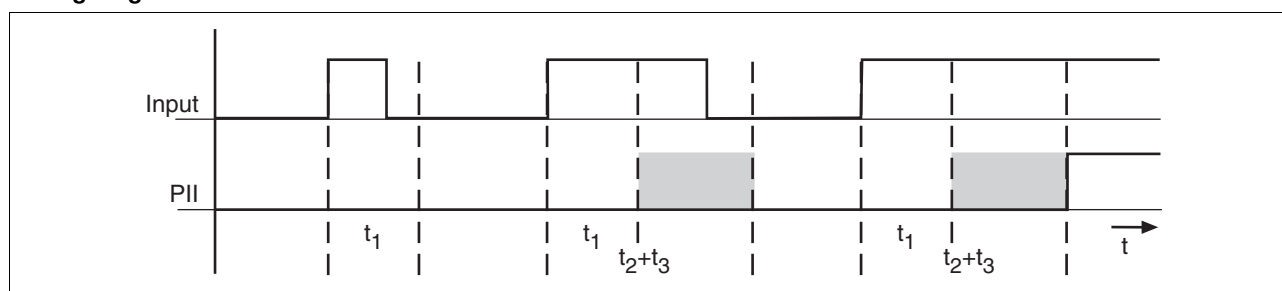
Signal detection at the inputs

- ▶ A signal ("0" signal or "1" signal) is always ignored if it is present for

less than the minimum processing time (see Technical details).

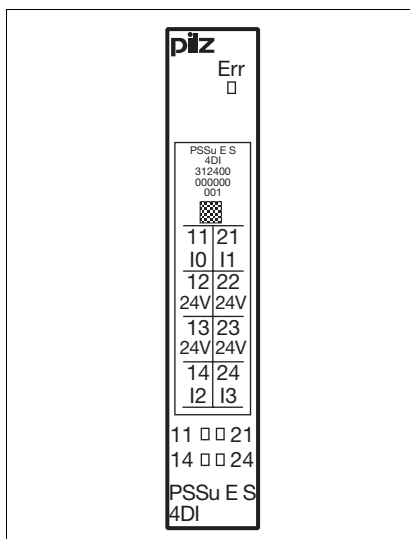
- ▶ A signal is always detected and transmitted to the process image (PII) if it is present for longer than the maximum processing time plus the scan time of the module bus ($t_2 + t_3$, see diagram and Technical details).

Timing diagram



- ▶ Input: Signal at the input
 - ▶ PII: Status of process image (PII)
 - ▶ t_1 Minimum processing time (see Technical details)
 - ▶ t_2 Maximum processing time (see Technical details)
 - ▶ t_3 Scan time of module bus
- Shaded area: Status of process image (PII) undefined.

Front view



Wiring

- ▶ Signal lines do not have to be shielded.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules without C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Digital input/output (standard)

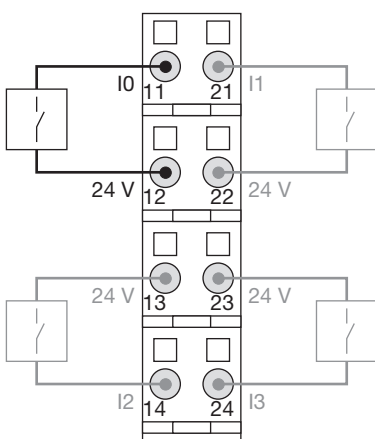
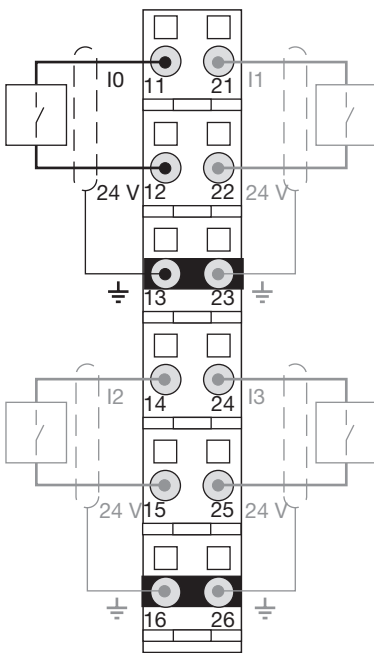
PSSu E S 4DI(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Input I1 12-22: +24 V output (periphery supply, 12-22 linked within the base module) 13-23: +24 V output (periphery supply, 13-23 linked within the base module) 14: Input I2 24: Input I3	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Input I1 12-22: +24 V output (periphery supply, 12-22 linked within the base module) 13-23: C-rail supply (13-23 linked within the base module) 14: Input I2 24: Input I3	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	21: Input I1 12-22: +24 V output (periphery supply, 12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Input I2 24: Input I3 15-25: +24 V output (periphery supply, 15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Digital input/output (standard)
PSSu E S 4DI(-T)

Connection

Input circuit	Single-channel input device	Single-channel input device
Input devices supplied via the periphery supply		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0200h
Number of ST input bits	4
Support in system environment A	
from ST firmware version for other head modules	5
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	24 mA
Module's power consumption	0.12 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	0 mA
Module's power consumption with no load	0.00 W
Max. power dissipation of the module	1.50 W

Digital input/output (standard)

PSSu E S 4DI(-T)

Inputs	
Number	4
Input voltage	24 V DC
Input current	3.0 - 10.0 mA
Min. threshold voltage when signal changes from "1" to "0"	8.0 V
Max. threshold voltage when signal changes from "0" to "1"	10.0 V
Potential isolation between input and voltage for the internal module bus	yes
Times	
Max. processing time for input when signal changes from "1" to "0"	4.00 ms
Max. processing time for input when signal changes from "0" to "1"	4.00 ms
Min. processing time for input when signal changes from "1" to "0"	3.00 ms
Min. processing time for input when signal changes from "0" to "1"	3.00 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T) -25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-40 - 70 °C coated version (-T)
Condensation	93 % r. h. at 40 °C
	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	31 g
Mechanical coding	
Type	A
Colour	dark grey

Digital input/output (standard) PSSu E S 4DI(-T)

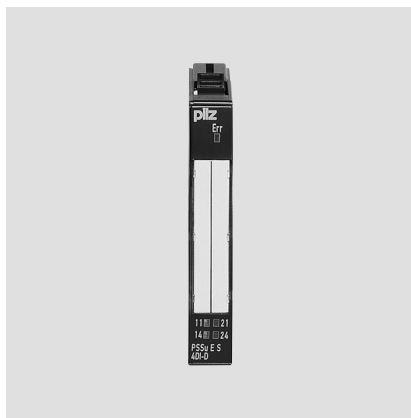
The standards current on **2005-04** apply.

Order reference	
Description	Order no.
PSSu E S 4DI (Electronic module)	312 400
PSSu E S 4DI-T (Electronic module, coated version)	314 400

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (standard)

PSSu E S 4DI-D



Electronic module with digital inputs and expanded diagnostics for standard applications.

Module features

- ▶ **4** Digital inputs
- ▶ **2** Outputs for periphery supply:
 - Current load capacity per output: **0.25 A**
 - Short circuit-proof
 - Overload-proof
- ▶ LEDs for:
 - Switch status of each input
 - Module error
- ▶ For standard applications in system environment A
- ▶ Communication via:
 - Standard fieldbus
- ▶ The module provides advanced diagnostic data.

Module description

The module provides type 1 inputs in accordance with IEC 61131-2. It may be used as an input module for standard functions.

The module may be used for standard applications in system environment A.

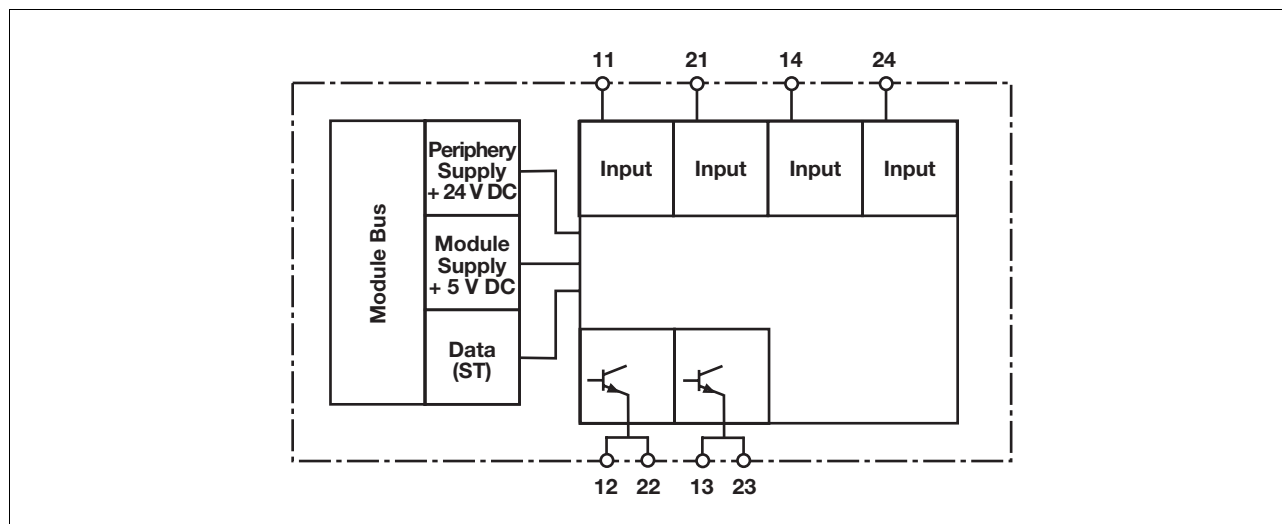
Integrated protection mechanisms

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

The module provides the following diagnostic data:

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

Block diagram



Digital input/output (standard)

PSSu E S 4DI-D

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The module routes the periphery supply from the module bus to the base module terminals.
- ▶ The periphery supply is available at the supply outputs S1 and S2.

Inputs

- ▶ The input status is signalled to the head module via the module bus.

- ▶ The inputs have input filters.
- ▶ Supply outputs S1 and S2
- ▶ The supply outputs supply the sensors at the inputs.
- ▶ The supply outputs are protected against overload and reverse polarity.
- ▶ The supply outputs cannot be controlled via the process image (PIO).

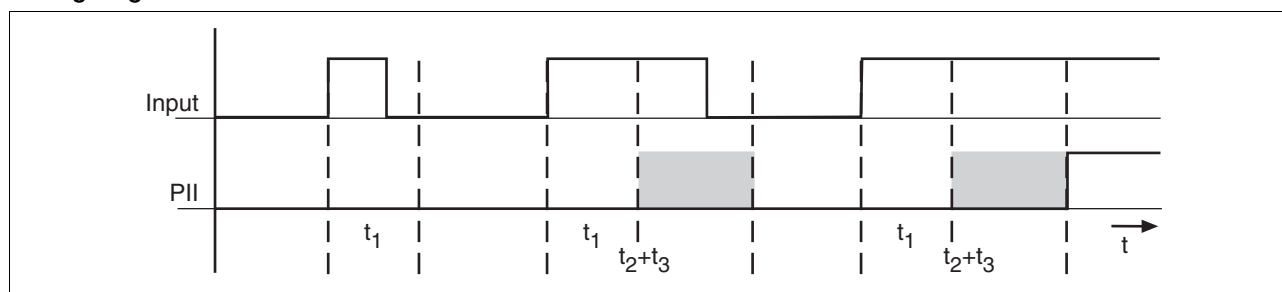
The module provides advanced diagnostic data, which is also available in a status byte in the ST-PII:

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

Signal detection at the inputs

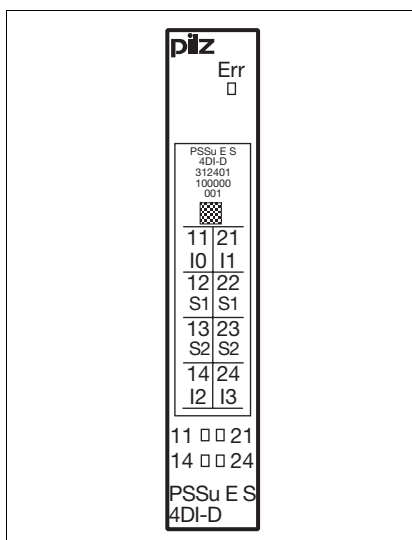
- ▶ A signal ("0" signal or "1" signal) is always ignored if it is present for less than the minimum processing time (see Technical details).
- ▶ A signal is always detected and transmitted to the process image (PII) if it is present for longer than the maximum processing time plus the scan time of the module bus ($t_2 + t_3$, see diagram and Technical details).

Timing diagram



- ▶ Input: Signal at the input
 - ▶ PII: Status of process image (PII)
 - ▶ t_1 Minimum processing time (see Technical details)
 - ▶ t_2 Maximum processing time (see Technical details)
 - ▶ t_3 Scan time of module bus
- Shaded area: Status of process image (PII) undefined.

Front view



Wiring

- ▶ Signal lines do not have to be shielded.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules without C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Digital input/output (standard)

PSSu E S 4DI-D

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Input I1 12-22: Supply output S1 (12-22 linked within the base module) 13-23: Supply output S2 (13-23 linked within the base module) 14: Input I2 24: Input I3	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	21: Input I1 12-22: Supply output S1 (12-22-15-25 linked within the base module) 13-23: Supply output S2 (13-23-16-26 linked within the base module) 14: Input I2 24: Input I3 15-25: Supply output S1 (12-22-15-25 linked within the base module) 16-26: Supply output S2 (13-23-16-26 linked within the base module)	

Digital input/output (standard)
PSSu E S 4DI-D

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Input I0 21: Input I1	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	12-22: Supply output S1 (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Input I2 24: Input I3 15-25: Supply output S2 (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Digital input/output (standard)
PSSu E S 4DI-D

Connection

Input circuit	Without C-rail	With C-rail
Sensors are supplied via supply outputs S1 and S2 with four connection levels Allocation: Supply output S1: I0 + I1 Supply output S2: I2 + I3		
Sensors are supplied via supply outputs S1 and S2 with six connection levels Allocation: Supply output S1: I0 + I1 Supply output S2: I2 + I3		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Digital input/output (standard)

PSSu E S 4DI-D

Technical details	
Application range	Standard
Module's device code	0210h
Number of ST input bits	4
Number of ST status bits	8
Support in system environment A	
from ST firmware version for other head modules	17
from ST firmware version PSSu H S PN	2
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	60 mA
Module's power consumption	0.30 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	25 mA
Module's power consumption with no load	0.60 W
Max. power dissipation of the module	1.50 W
Inputs	
Number	4
Input voltage	24 V DC
Input current	3.0 - 10.0 mA
Min. threshold voltage when signal changes from "1" to "0"	8.0 V
Max. threshold voltage when signal changes from "0" to "1"	10.0 V
Potential isolation between input and voltage for the internal module bus	yes
Outputs	
Number of outputs for periphery supply	2
Function	Sensor supply
Short-circuit proof	yes
Potential isolation between output and voltage for the internal module bus	yes
Max. output current at rated voltage	0.25 A
Permitted loads	inductive, capacitive, resistive
Times	
Max. processing time for input when signal changes from "1" to "0"	4.00 ms
Max. processing time for input when signal changes from "0" to "1"	4.00 ms
Min. processing time for input when signal changes from "1" to "0"	3.00 ms
Min. processing time for input when signal changes from "0" to "1"	3.00 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g

Digital input/output (standard)

PSSu E S 4DI-D

Environmental data

Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms

Protection type in accordance with **EN 60529**

Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20

Airgap creepage in accordance with **EN 60664-1**

Overvoltage category	II
Pollution degree	2

Mechanical data

Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	32 g
Mechanical coding	
Type	A
Colour	dark grey

The standards current on **2008-03** apply.

Order reference

Description	Order no.
PSSu E S 4DI-D (Electronic module)	312 401

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623

Digital input/output (standard)

PSSu E S 4DO 0.5(-T)



Electronic module with digital outputs for standard applications

Approvals

	PSSu E S 4DO 0.5
	◆

Module features

- ▶ **4 Digital outputs**
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **0.50 A**
 - Short circuit-proof
 - Overload-proof
- ▶ **LEDs for:**
 - Switch status of each output
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 4DO 0.5-T**: for increased environmental requirements

Module description

The module provides type 1 outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may be used for standard applications in system environment A and B.

The module **PSSu E S 4DO 0.5-T** is suitable for use where there are increased environmental requirements (see Technical Details).

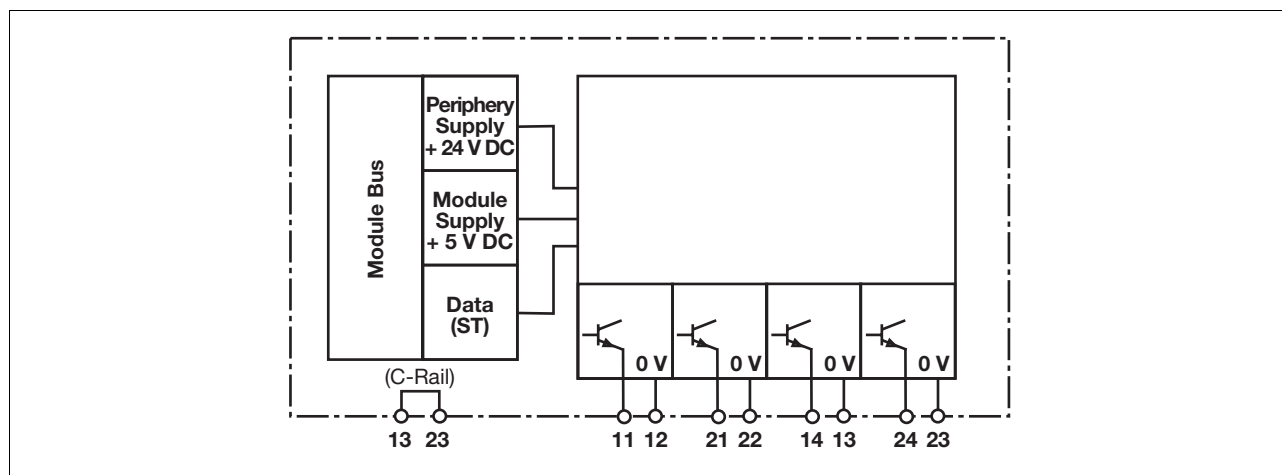
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Digital input/output (standard) PSSu E S 4DO 0.5(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "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

Periphery supply

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

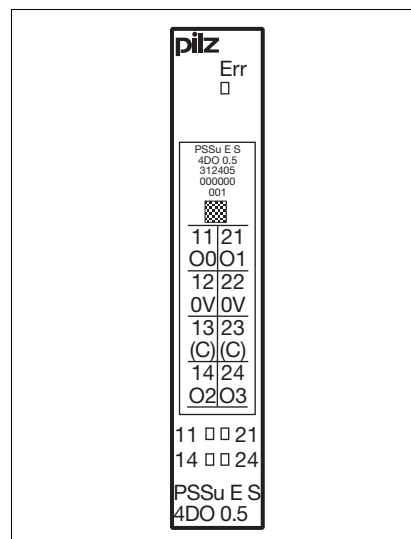
Outputs

- ▶ The head module sets the output status via the module bus.

Wiring

- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

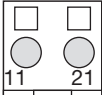
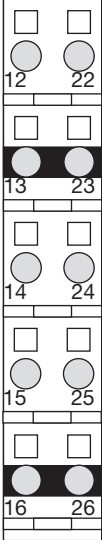
Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail:	
	11: Output O0	11 21
	21: Output O1	21 21
	12-22: 0 V periphery supply (12-22 linked within the base module)	12 22
	13-23: 0 V periphery supply (13-23 linked within the base module)	13 23
	14: Output O2	14 24
	24: Output O3	24 24
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail:	
	11: Output O0	11 21
	21: Output O1	21 21
	12-22: 0 V periphery supply (12-22 linked within the base module)	12 22
	13-23: C-rail supply (13-23 linked within the base module)	13 23
	14: Output O2	14 24
	24: Output O3	24 24

Digital input/output (standard)
PSSu E S 4DO 0.5(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Output O2 24: Output O3 15-25: 0 V periphery supply (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Digital input/output (standard)
PSSu E S 4DO 0.5(-T)

Connection

Output circuit	Without C-rail	With C-rail
Single-channel actuator Base modules with four connection levels		
Single-channel actuator Base modules with six connection levels		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Digital input/output (standard)

PSSu E S 4DO 0.5(-T)

Technical details	
Application range	Standard
Module's device code	0401h
Number of ST output bits	4
Support in system environment A	
from ST firmware version for other head modules	5
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	20 mA
Module's power consumption	0.10 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	18 mA
Module's power consumption with no load	0.43 W
Max. power dissipation of the module	1.50 W
Outputs	
Number of positive-switching single-pole semiconductor outputs	4
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	0.50 A
Permitted current range	0.00 - 0.62 A
Max. pulsed current for $t < 100$ ms	6 A
Residual current at "0" signal	0.02 mA
Permitted loads	inductive, capacitive, resistive
Times	
Max. processing time for semiconductor output when signal changes from "1" to "0"	0.500 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms

Digital input/output (standard)

PSSu E S 4DO 0.5(-T)

Environmental data

Protection type in accordance with **EN 60529**

Mounting (e.g. cabinet)

IP54

Housing

IP20

Terminals

IP20

Airgap creepage in accordance with **EN 60664-1**

Overvoltage category

II

Pollution degree

2

Mechanical data

Housing material

Front

PC

Bottom

PC

Coding

PA

Dimensions

Height

76.0 mm

Width

12.6 mm

Depth

60.2 mm

Weight

33 g

Mechanical coding

Type

B

Colour

dark grey

The standards current on **2005-04** apply.

Order reference

Description

Order no.

PSSu E S 4DO 0.5

312 405

(Electronic module)

PSSu E S 4DO 0.5-T

314 405

(Electronic module, coated version)

Base modules

Order no.

PSSu BP 1/8S

312 600

(Base module without C-rail with screw terminals)

PSSu BP 1/8S-T

314 600

(Base module without C-rail with screw terminals, coated version)

PSSu BP 1/8C

312 601

(Base module without C-rail with cage clamp terminals)

PSSu BP 1/8C-T

314 601

(Base module without C-rail with cage clamp terminals, coated version)

PSSu BP-C 1/8S

312 610

(Base module with C-rail and screw terminals)

PSSu BP-C 1/8S-T

314 610

(Base module with C-rail and screw terminals, coated version)

PSSu BP-C 1/8C

312 611

(Base module with C-rail and cage clamp terminals)

PSSu BP-C 1/8C-T

314 611

(Base module with C-rail and cage clamp terminals, coated version)

PSSu BP 1/12S

312 618

(Base module without C-rail with screw terminals)

PSSu BP 1/12S-T

314 618

(Base module without C-rail with screw terminals, coated version)

PSSu BP 1/12C

312 619

(Base module without C-rail with cage clamp terminals)

Digital input/output (standard)

PSSu E S 4DO 0.5(-T)

Base modules	Order no.
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (standard)

PSSu E S 4DO 0.5-(T)D



Electronic module with digital outputs and expanded diagnostics for standard applications

Approvals

	PSSu E S 4DO 0.5-D
	◆

Module features

- ▶ **4 Digital outputs**
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **0.50 A**
 - Short circuit-proof
 - Overload-proof
- ▶ **LEDs for:**
 - Switch status of each output
 - Module error
- ▶ For standard applications in system environment A
- ▶ Communication via:
 - Standard fieldbus
- ▶ The module provides advanced diagnostic data.

Module description

The module provides type 1 outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may be used for standard applications in system environment A. The module **PSSu E S 4DO 0.5-TD** is suitable for use where there are increased environmental requirements (see Technical Details).

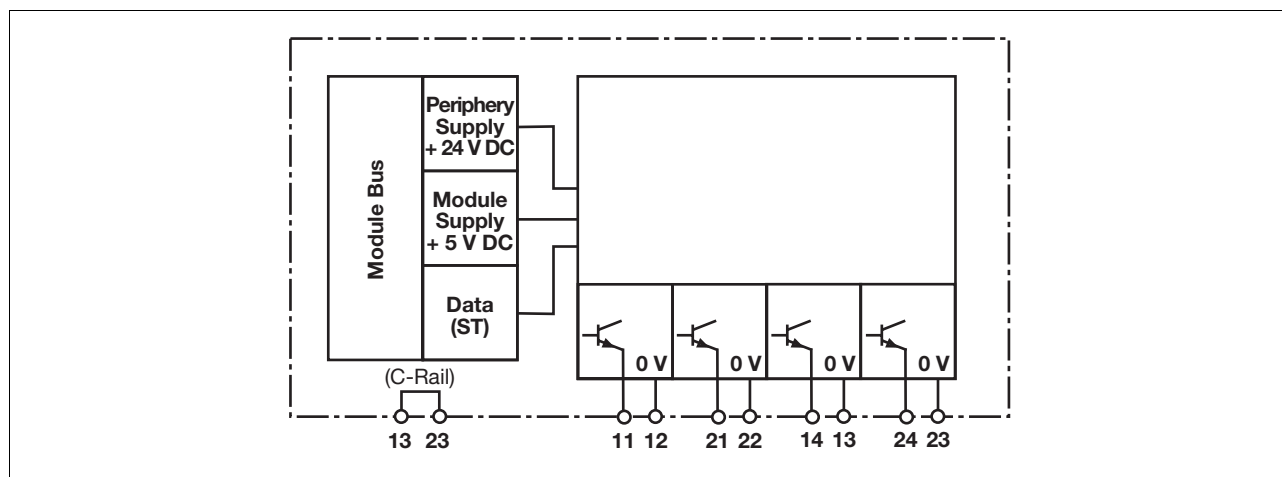
Integrated protection mechanisms

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

The module provides the following diagnostic data:

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

Block diagram



Digital input/output (standard)

PSSu E S 4DO 0.5-(T)D

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "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

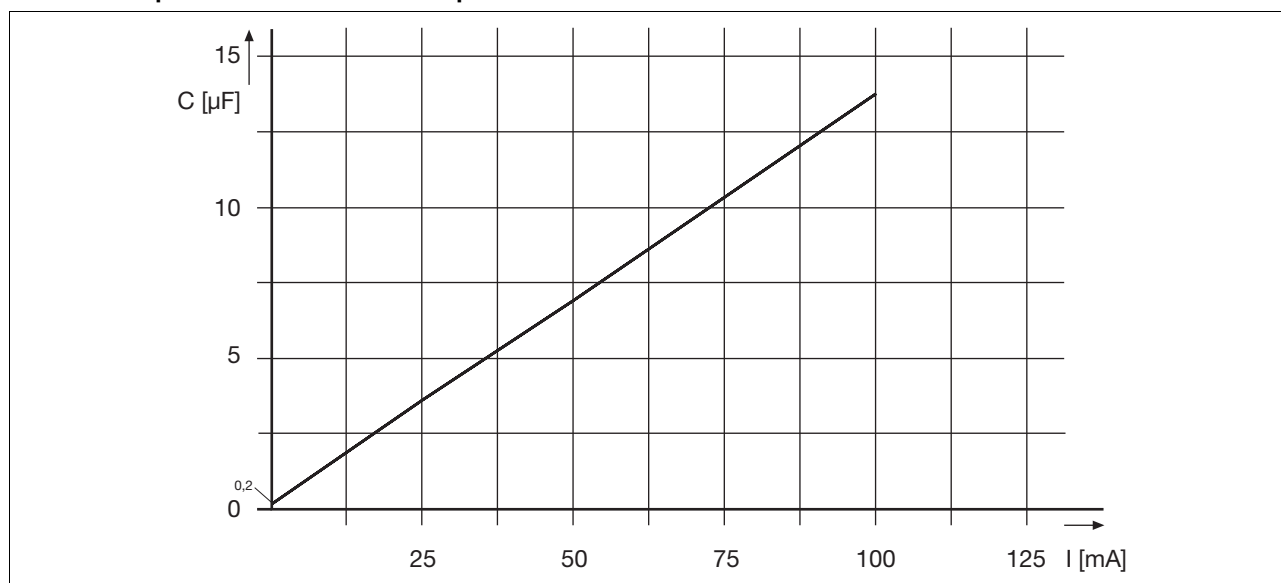
Periphery supply

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

Outputs

- ▶ The head module sets the output status via the module bus.
- The module provides advanced diagnostic data, which is also available in a status byte in the ST-PII:
- ▶ Output overload/short circuit
 - ▶ Excess module temperature

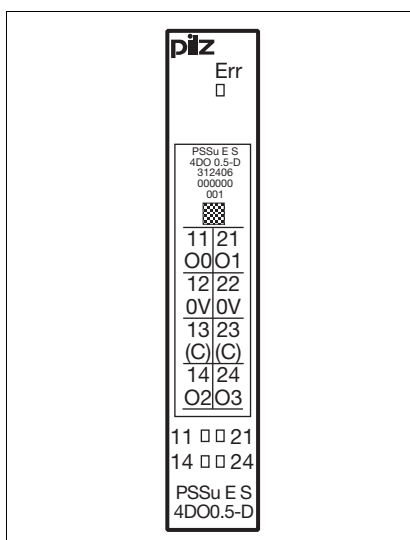
Permitted capacitive load based on output current



Wiring

- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Digital input/output (standard)

PSSu E S 4DO 0.5-(T)D

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: 0 V periphery supply (13-23 linked within the base module) 14: Output O2 24: Output O3	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23 linked within the base module) 14: Output O2 24: Output O3	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Output O2 24: Output O3 15-25: 0 V periphery supply (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Digital input/output (standard)
PSSu E S 4DO 0.5-(T)D

Connection

Output circuit	Without C-rail	With C-rail
Single-channel actuator Base modules with four connection levels		
Single-channel actuator Base modules with six connection levels		

NOTICE

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Digital input/output (standard)

PSSu E S 4DO 0.5-(T)D

Technical details

Application range	Standard
Module's device code	0411h
Number of ST output bits	4
Number of ST status bits	8
Support in system environment A	
from ST firmware version for other head modules	16
from ST firmware version PSSu H S PN	1
Support in system environment B	no

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	60 mA
Module's power consumption	0.30 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	30 mA
Module's power consumption with no load	0.72 W
Max. power dissipation of the module	1.50 W

Outputs

Number of positive-switching single-pole semiconductor outputs	4
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	0.50 A
Permitted current range	0.00 - 0.62 A
Max. pulsed current for $t < 100$ ms	6 A
Residual current at "0" signal	0.02 mA
Max. output current with 1 output under load	2.0 A
Max. output current with 2 outputs under load	1.5 A
Typ. threshold value for overload	8 A
Permitted loads	inductive, capacitive, resistive

Times

Max. processing time for semiconductor output when signal changes from "1" to "0"	0.500 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms

Environmental data

Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)
Max. operating height above sea level	2000 m
	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
	10 - 1,000 Hz coated version (-T)
Max. acceleration	1g
	5g coated version (-T)

Digital input/output (standard)

PSSu E S 4DO 0.5-(T)D

Environmental data	
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	25g coated version (-T)
	16 ms
	6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	34 g
	35 g coated version (-T)
Mechanical coding	
Type	B
Colour	dark grey

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

Order reference	
Description	Order no.
PSSu E S 4DO 0.5-D (Electronic module)	312 406
PSSu E S 4DO 0.5-TD (Electronic module, coated version)	314 406

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611

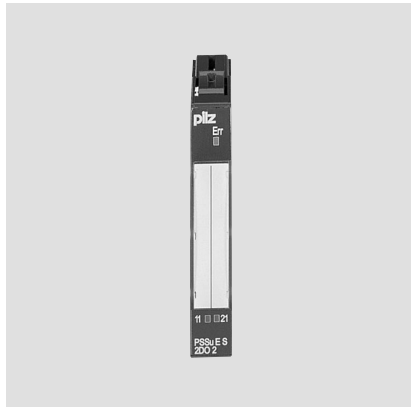
Digital input/output (standard)

PSSu E S 4DO 0.5-(T)D

Base modules	Order no.
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (standard)

PSSu E S 2DO 2(-T)



Electronic module with digital outputs for standard applications

Approvals

	PSSu E S 2DO 2
	◆

Module features

- ▶ **2 Digital outputs**
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **2.00 A**
 - Short circuit-proof
 - Overload-proof
- ▶ **LEDs for:**
 - Switch status of each output
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 2DO 2-T**: for increased environmental requirements

Module description

The module provides type 1 outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may be used for standard applications in system environment A and B.

The module **PSSu E S 2DO 2-T** is suitable for use where there are increased environmental requirements (see Technical Details).

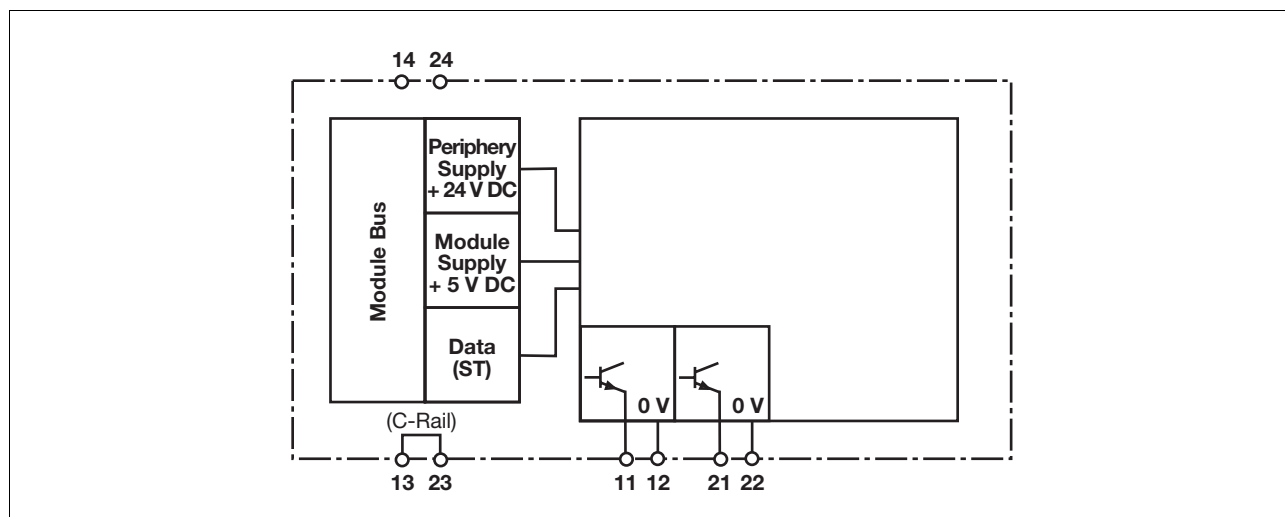
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Digital input/output (standard) PSSu E S 2DO 2(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "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

Periphery supply

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

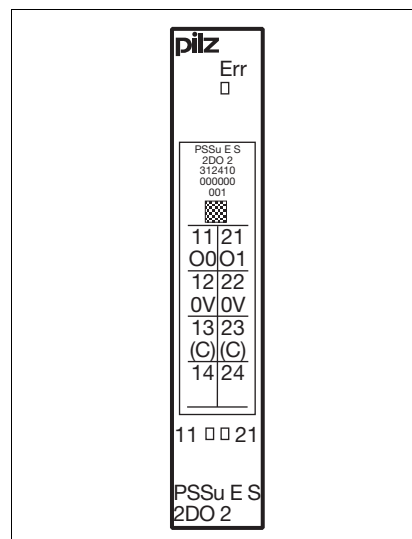
Outputs

- ▶ The head module sets the output status via the module bus.

Wiring

- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail:	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1	
	12-22: 0 V periphery supply (12-22 linked within the base module)	
	13-23: 0 V periphery supply (13-23 linked within the base module)	
	14: Not connected	
	24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail:	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1	
	12-22: 0 V periphery supply (12-22 linked within the base module)	
	13-23: C-rail supply (13-23 linked within the base module)	
	14: Not connected	
	24: Not connected	

Digital input/output (standard)
PSSu E S 2DO 2(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Output O0 21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Not connected 24: Not connected 15-25: 0 V periphery supply (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Connection

Output circuit	Without C-rail	With C-rail
Single-channel actuator		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Digital input/output (standard)

PSSu E S 2DO 2(-T)

Technical details

Application range	Standard
Module's device code	0400h
Number of ST output bits	2
Support in system environment A	
from ST firmware version for other head modules	5
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module ST firmware version	1.0.0

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	18 mA
Module's power consumption	0.09 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	1.50 W

Outputs

Number of positive-switching single-pole semiconductor outputs	2
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	2.00 A
Permitted current range	0.00 - 2.50 A
Max. pulsed current for $t < 100$ ms	12 A
Residual current at "0" signal	0.01 mA
Permitted loads	inductive, capacitive, resistive

Times

Max. processing time for semiconductor output when signal changes from "1" to "0"	0.600 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms

Environmental data

Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms

Digital input/output (standard)

PSSu E S 2DO 2(-T)

Environmental data	
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	32 g
Mechanical coding	
Type	C
Colour	dark grey

The standards current on **2005-04** apply.

Order reference	
Description	Order no.
PSSu E S 2DO 2 (Electronic module)	312 410
PSSu E S 2DO 2-T (Electronic module, coated version)	314 410

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619

Digital input/output (standard)

PSSu E S 2DO 2(-T)

Base modules	Order no.
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (standard) PSSu E S 2DO 2-(T)D



Electronic module with digital outputs and expanded diagnostics for standard applications

Approvals

	PSSu E S 2DO 2-D
	◆

Module features

- ▶ **2 Digital outputs**
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **2.00 A**
 - Short circuit-proof
 - Overload-proof
- ▶ **LEDs for:**
 - Switch status of each output
 - Module error
- ▶ For standard applications in system environment A
- ▶ Communication via:
 - Standard fieldbus
- ▶ The module provides advanced diagnostic data.

Module description

The module provides type 1 outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may be used for standard applications in system environment A. The module **PSSu E S 2DO 2-TD** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

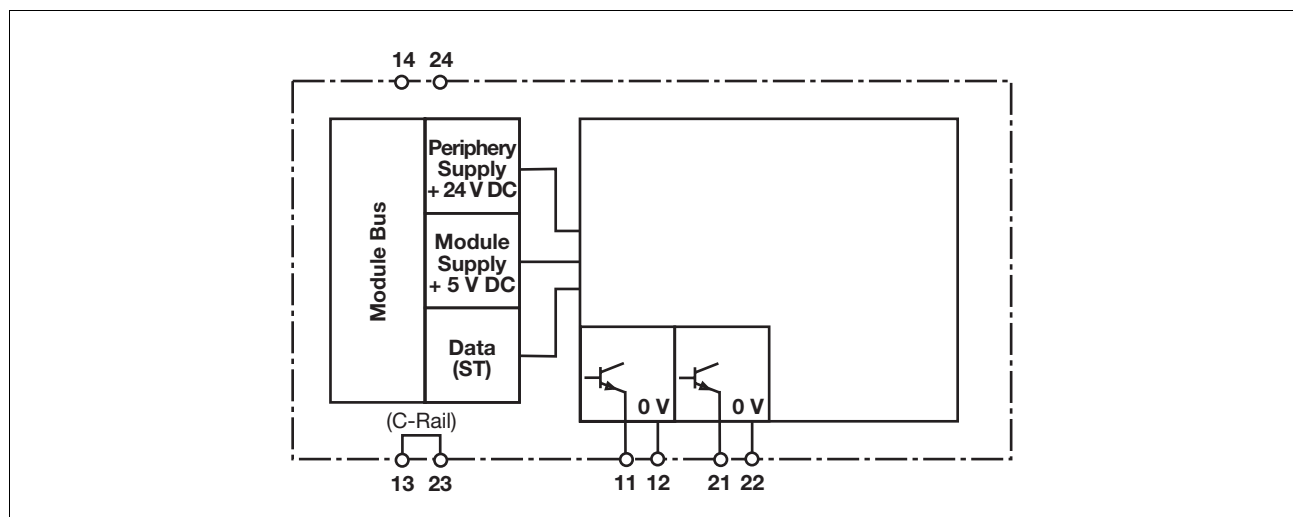
When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

The module provides the following diagnostic data:

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

3.4

Block diagram



Digital input/output (standard) PSSu E S 2DO 2-(T)D

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "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

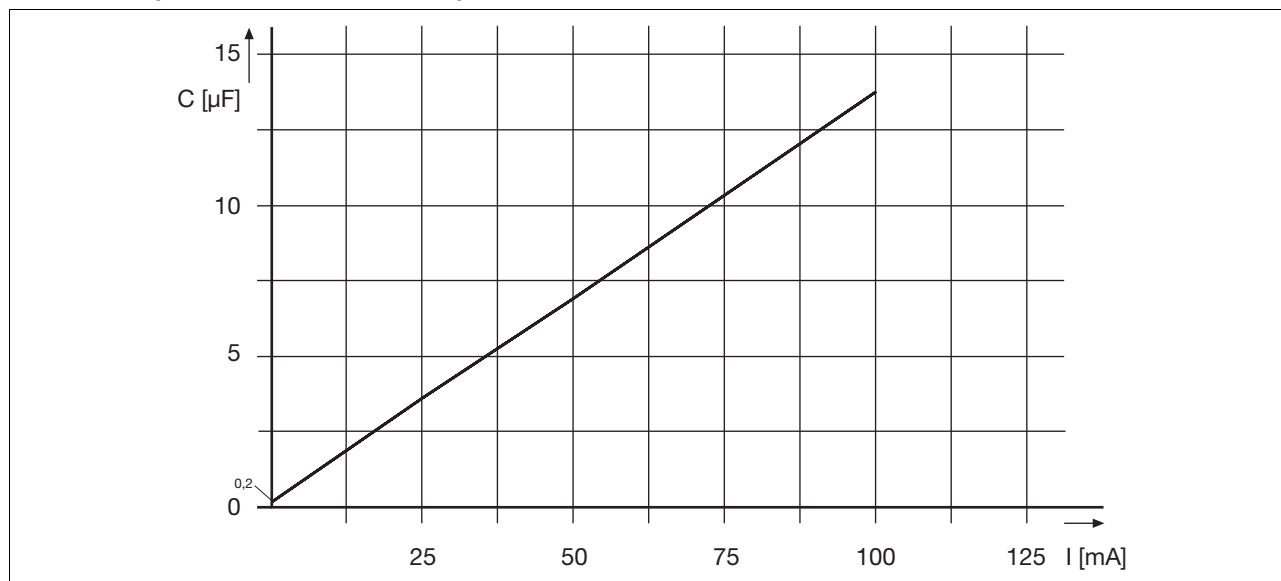
Periphery supply

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

Outputs

- ▶ The head module sets the output status via the module bus.
- The module provides advanced diagnostic data, which is also available in a status byte in the ST-PII:
- ▶ Output overload/short circuit
 - ▶ Excess module temperature

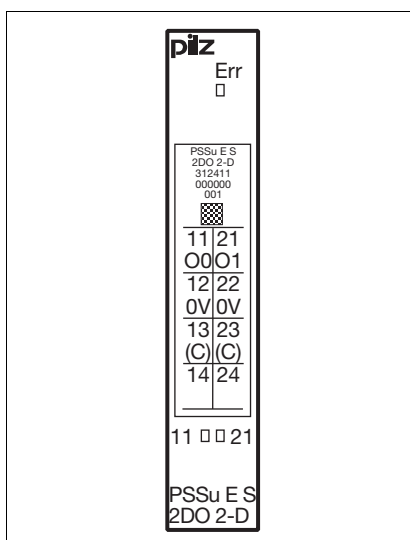
Permitted capacitive load based on output current



Wiring

- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Digital input/output (standard)

PSSu E S 2DO 2-(T)D

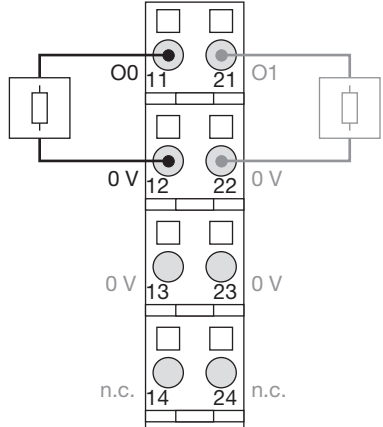
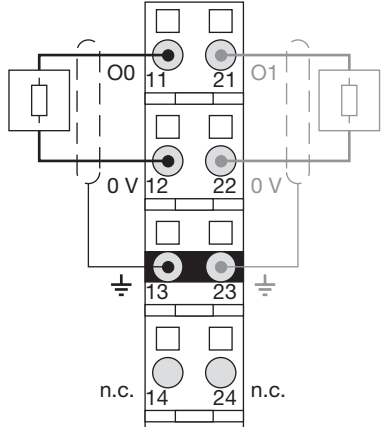
Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: 0 V periphery supply (13-23 linked within the base module) 14: Not connected 24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23 linked within the base module) 14: Not connected 24: Not connected	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Not connected 24: Not connected 15-25: 0 V periphery supply (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Digital input/output (standard)

PSSu E S 2DO 2-(T)D

Connection

Output circuit	Without C-rail	With C-rail
Single-channel actuator		

NOTICE

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Standard
Module's device code	0410h
Number of ST output bits	2
Number of ST status bits	8
Support in system environment A	
from ST firmware version for other head modules	16
from ST firmware version PSSu H S PN	1
Support in system environment B	no

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	40 mA
Module's power consumption	0.20 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	20 mA
Module's power consumption with no load	0.48 W
Max. power dissipation of the module	1.50 W

Outputs

Number of positive-switching single-pole semiconductor outputs	2
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	2.00 A
Permitted current range	0.00 - 2.50 A
Max. pulsed current for $t < 100$ ms	12 A
Residual current at "0" signal	0.01 mA
Max. output current with 1 output under load	3.5 A
Typ. threshold value for overload	13 A
Permitted loads	inductive, capacitive, resistive

Digital input/output (standard)

PSSu E S 2DO 2-(T)D

Times	
Max. processing time for semiconductor output when signal changes from "1" to "0"	0.600 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)
Max. operating height above sea level	2000 m
	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
	10 - 1,000 Hz coated version (-T)
Max. acceleration	1g
	5g coated version (-T)
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	25g coated version (-T)
	16 ms
	6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	33 g
	34 g coated version (-T)
Mechanical coding	
Type	C
Colour	dark grey

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

Digital input/output (standard)

PSSu E S 2DO 2-(T)D

Order reference

Description	Order no.
PSSu E S 2DO 2-D (Electronic module)	312 411
PSSu E S 2DO 2-TD (Electronic module, coated version)	314 411

Base modules

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (standard)

PSSu E S 2DOR 2(-T)



Electronic module with relay outputs for standard applications

Approvals

	PSSu E S 2DOR 2
	◆

Module features

- ▶ **2 relay contacts**
 - Normally open contact
 - Volt-free
 - Current load capacity per output: **2.0 A**
- ▶ LEDs for:
 - Switch status of each output
 - Module error
- ▶ For standard applications in system environment A
- ▶ Coated version of the module: **PSSu E S 2DOR 2-T**: for increased environmental requirements
- ▶ Communication via:
 - Standard fieldbus

Module description

The module provides type 1 relay outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads

The module may be used for standard applications in system environment A. The module **PSSu E S 2DOR 2-T** is suitable for use where there are increased environmental requirements (see Technical Details).

The module may **not** be used in combination with PSSu E F BSW(-T) modules in safety-related applications.

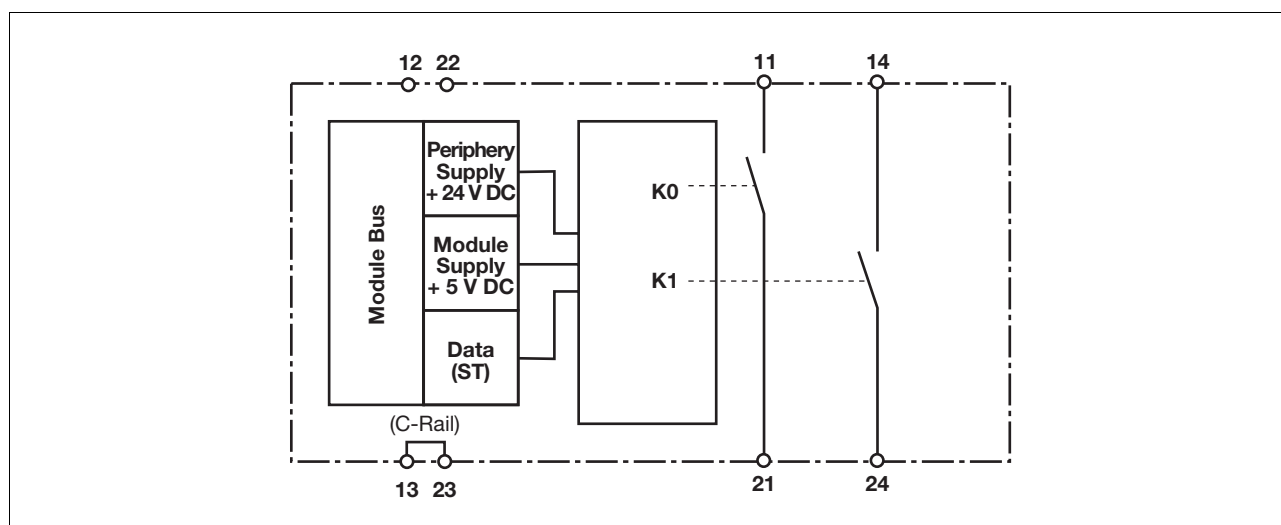
Integrated protection mechanisms

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

The module has the following protection mechanisms:

- ▶ Safe separation between both relay contacts (see Technical details)
 - ▶ Safe separation between both relay contacts and the periphery supply as well as the module supply, in accordance with DIN VDE 0110 over-voltage category 2 in a protected industrial network
 - ▶ Temperature monitoring
- The module provides the following diagnostic data:
- ▶ Start-up error
 - ▶ Configuration error
 - ▶ ST communication error
 - ▶ Bus termination error
 - ▶ Temperature error: too warm
 - ▶ Temperature error: too hot

Block diagram



Digital input/output (standard)
PSSu E S 2DOR 2(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Outputs

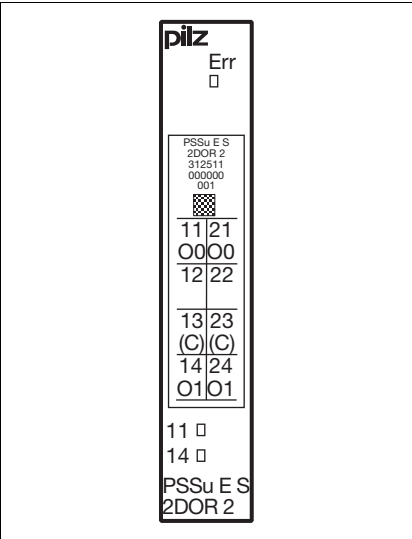
- ▶ The head module sets the output status via the module bus.

Wiring

- ▶ The C-rail of the supply group may only be connected to the protective earth (PE).
- ▶ The actuators may be connected using unshielded cables.
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see Technical details).

- ▶ With inductive loads, sufficient fuse protection must be provided on all output contacts.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

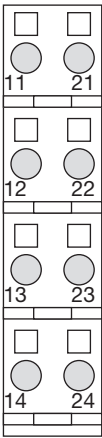
Front view



3.4

Terminal configuration

Base module	Terminal configuration
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0 Relay contact 1
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O0 Relay contact 1 12–22: Not connected 13–23: Not connected (13–23 linked within the base module) 14 Output O1 Relay contact 2 24: Output O1 Relay contact 2



Digital input/output (standard)
PSSu E S 2DOR 2(-T)

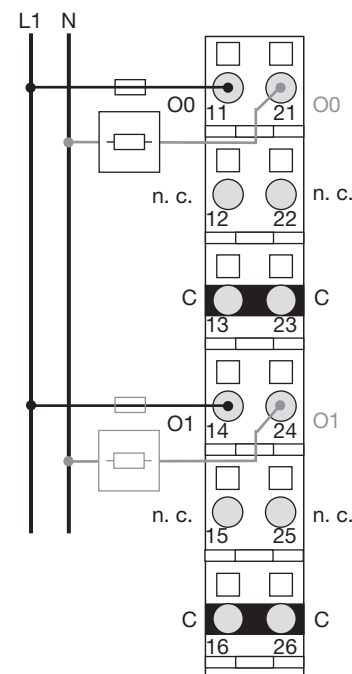
Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Output O0 Relay contact 1	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	21: Output O0 Relay contact 1	
	12-22: Not connected	
	13-23: C-rail supply (13-23-16-26 linked within the base module)	
	14 Output O1 Relay contact 2	
	24: Output O1 Relay contact 2	
	15-25: Not connected	
	16-26: C-rail supply (13-23-16-26 linked within the base module)	

Connection

Output circuit	Without C-rail
Resistive load Switches 230 VAC	

Digital input/output (standard)

PSSu E S 2DOR 2(-T)

Output circuit	With C-rail
Resistive load Switches 230 VAC	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0404h
Number of ST output bits	2
Support in system environment A	
from ST firmware version for other head modules	16
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	9
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	19 mA
Module's power consumption	0.09 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	42 mA
Module's power consumption with no load	1.00 W
Max. power dissipation of the module	1.50 W
Outputs	
Number of relay outputs	2
Contact material	AgSnO2
External contact fuse protection ($I_K = 1 \text{ kA}$) to EN 60947-5-1	
quick	6 A
slow	4 A

Digital input/output (standard)

PSSu E S 2DOR 2(-T)

Outputs	
Potential isolation between relay contact and periphery supply	4900 V (safe separation)
Potential isolation between relay contact and module supply	4900 V (safe separation)
Potential isolation between relay contact and C-rail	3050 V (basic insulation)
Potential isolation between relay contact 1 and relay contact 2	4900 V (safe separation)
Utilisation category in accordance with EN 60947-4-1	
Relay contacts: AC1 at 250 V	$I_{min}: 15.00 \text{ mA}$, $I_{max}: 2.0 \text{ A}$ $P_{max}: 480 \text{ VA}$
Relay contacts: DC1 at 24 V	$I_{min}: 15.00 \text{ mA}$, $I_{max}: 2.0 \text{ A}$ $P_{max}: 48 \text{ W}$
Utilisation category in accordance with EN 60947-5-1	
Relay contacts: AC15 at 230 V	$I_{max}: 1.5 \text{ A}$
Relay contacts: DC13 at 24 V (6 cycles/min)	$I_{max}: 1.5 \text{ A}$
Switching capability in accordance with UL 508	
240 V AC G. P.	2.0 A
24 V DC Resistive	2.0 A
Permitted loads	inductive, resistive
Times	
Max. processing time for relay output when signal changes from "1" to "0"	20 ms
Max. processing time for relay output when signal changes from "0" to "1"	15 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Max. ambient temperature in accordance with UL 508	60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2

Digital input/output (standard)

PSSu E S 2DOR 2(-T)

Mechanical data

Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	43 g
	44 g coated version (-T)
Mechanical coding	
Type	I
Colour	dark grey

The standards current on **2008-07** apply.

Order reference

Description	Order no.
PSSu E S 2DOR 2 (Electronic module)	312 511
PSSu E S 2DOR 2-T (Electronic module, coated version)	314 511

Base modules

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619

Digital input/output (standard)

PSSu E S 2DOR 2(-T)

Base modules	Order no.
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (standard)

PSSu E S 2DOR 10(-T)



Electronic module with relay outputs for standard applications

Approvals

	PSSu E S 2DOR 10
	◆

Module features

- ▶ **2 relay contacts**
 - Normally open contact
 - Volt-free
 - Current load capacity per output: **10.0 A**
- ▶ LEDs for:
 - Switch status of each output
 - Module error
- ▶ For standard applications in system environment A
- ▶ Coated version of the module: **PSSu E S 2DOR 10-T**: for increased environmental requirements
- ▶ Communication via:
 - Standard fieldbus

Module description

The module provides type 1 relay outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads

The module may be used for standard applications in system environment A. The module **PSSu E S 2DOR 10-T** is suitable for use where there are in-

creased environmental requirements (see Technical Details).

The module may **not** be used in combination with PSSu E F BSW(-T) modules in safety-related applications.

Integrated protection mechanisms

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

The module has the following protection mechanisms:

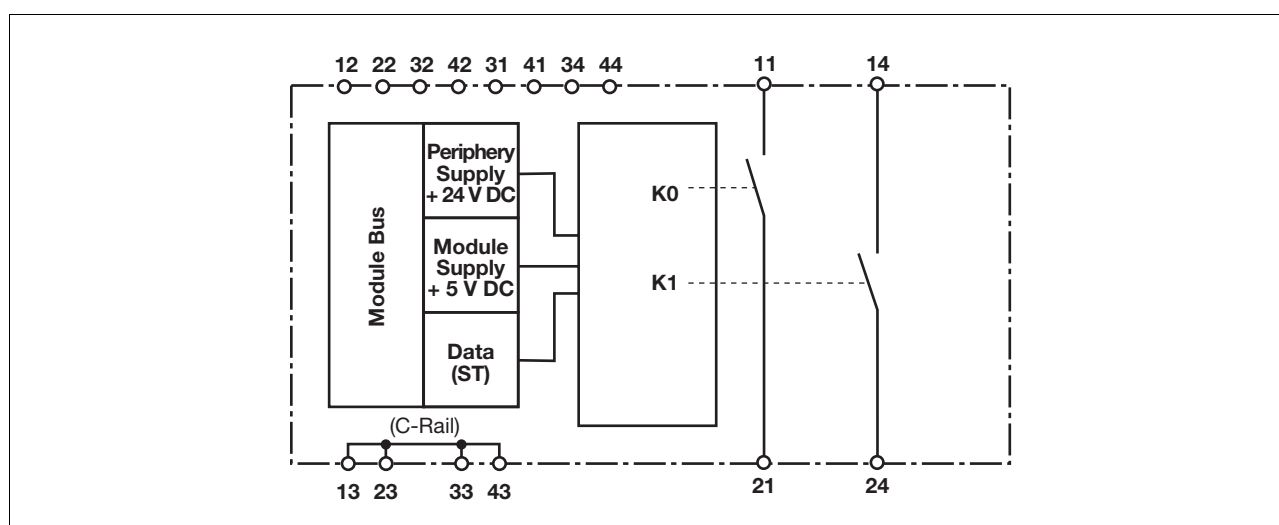
- ▶ Safe separation between both relay contacts (see Technical details)
- ▶ Safe separation between both relay contacts and the periphery supply as well as the module supply, in accordance with DIN VDE 0110 over-voltage category 2 in a protected industrial network

- ▶ Temperature monitoring

The module provides the following diagnostic data:

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

Block diagram



Digital input/output (standard)

PSSu E S 2DOR 10(-T)

Function description

Module supply

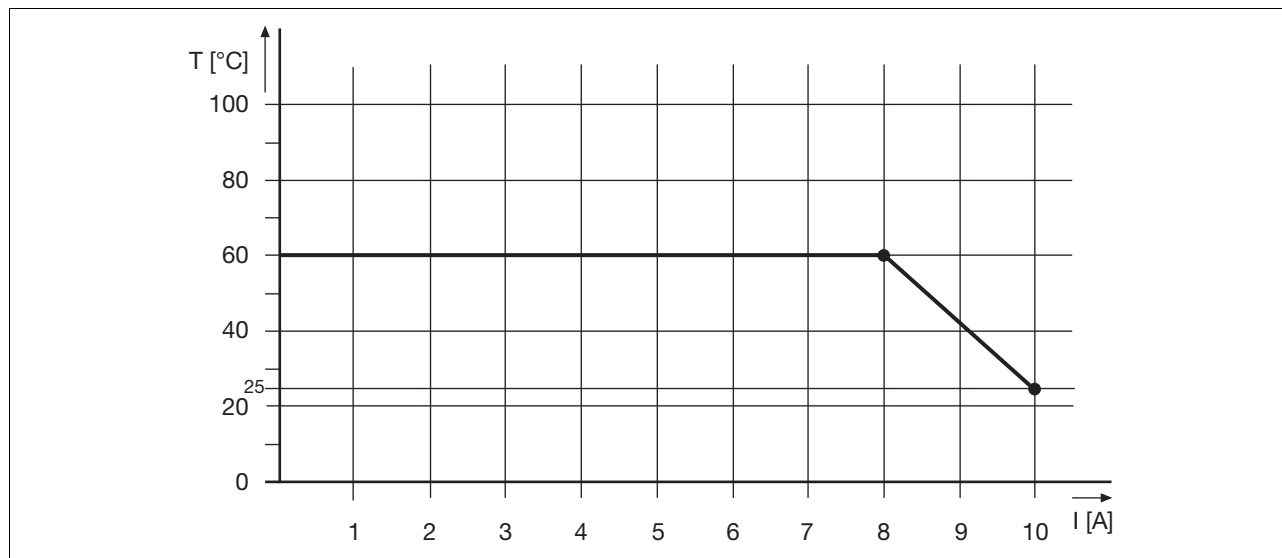
- ▶ The module supply provides the module with voltage.

Outputs

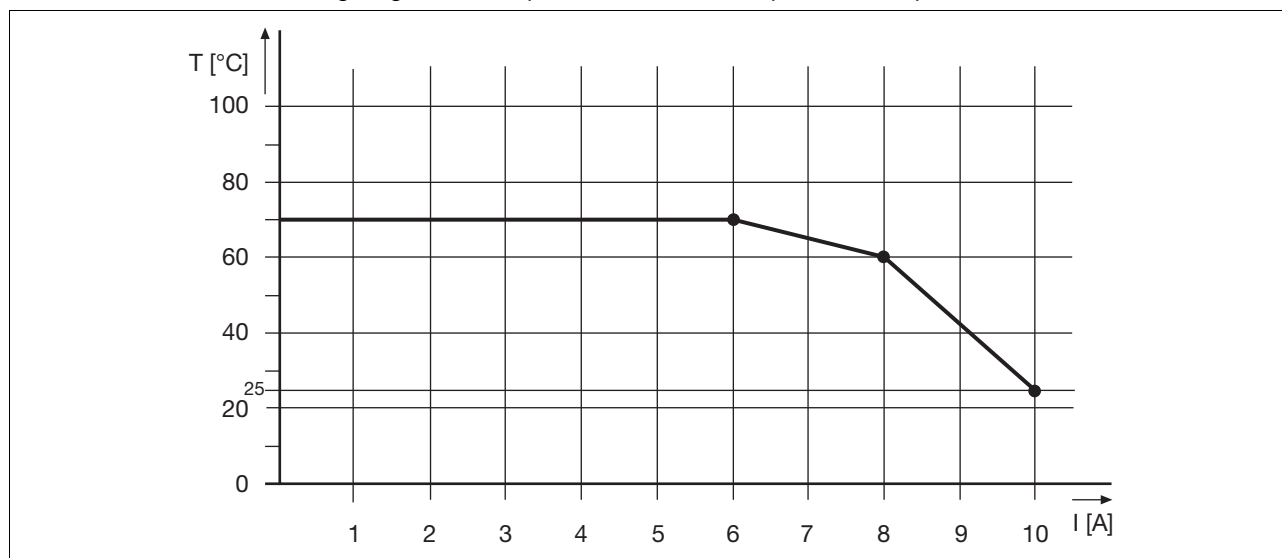
- ▶ The head module sets the output status via the module bus.
- ▶ The relationship between the load current and the operating temperature is illustrated in the following derating diagram. The operating point should be below the characteristic curve.

ture is illustrated in the following derating diagram. The operating point should be below the characteristic curve.

PSSu E S 2DOR 10: Derating diagram for the permitted ambient temperature T dependent on load current I



PSSu E S 2DOR 10-T: Derating diagram for the permitted ambient temperature T dependent on load current I

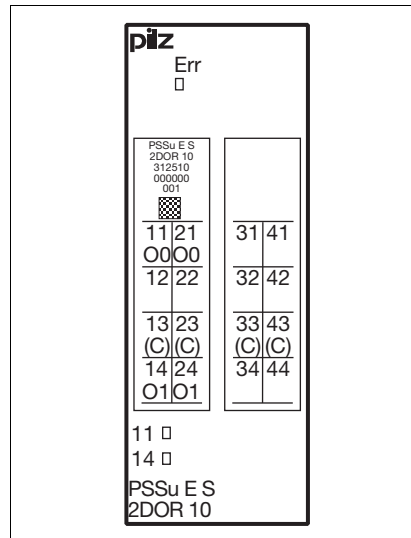


Digital input/output (standard) PSSu E S 2DOR 10(-T)

Wiring

- ▶ The actuators may be connected using unshielded cables.
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see Technical details).
- ▶ With inductive loads, sufficient fuse protection must be provided on all output contacts.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

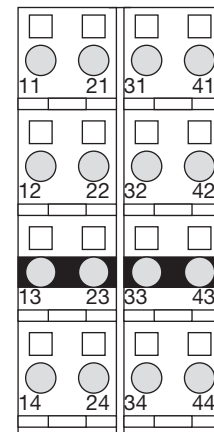
Front view



3.4

Terminal configuration

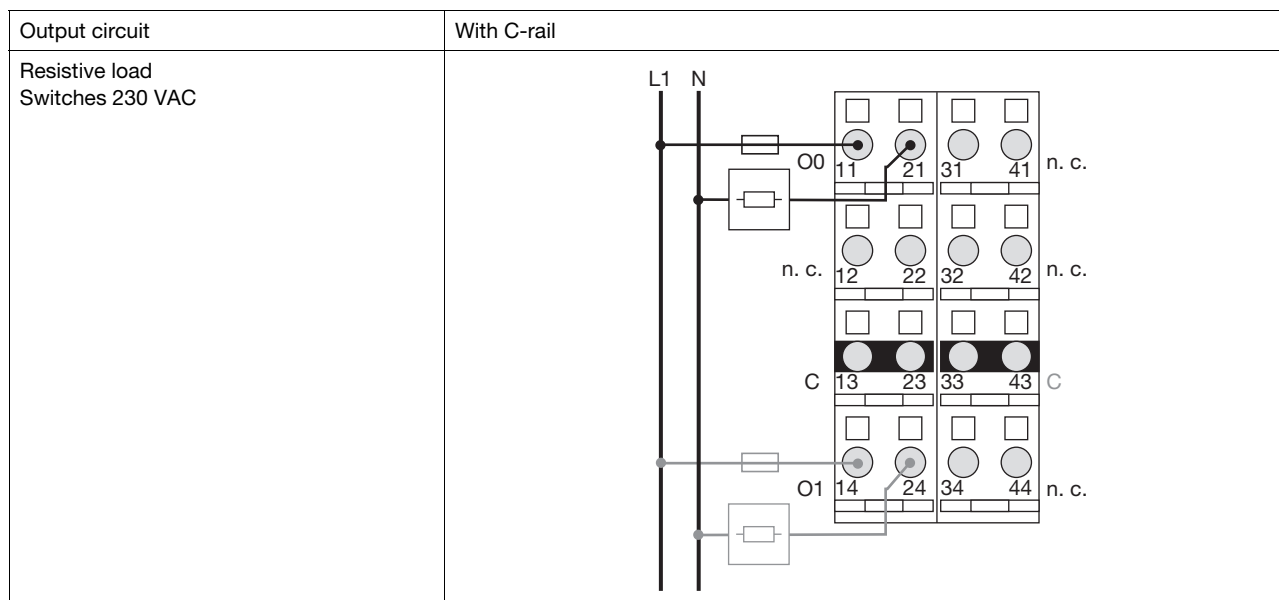
Base module	Terminal configuration
Screw terminals: PSSu BP-C 2/16S PSSu BP-C 2/16S-T	With C-rail: 11: Output O0 Relay contact 1 21: Output O0 Relay contact 1 12–22: Not connected 13–23: C-rail supply (13-23-33-43 linked within the base module) 14 Output O1 Relay contact 2 24: Output O1 Relay contact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



Digital input/output (standard)

PSSu E S 2DOR 10(-T)

Connection



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0403h
Number of ST output bits	2
Support in system environment A	
from ST firmware version for other head modules	16
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	9
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	19 mA
Module's power consumption	0.09 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	60 mA
Module's power consumption with no load	1.50 W
Max. power dissipation of the module	2.50 W
Outputs	
Number of relay outputs	2
Contact material	AgCuNi
External contact fuse protection ($I_K = 1 \text{ kA}$) to EN 60947-5-1	
quick	10 A
slow	6 A

Digital input/output (standard)

PSSu E S 2DOR 10(-T)

Outputs	
Potential isolation between relay contact and periphery supply	4900 V (safe separation)
Potential isolation between relay contact and module supply	4900 V (safe separation)
Potential isolation between relay contact and C-rail	3050 V (basic insulation)
Potential isolation between relay contact 1 and relay contact 2	4900 V (safe separation)
Utilisation category in accordance with EN 60947-4-1	
Relay contacts: AC1 at 250 V	$I_{min}: 10.00 \text{ mA}$, $I_{max}: 10.0 \text{ A}$ $P_{max}: 2400 \text{ VA}$
Relay contacts: DC1 at 24 V	$I_{min}: 10.00 \text{ mA}$, $I_{max}: 10.0 \text{ A}$ $P_{max}: 240 \text{ W}$
Utilisation category in accordance with EN 60947-5-1	
Relay contacts: AC15 at 240 V	$I_{max}: 6.0 \text{ A}$
Relay contacts: DC13 at 24 V (6 cycles/min)	$I_{max}: 2.0 \text{ A}$
Switching capability in accordance with UL 508	
240 V AC G. P.	4.0 A
24 V DC G. P. Resistive	4.0 A
24 V DC Pilot Duty	3.0 A
Permitted loads	inductive, resistive
Times	
Max. processing time for relay output when signal changes from "1" to "0"	25 ms
Max. processing time for relay output when signal changes from "0" to "1"	15 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Max. ambient temperature in accordance with UL 508	60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2

Digital input/output (standard)

PSSu E S 2DOR 10(-T)

Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.2 mm
Depth	60.2 mm
Weight	91 g
	92 g coated version (-T)
Mechanical coding	
Type	I
Colour	dark grey

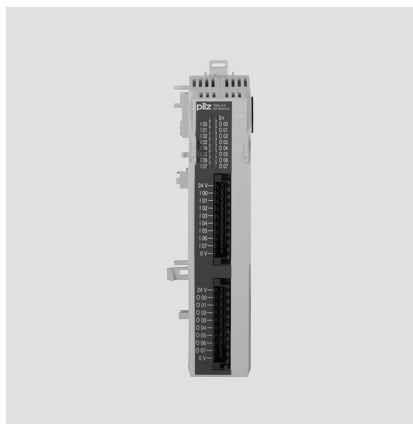
The standards current on **2008-07** apply.

Order reference	
Description	Order no.
PSSu E S 2DOR 10 (Electronic module)	312 510
PSSu E S 2DOR 10-T (Electronic module, coated version)	314 510

Base modules	Order no.
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16S-T (Base module without C-rail with screw terminals, coated version)	314 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP 2/16C-T (Base module without C-rail with cage clamp terminals, coated version)	314 629
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16S-T (Base module with C-rail and screw terminals, coated version)	314 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631
PSSu BP-C 2/16C-T (Base module with C-rail and cage clamp terminals, coated version)	314 631

Digital input/output (standard)

PSSu K S 8DI 8DO 0.5(-T)



Compact module with digital inputs/outputs for standard applications

Approvals

	PSSu K S 8DI 8DO 0.5
	◆

Module features

- ▶ **8** Digital inputs
 - ▶ **8** Digital outputs
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **0.50 A**
 - Short circuit-proof
 - Overload-proof
 - ▶ LEDs for:
 - Switch status of each input/output
 - Module error
 - ▶ Communication via:
 - Standard fieldbus
 - ▶ For standard applications in system environment A and B
- Accessories:
- ▶ Connector with spring-loaded terminals (necessary for operation)
 - ▶ Labelling bracket
 - ▶ Labelling strips (sheets)

Module description

The module provides type 1 inputs in accordance with IEC 61131-2. It may

be used as an input module for standard functions.

The module provides type 1 outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may **not** be used in combination with PSSu E F BSW(-T) modules in safety-related applications.

The module may be used for standard applications in system environment A and B.

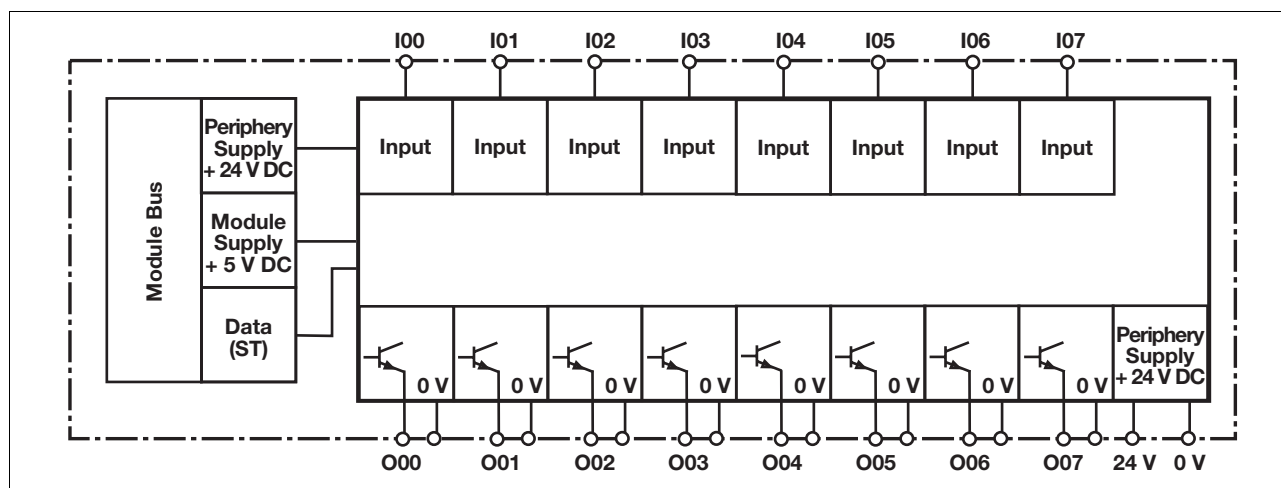
Integrated protection mechanisms

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

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error
- ▶ Temperature error

Block diagram



Digital input/output (standard) PSSu K S 8DI 8DO 0.5(-T)

Input function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The module routes the periphery supply from the module bus to the module's connector strips.
- ▶ The periphery supply is used to supply the sensors.

- ▶ The module does not switch the periphery supply.
- ▶ The periphery supply has no current limitation.

Inputs

- ▶ The input status is signalled to the head module via the module bus.
- ▶ The inputs have input filters.

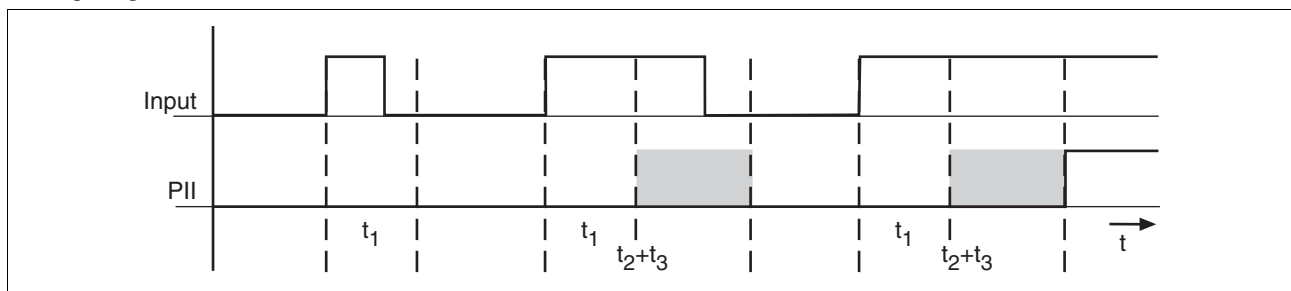
Signal detection at the inputs

- ▶ A signal ("0" signal or "1" signal) is always ignored if it is present for

less than the minimum processing time (see Technical details).

- ▶ A signal is always detected and transmitted to the process image (PII) if it is present for longer than the maximum processing time plus the scan time of the module bus ($t_2 + t_3$, see diagram and Technical details).

Timing diagram

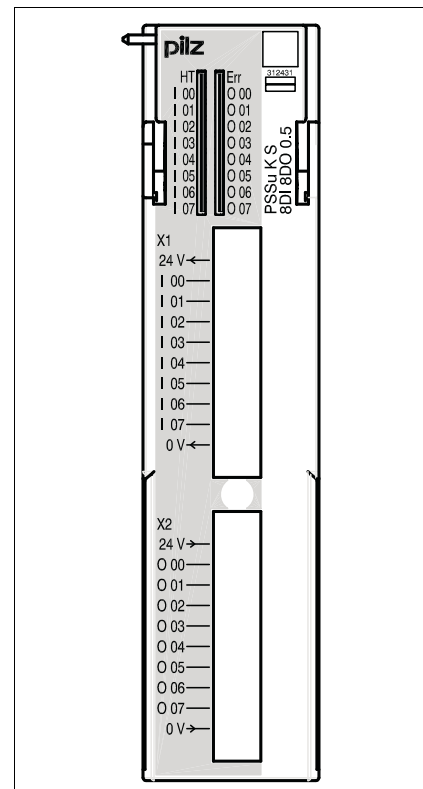


- ▶ Input: Signal at the input
 - ▶ PII: Status of process image (PII)
 - ▶ t_1 Minimum processing time (see Technical details)
 - ▶ t_2 Maximum processing time (see Technical details)
 - ▶ t_3 Scan time of module bus
- Shaded area: Status of process image (PII) undefined.

Wiring

- ▶ Signal lines do not have to be shielded.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.

Front view



Output function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "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

Periphery supply

- ▶ The Periphery Supply is not provided via the module bus, but it has to be fed via the connectors.
- ▶ The periphery supply is used to supply the outputs.

Outputs

- ▶ The head module sets the output status via the module bus.

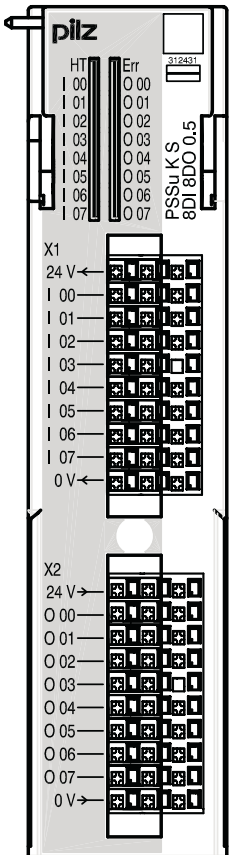
Digital input/output (standard) PSSu K S 8DI 8DO 0.5(-T)

Terminal configuration

	Terminal configuration	
Connector with spring-loaded terminals (1-row/10-pin): PSSu A Con 1/10 C	1. Terminals X1: 24 V: +24 V (periphery supply) I 00: Input 0 I 01: Input 1 I 02: Input 2 I 03: Input 3 I 04: Input 4 I 05: Input 5 I 06: Input 6 I 07: Input 7 0 V: 0 V (periphery supply) X2: 24 V: +24 V (external periphery supply) O 00: Output 0 O 01: Output 1 O 02: Output 2 O 03: Output 3 O 04: Output 4 O 05: Output 5 O 06: Output 6 O 07: Output 7 0 V: 0 V (external periphery supply)	

Digital input/output (standard)

PSSu K S 8DI 8DO 0.5(-T)

	Terminal configuration			
Connector with spring-loaded terminals (3-row/30-pin): PSSu A Con 3/30 C	1. Terminals	2. Terminals	3. Terminals	
	X1: 24 V: +24 V (periphery supply) I 00: Input 0 I 01: Input 1 I 02: Input 2 I 03: Input 3 I 04: Input 4 I 05: Input 5 I 06: Input 6 I 07: Input 7 0 V: 0 V (periphery supply)	X1: +24 V (periphery supply) is present at all 10 spring-loaded terminals. X2: +24 V (external periphery supply) is present at all 10 spring-loaded terminals.	X1: 0 V (periphery supply) is present at all 10 spring-loaded terminals. X2: 0 V (external periphery supply) is present at all 10 spring-loaded terminals.	
	X2: 24 V: +24 V (external periphery supply) O 00: Output 0 O 01: Output 1 O 02: Output 2 O 03: Output 3 O 04: Output 4 O 05: Output 5 O 06: Output 6 O 07: Output 7 0 V: 0 V (external periphery supply)			

Digital input/output (standard)
PSSu K S 8DI 8DO 0.5(-T)

Input connections

Input circuit	1-row/10-pin connector PSSu A Con 1/10 C	3-row/30-pin connector PSSu A Con 3/30 C
Single-wire technology		
Two-wire technology		
Three-wire technology		

3.4

Digital input/output (standard)
PSSu K S 8DI 8DO 0.5(-T)

Output connections

Input circuit	1-row/10-pin connector PSSu A Con 1/10 C	3-row/30-pin connector PSSu A Con 3/30 C
Single-wire technology		
Two-wire technology		
Three-wire technology		

Digital input/output (standard)

PSSu K S 8DI 8DO 0.5(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Standard
Module's device code	0630h
Number of ST input bits	8
Number of ST output bits	8
Support in system environment A	
from ST firmware version for other head modules	17
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	9
Support in system environment B	
from head module ST firmware version	1.2.0

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	45 mA
Module's power consumption	0.13 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	0 mA
Module's power consumption with no load	0.00 W

Inputs

Number	8
Input voltage	24 V DC
Input current	2.5 - 4.0 mA
Min. threshold voltage when signal changes from "1" to "0"	11.0 V
Max. threshold voltage when signal changes from "0" to "1"	12.0 V
Potential isolation between input and voltage for the internal module bus	yes

Outputs

Number of positive-switching single-pole semiconductor outputs	8
Short circuit-proof	yes
Potential isolation between semiconductor output and input	yes
Potential isolation between output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	0.50 A
Permitted current range	0.00 - 0.62 A
Max. pulsed current for $t < 100$ ms	6 A
Residual current at "0" signal	0.02 mA
Permitted loads	inductive, capacitive, resistive
Infeed for	Outputs
Voltage	24 V, DC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Max. unit fuse protection F1	10 A
Max. unit fuse protection F1 in according with UL508	4 A

Digital input/output (standard)

PSSu K S 8DI 8DO 0.5(-T)

Times	
Max. processing time for input when signal changes from "1" to "0"	4.00 ms
Max. processing time for input when signal changes from "0" to "1"	4.00 ms
Min. processing time for input when signal changes from "1" to "0"	3.00 ms
Min. processing time for input when signal changes from "0" to "1"	3.00 ms
Max. processing time for semiconductor output when signal changes from "1" to "0"	0.500 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 55011: class A, EN 61000-4-11, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-9
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Labelling bracket (accessories)	PC
Dimensions	
Height	128.9 mm
Width	30.0 mm
Depth	56.0 mm
Depth incl. connector (accessories)	69.5 mm
Depth incl. labelling bracket (accessories)	83.5 mm
Weight	87 g
Connector with spring-loaded terminals (accessories)	
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 1.50 mm ² , 22 - 16 AWG
Spring-loaded terminals: Terminal points per connection	1
Stripping length	8 mm

The standards current on **2005-04** apply.

Digital input/output (standard)**PSSu K S 8DI 8DO 0.5(-T)****Order reference****Description****Order no.**

PSSu K S 8DI 8DO 0.5
(Compact module without connector, labelling bracket and labelling strips)

312 431

Accessories**Order no.**

PSSu A Con 1/10 C, Scope of delivery: 2 pieces
(Connector with spring-loaded terminals, 1-row/10-pin)

313 115

PSSu A Con 3/30 C, Scope of delivery: 2 pieces
(Connector with spring-loaded terminals, 3-row/30-pin)

313 116

PSSu A LC 0.1, Scope of delivery: 5 pieces
(Labelling bracket)

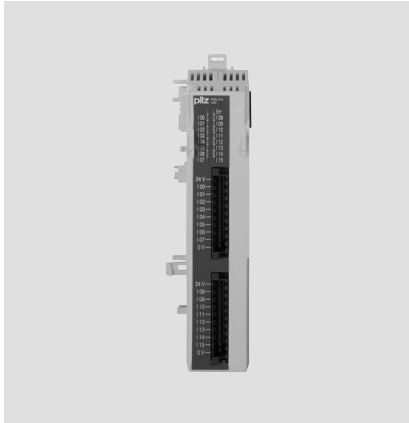
312 966

PSSu A LA0, Scope of delivery: 1080 pieces (10 x DIN A4 sheet, 108 on each)
(Labelling strips, laser printable)

312 958

Digital input/output (standard)

PSSu K S 16DI



Compact module with digital inputs for standard applications

Module features

- ▶ 16 Digital inputs
 - ▶ LEDs for:
 - Switch status of each input
 - Module error
 - ▶ 2 x 10-pin connector strip
 - ▶ Communication via:
 - Standard fieldbus
 - ▶ For standard applications in system environment A
- Accessories:
- ▶ Connector with spring-loaded terminals (necessary for operation)
 - ▶ Labelling bracket
 - ▶ Labelling strips (sheets)

Module description

The module provides type 1 inputs in accordance with IEC 61131-2. It may be used as an input module for standard functions.

The module may **not** be used in combination with PSSu E F BSW(-T) modules in safety-related applications.

The module may be used for standard applications in system environment A.

Integrated protection mechanisms

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

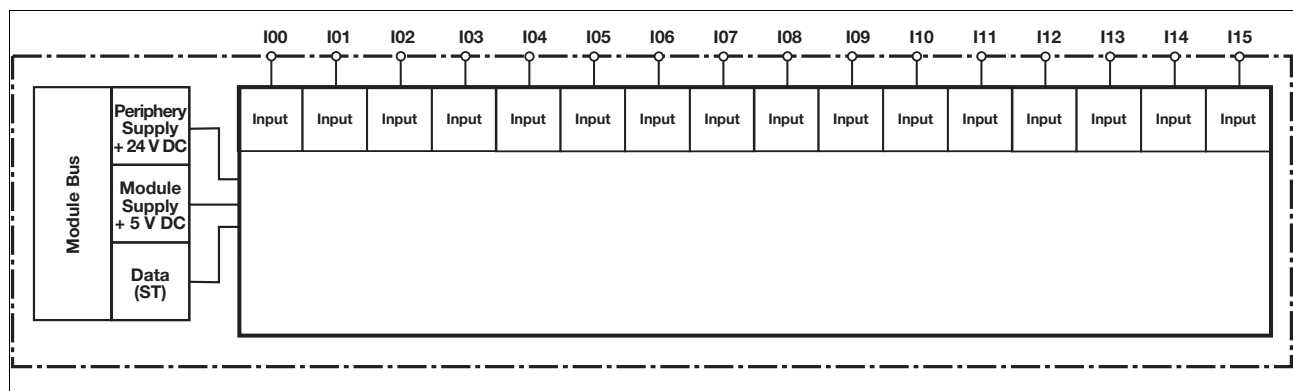
The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error
- ▶ Temperature error

Approvals

	PSSu K S 16DI
	◆

Block diagram



Digital input/output (standard) PSSu K S 16DI

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The module routes the periphery supply from the module bus to the module's connector strips.
- ▶ The periphery supply is used to supply the sensors.

- ▶ The module does not switch the periphery supply.
- ▶ The periphery supply has no current limitation.

Inputs

- ▶ The input status is signalled to the head module via the module bus.
- ▶ The inputs have input filters.

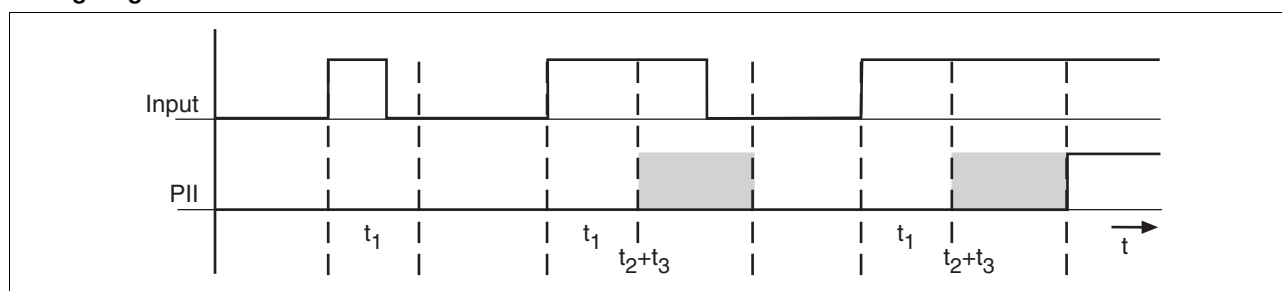
Signal detection at the inputs

- ▶ A signal ("0" signal or "1" signal) is always ignored if it is present for

less than the minimum processing time (see Technical details).

- ▶ A signal is always detected and transmitted to the process image (PII) if it is present for longer than the maximum processing time plus the scan time of the module bus ($t_2 + t_3$, see diagram and Technical details).

Timing diagram

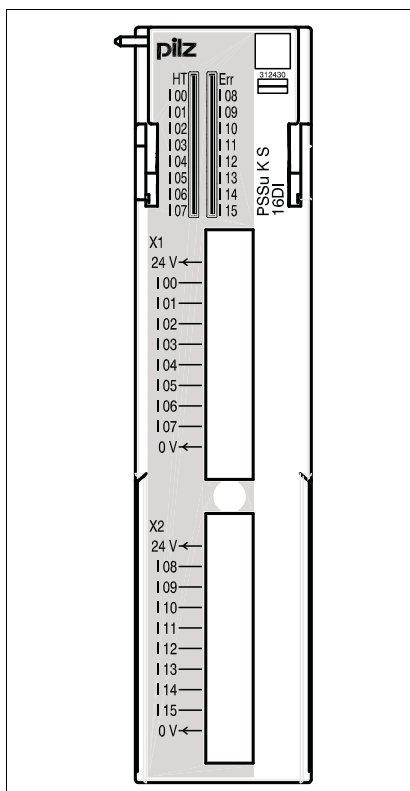


- ▶ Input: Signal at the input
 - ▶ PII: Status of process image (PII)
 - ▶ t_1 Minimum processing time (see Technical details)
 - ▶ t_2 Maximum processing time (see Technical details)
 - ▶ t_3 Scan time of module bus
- Shaded area: Status of process image (PII) undefined.

Wiring

- ▶ Signal lines do not have to be shielded.
- ▶ Use copper wiring.

Front view



Digital input/output (standard) PSSu K S 16DI

Terminal configuration

	Terminal configuration	
Connector with spring-loaded terminals (1-row/10-pin): PSSu A Con 1/10 C	1. Terminals X1: 24 V: +24 V (periphery supply) I 00: Input 0 I 01: Input 1 I 02: Input 2 I 03: Input 3 I 04: Input 4 I 05: Input 5 I 06: Input 6 I 07: Input 7 0 V: 0 V (periphery supply) X2: 24 V: +24 V (periphery supply) I 08: Input 8 I 09: Input 9 I 10: Input 10 I 11: Input 11 I 12: Input 12 I 13: Input 13 I 14: Input 14 I 15: Input 15 0 V: 0 V (periphery supply)	

Digital input/output (standard) PSSu K S 16DI

	Terminal configuration			
Connector with spring-loaded terminals (3-row/30-pin): PSSu A Con 3/30 C	1. Terminals X1: 24 V: +24 V (periphery supply) I 00: Input 0 I 01: Input 1 I 02: Input 2 I 03: Input 3 I 04: Input 4 I 05: Input 5 I 06: Input 6 I 07: Input 7 0 V: 0 V (periphery supply) X2: 24 V: +24 V (periphery supply) I 08: Input 8 I 09: Input 9 I 10: Input 10 I 11: Input 11 I 12: Input 12 I 13: Input 13 I 14: Input 14 I 15: Input 15 0 V: 0 V (periphery supply)	2. Terminals X1: +24 V (periphery supply) is present at all 10 spring-loaded terminals. X2: +24 V (periphery supply) is present at all 10 spring-loaded terminals.	3. Terminals X1: 0 V (periphery supply) is present at all 10 spring-loaded terminals. X2: 0 V (periphery supply) is present at all 10 spring-loaded terminals.	

Digital input/output (standard)
PSSu K S 16DI

Connection

Input circuit	1-row/10-pin connector PSSu A Con 1/10 C	3-row/30-pin connector PSSu A Con 3/30 C
Single-wire technology		
Two-wire technology		
Three-wire technology		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Digital input/output (standard)

PSSu K S 16DI

Technical details

Application range	Standard
Module's device code	0230h
Number of ST input bits	16
Support in system environment A	
from ST firmware version for other head modules	17
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	9
Support in system environment B	no

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	47 mA
Module's power consumption	0.24 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	0 mA
Module's power consumption with no load	0.00 W
Max. power dissipation of the module	2.00 W

Inputs

Number	16
Input voltage	24 V DC
Input current	2.5 - 4.0 mA
Min. threshold voltage when signal changes from "1" to "0"	11.0 V
Max. threshold voltage when signal changes from "0" to "1"	12.0 V
Potential isolation between input and voltage for the internal module bus	yes

Times

Max. processing time for input when signal changes from "1" to "0"	4.00 ms
Max. processing time for input when signal changes from "0" to "1"	4.00 ms
Min. processing time for input when signal changes from "1" to "0"	3.00 ms
Min. processing time for input when signal changes from "0" to "1"	3.00 ms

Environmental data

Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 55011: class A, EN 61000-4-11, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-9
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms

Digital input/output (standard)

PSSu K S 16DI

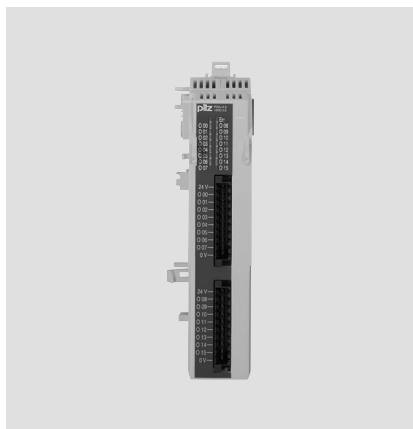
Environmental data	
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Labelling bracket (accessories)	PC
Dimensions	
Height	128.9 mm
Width	30.0 mm
Depth	56.0 mm
Depth incl. connector (accessories)	69.5 mm
Depth incl. labelling bracket (accessories)	83.5 mm
Weight	89 g
Connector with spring-loaded terminals (accessories)	
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 1.50 mm², 22 - 16 AWG
Spring-loaded terminals: Terminal points per connection	1
Stripping length	8 mm

The standards current on **2005-04** apply.

Order reference	
Description	Order no.
PSSu K S 16DI (Compact module without connector, labelling bracket and labelling strips)	312 430
Accessories	
PSSu A Con 1/10 C, Scope of delivery: 2 pieces (Connector with spring-loaded terminals, 1-row/10-pin)	313 115
PSSu A Con 3/30 C, Scope of delivery: 2 pieces (Connector with spring-loaded terminals, 3-row/30-pin)	313 116
PSSu A LC 0.1, Scope of delivery: 5 pieces (Labelling bracket)	312 966
PSSu A LA0, Scope of delivery: 1080 pieces (10 x DIN A4 sheet, 108 on each) (Labelling strips, laser printable)	312 958

Digital input/output (standard)

PSSu K S 16DO 0.5



Compact module with digital outputs for standard applications

Approvals

	PSSu K S 16DO 0.5
	◆

Module features

- ▶ **16** Digital outputs
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **0.50 A**
 - Short circuit-proof
 - Overload-proof
 - ▶ LEDs for:
 - Switch status of each output
 - Module error
 - ▶ 2 x 10-pin connector strip
 - ▶ Communication via:
 - Standard fieldbus
 - ▶ For standard applications in system environment A
- Accessories:
- ▶ Connector with spring-loaded terminals (necessary for operation)
 - ▶ Labelling bracket
 - ▶ Labelling strips (sheets)

Module description

The module provides type 1 outputs in accordance with IEC 61131-2. It may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may **not** be used in combination with PSSu E F BSW(-T) modules in safety-related applications.

The module may be used for standard applications in system environment A.

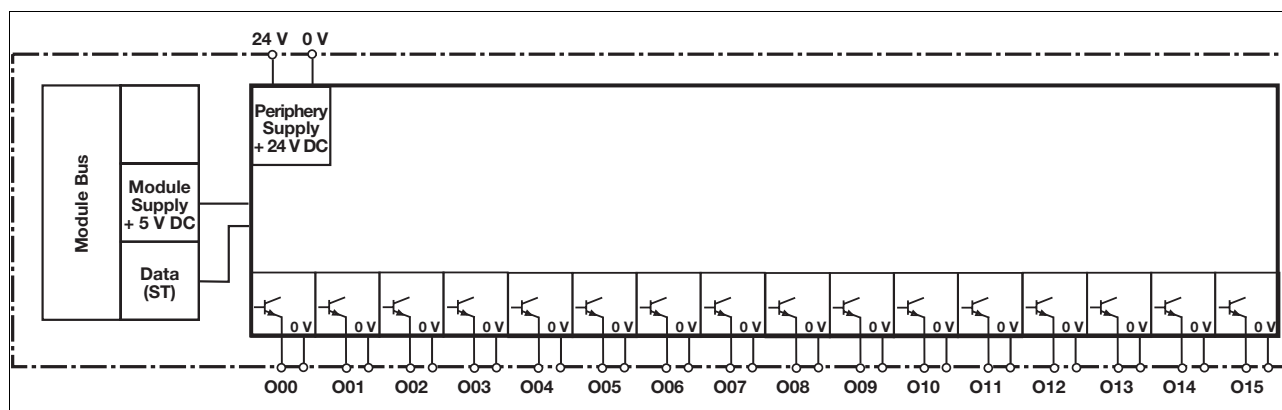
Integrated protection mechanisms

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

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error
- ▶ Temperature error

Block diagram



Digital input/output (standard) PSSu K S 16DO 0.5

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ “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

Periphery supply

- ▶ The Periphery Supply is not provided via the module bus, but it has to be fed via the connectors.
- ▶ The periphery supply is used to supply the outputs.

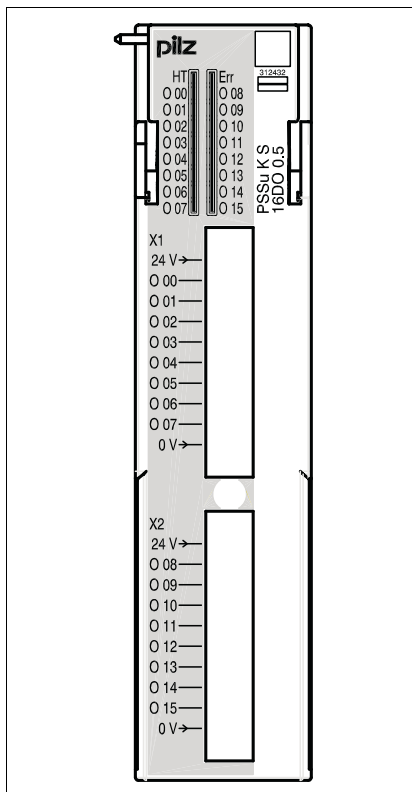
Outputs

- ▶ The head module sets the output status via the module bus.

Wiring

- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.

Front view



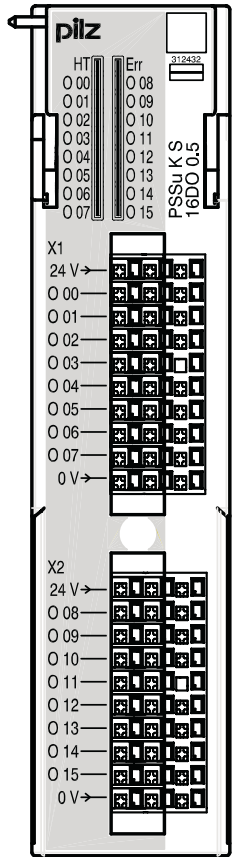
Digital input/output (standard) PSSu K S 16DO 0.5

Terminal configuration

	Terminal configuration	
Connector with spring-loaded terminals (1-row/10-pin): PSSu A Con 1/10 C	1. Terminals X1: 24 V: +24 V (external periphery supply) O 00: Output 0 O 01: Output 1 O 02: Output 2 O 03: Output 3 O 04: Output 4 O 05: Output 5 O 06: Output 6 O 07: Output 7 0 V: 0 V (external periphery supply) X2: 24 V: +24 V (external periphery supply) O 08: Output 8 O 09: Output 9 O 10: Output 10 O 11: Output 11 O 12: Output 12 O 13: Output 13 O 14: Output 14 O 15: Output 15 0 V: 0 V (external periphery supply)	

Digital input/output (standard)

PSSu K S 16DO 0.5

	Terminal configuration			
Connector with spring-loaded terminals (3-row/30-pin): PSSu A Con 3/30 C	1. Terminals	2. Terminals	3. Terminals	
	X1: 24 V: +24 V (external periphery supply) O 00: Output 0 O 01: Output 1 O 02: Output 2 O 03: Output 3 O 04: Output 4 O 05: Output 5 O 06: Output 6 O 07: Output 7 0 V: 0 V (external periphery supply)	X1: +24 V (external periphery supply) is present at all 10 spring-loaded terminals.	X1: 0 V (external periphery supply) is present at all 10 spring-loaded terminals.	
	X2: 24 V: +24 V (external periphery supply) O 08: Output 8 O 09: Output 9 O 10: Output 10 O 11: Output 11 O 12: Output 12 O 13: Output 13 O 14: Output 14 O 15: Output 15 0 V: 0 V (external periphery supply)	X2: +24 V (external periphery supply) is present at all 10 spring-loaded terminals.	X2: 0 V (external periphery supply) is present at all 10 spring-loaded terminals.	

Digital input/output (standard)
PSSu K S 16DO 0.5

Connection

Input circuit	1-row/10-pin connector PSSu A Con 1/10 C	3-row/30-pin connector PSSu A Con 3/30 C
Single-wire technology		
Two-wire technology		
Three-wire technology		

3.4

Digital input/output (standard)

PSSu K S 16DO 0.5

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0430h
Number of ST output bits	16
Support in system environment A	
from ST firmware version for other head modules	17
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	9
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	40 mA
Module's power consumption	0.20 W
Outputs	
Number of positive-switching single-pole semiconductor outputs	16
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	0.50 A
Permitted current range	0.00 - 0.62 A
Max. pulsed current for $t < 100$ ms	6 A
Residual current at "0" signal	0.02 mA
Permitted loads	inductive, capacitive, resistive
Infeed for	Outputs
Voltage	24 V, DC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Max. unit fuse protection F1 in according with UL508	4 A
Times	
Max. processing time for semiconductor output when signal changes from "1" to "0"	0.500 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 55011: class A, EN 61000-4-11, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-9
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g

Digital input/output (standard)

PSSu K S 16DO 0.5

Environmental data

Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms

Protection type in accordance with **EN 60529**

Mounting (e.g. cabinet) **IP54**

Housing **IP20**

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

Overvoltage category **II**

Pollution degree **2**

Pollution degree in accordance with **2**

Mechanical data

Housing material

Front **PC**

Bottom **PC**

Labelling bracket (accessories) **PC**

Dimensions

Height **128.9 mm**

Width **30.0 mm**

Depth **56.0 mm**

Depth incl. connector (accessories) **69.5 mm**

Depth incl. labelling bracket (accessories) **83.5 mm**

Weight **91 g**

Connector with spring-loaded terminals (accessories)

Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors **0.20 - 1.50 mm², 22 - 16 AWG**

Spring-loaded terminals: Terminal points per connection **1**

Stripping length **8 mm**

The standards current on **2005-04** apply.

Order reference

Description

PSSu K S 16DO 0.5
(Compact module without connector, labelling bracket and labelling strips)

Order no.

312 432

Accessories

PSSu A Con 1/10 C, Scope of delivery: 2 pieces
(Connector with spring-loaded terminals, 1-row/10-pin)

313 115

PSSu A Con 3/30 C, Scope of delivery: 2 pieces
(Connector with spring-loaded terminals, 3-row/30-pin)

313 116

PSSu A LC 0.1, Scope of delivery: 5 pieces
(Labelling bracket)

312 966

PSSu A LA0, Scope of delivery: 1080 pieces (10 x DIN A4 sheet, 108 on each)
(Labelling strips, laser printable)

312 958

Digital input/output (failsafe)

Digital input/output (failsafe)

Contents	Page
Digital input/output (failsafe)	
PSSu E F 4DI(-T)	3.5-2
PSSu E F 4DO 0.5(-T)	3.5-10
PSSu E F 2DO 2(-T)	3.5-19
PSSu E F 2DOR 8(-T)	3.5-28
PSSu E F DI OZ 2(-T)	3.5-37

Digital input/output (failsafe) PSSu E F 4DI(-T)



Electronic module with digital inputs for failsafe applications

Module features

- ▶ **4** Digital inputs
- ▶ **2** Test pulse outputs, with the option to configure them as:
 - Independent test pulse outputs that use different test pulses (periphery supply)
 - Outputs with constant voltage (periphery supply)
- ▶ LEDs for:
 - Switch status of each input
 - Module error
- ▶ For failsafe applications in system environment A and B
- ▶ Coated version of the module: **PSSu E F 4DI-T**: for increased environmental requirements

Integrated protection mechanisms

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

- ▶ Test pulse signals are always buffered for 20 ms.

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error
- ▶ Temperature error: Too warm
- ▶ Test pulse error
- ▶ Input error

Approvals

	PSSu E F 4DI
	◆
	◆
	◆

Module description

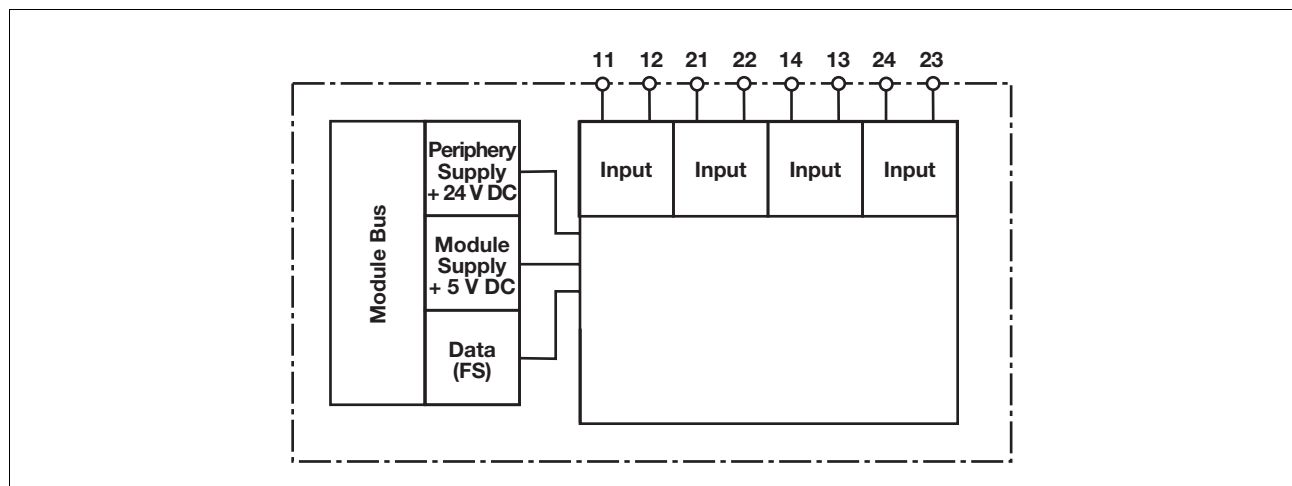
The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

It provides type 1 failsafe inputs in accordance with IEC 61131-2.

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

The module **PSSu E F 4DI-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Block diagram



Digital input/output (failsafe)

PSSu E F 4DI(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The module switches the periphery supply from the module bus to the base module terminals.
- ▶ The periphery supply is used to supply or provide test pulses to the input devices.

Inputs

- ▶ The input status is signalled to the head module via the module bus.
- ▶ Test pulses can be used to check the inputs for shorts across contacts and correct functionality.
- ▶ The inputs have input filters.

Test pulse outputs

- ▶ 2 test pulse outputs that use different test pulses (test pulse 0, test pulse 1)
- ▶ Short circuit-proof
- ▶ Current limitation
- ▶ Test pulses can be switched on or off.
- ▶ Test pulses are switched off in the default setting.
- ▶ When test pulses are switched off, the periphery supply is constantly available at the outputs.

Detection of shorts across contacts

- ▶ The test pulses are used to detect shorts between inputs. Shorts between inputs are detected when
 - the test pulses are different (test pulse 0, test pulse 1) or when

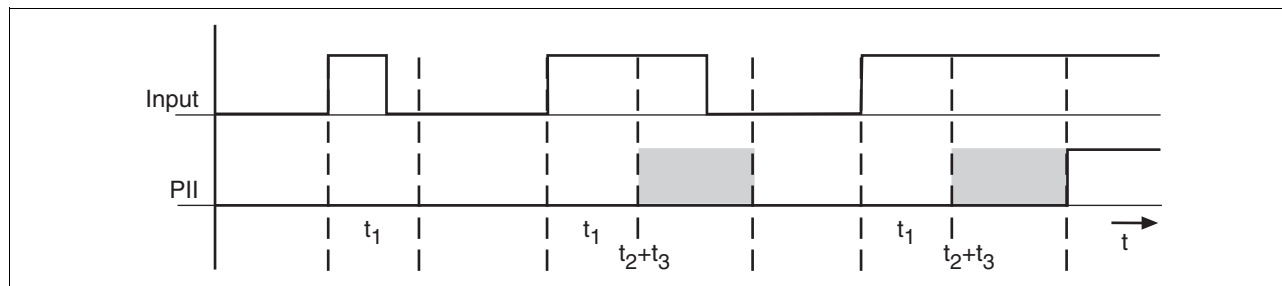
- the test pulses originate from other modules on a PSSu system.

- ▶ Shorts between inputs of the same module with the same test pulses will not be detected.

Signal detection at the inputs

- ▶ A signal ("0" signal or "1" signal) is always ignored if it is present for less than the minimum processing time (see Technical details).
- ▶ A signal is always detected and transmitted to the process image (PII) if it is present for longer than the maximum processing time plus the scan time of the module bus ($t_2 + t_3$, see diagram and Technical details).

Timing diagram

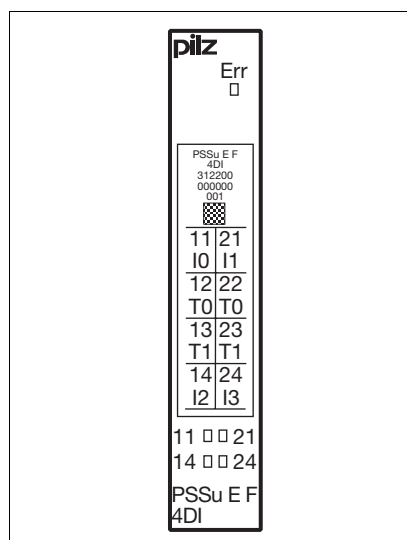


- ▶ Input: Signal at the input
 - ▶ PII: Status of process image (PII)
 - ▶ t_1 Minimum processing time (see Technical details)
 - ▶ t_2 Maximum processing time (see Technical details)
 - ▶ t_3 Scan time of module bus
- Shaded area: Status of process image (PII) undefined.

Wiring

- ▶ Appropriate wiring must be used to exclude short circuits between the test pulse outputs and the corresponding input!
- ▶ Appropriate wiring must be used to exclude short circuits between the inputs or to a supply line!
- ▶ The cable runs for the test pulses may be max. 200 m.
- ▶ Signal lines do not have to be shielded.
- ▶ Use copper wiring.

Front view



Digital input/output (failsafe) PSSu E F 4DI(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Input I1 12-22: Test pulse output T0 or +24 V output (periphery supply, 12-22 linked within the base module) 13-23: Test pulse output T1 or +24 V output (periphery supply, 13-23 linked within the base module) 14: Input I2 24: Input I3	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	21: Input I1 12-22: Test pulse output T0 or +24 V output (periphery supply, 12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Input I2 24: Input I3 15-25: Test pulse output T1 or +24 V output (periphery supply, 15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Digital input/output (failsafe)
PSSu E F 4DI(-T)

Connection

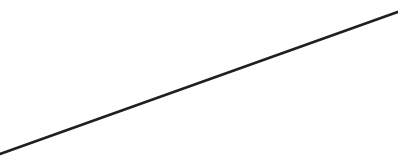
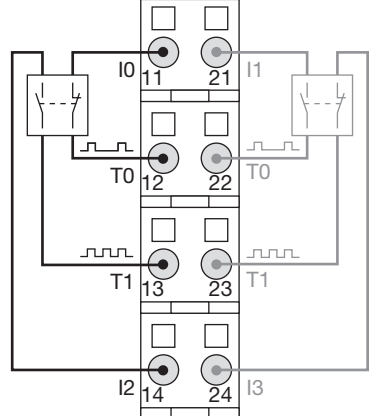
Input circuit	Single-channel input device	Dual-channel input device
Without test pulses (unchecked)		
Without test pulses (unchecked) Input device with homogenous channels		
Without test pulses (unchecked) Input device with diverse channels		

Digital input/output (failsafe)
PSSu E F 4DI(-T)

With test pulses (checked)		
With test pulses (checked) Input device with homogenous channels		
With test pulses (checked) Input device with homogenous channels		

Digital input/output (failsafe)

PSSu E F 4DI(-T)

With test pulses (checked) Input device with diverse channels		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0A00h
Number of FS input bits	4
Support in system environment A	
from FS firmware version for other head modules	4
from FS firmware version PSSu H F PN	1
Support in system environment B	
from head module FS firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	23 mA
Module's power consumption	0.12 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	8 mA
Module's power consumption with no load	0.19 W
Max. power dissipation of the module	1.50 W
Inputs	
Number	4
Input voltage	24 V DC
Input current	2.6 - 7.8 mA
Min. threshold voltage when signal changes from "1" to "0"	9.0 V
Max. threshold voltage when signal changes from "0" to "1"	10.0 V
Potential isolation between input and voltage for the internal module bus	yes
Number of test pulse outputs	2
Number of outputs that can be configured as test pulses	2
Max. output current at "1" signal	0.25 A
Short circuit-proof	yes
Max. cable runs between test pulse output and input	200 m
Standard for voltage interruptions	DIN V EN V 1954, EN61131-2, EN61496-1

Digital input/output (failsafe)

PSSu E F 4DI(-T)

Times	
Max. processing time for input when signal changes from "1" to "0"	1.00 ms
Max. processing time for input when signal changes from "0" to "1"	1.00 ms
Min. processing time for input when signal changes from "1" to "0"	0.50 ms
Min. processing time for input when signal changes from "0" to "1"	0.50 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	35 g
Mechanical coding	
Type	D
Colour	yellow

Digital input/output (failsafe)

PSSu E F 4DI(-T)

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
digital inputs	single-channel	PL d (Cat. 2)	Cat. 2	SIL CL 2	9.10E-09	20
digital inputs	dual-channel	PL e (Cat. 3)	Cat. 3	SIL CL 3	3.10E-09	20
digital inputs	light beam device	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.91E-09	20

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

The standards current on **2005-04** apply.

Order reference

Description	Order no.
PSSu E F 4DI (Electronic module)	312 200
PSSu E F 4DI-T (Electronic module, coated version)	314 200

Base modules

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (failsafe)

PSSu E F 4DO 0.5(-T)



Electronic module with digital single-pole outputs for failsafe applications

Approvals

	PSSu E F 4DO 0.5
	◆
	◆
	◆

Module features

- ▶ **4 Digital outputs**
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **0.50 A**
 - Short circuit-proof
 - Overload-proof
 - Free from feedback
- ▶ **LEDs for:**
 - Switch status per output
 - FS enable per output
 - Module error
- ▶ **For failsafe applications in system environment A and B**
- ▶ **Coated version of the module: PSSu E F 4DO 0.5-T: for increased environmental requirements**

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**. It provides type 1 failsafe outputs in accordance with IEC 61131-2. The outputs may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may be used for failsafe applications in system environment A and B (automation system PSS 4000). The module **PSSu E F 4DO 0.5-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

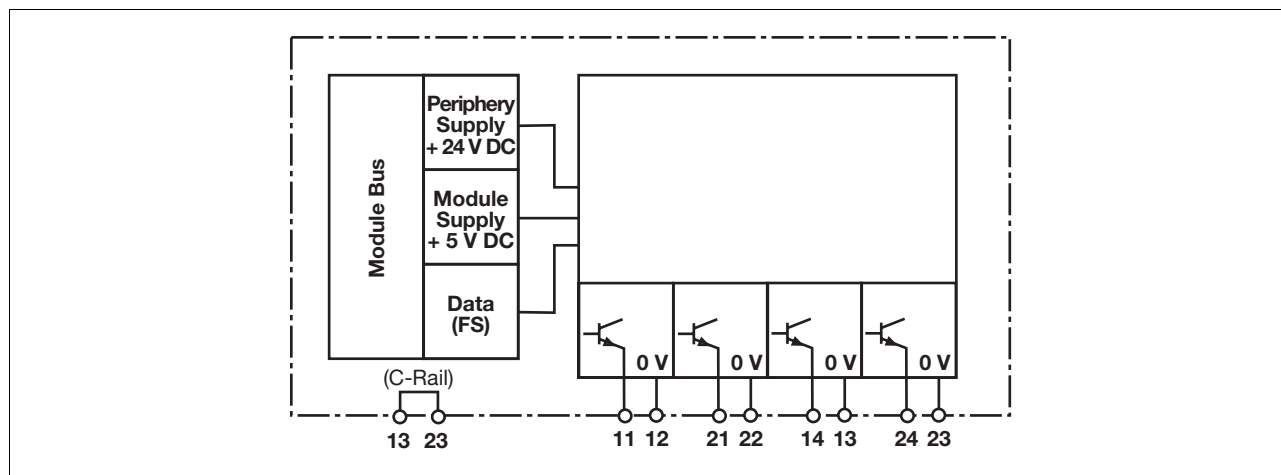
The module has the following protection mechanisms:

- ▶ Common second shutdown route, tested regularly
- ▶ Cyclical output tests
- ▶ Tests for shorts between the outputs

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error
- ▶ Temperature error: Too warm
- ▶ Output error

Block diagram



Digital input/output (failsafe) PSSu E F 4DO 0.5(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "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

Periphery supply

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

Outputs

- ▶ The head module sets the output status via the module bus.
- ▶ The max. capacity at an output depends on the load (see characteristic). Connecting a higher capacity may lead to an error.
- ▶ Operation with electronic contactors has not been tested and may

lead to errors. Please contact our Customer Support team if you are using electronic contactors.

Output test

- ▶ Outputs that are switched on are checked via regular off tests.
 - Test pulses for outputs that are switched on: see Technical Details
 - Outputs that are switched on are switched off for the duration of the test pulse.
 - The load must not switch off because of the test.
- ▶ Outputs that are switched off are checked via regular on tests.
 - Test pulses for outputs that are switched off: see Technical Details
 - Outputs that are switched off are switched on for the duration of the test pulse.
 - The load must not switch on because of the test.

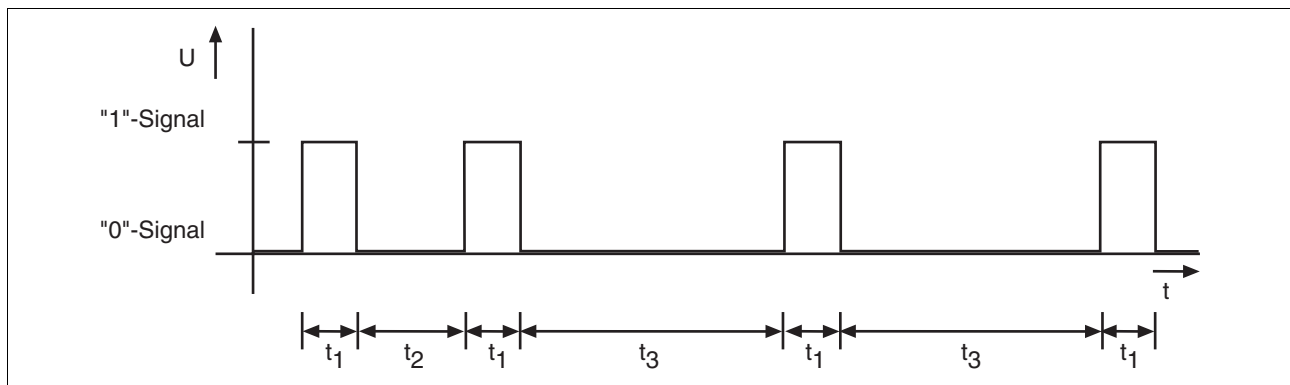
Excluding individual outputs from the output test:

- ▶ If a plant is particularly sensitive to the test pulses, they may be switched off for individual outputs.
- ▶ The test must be replaced by other measures, depending on the safety requirement.
- ▶ When test pulses are switched off:
 - The correct switch status is always checked.
 - The output's ability to switch will not be detected until the next time the output is switched on/off.

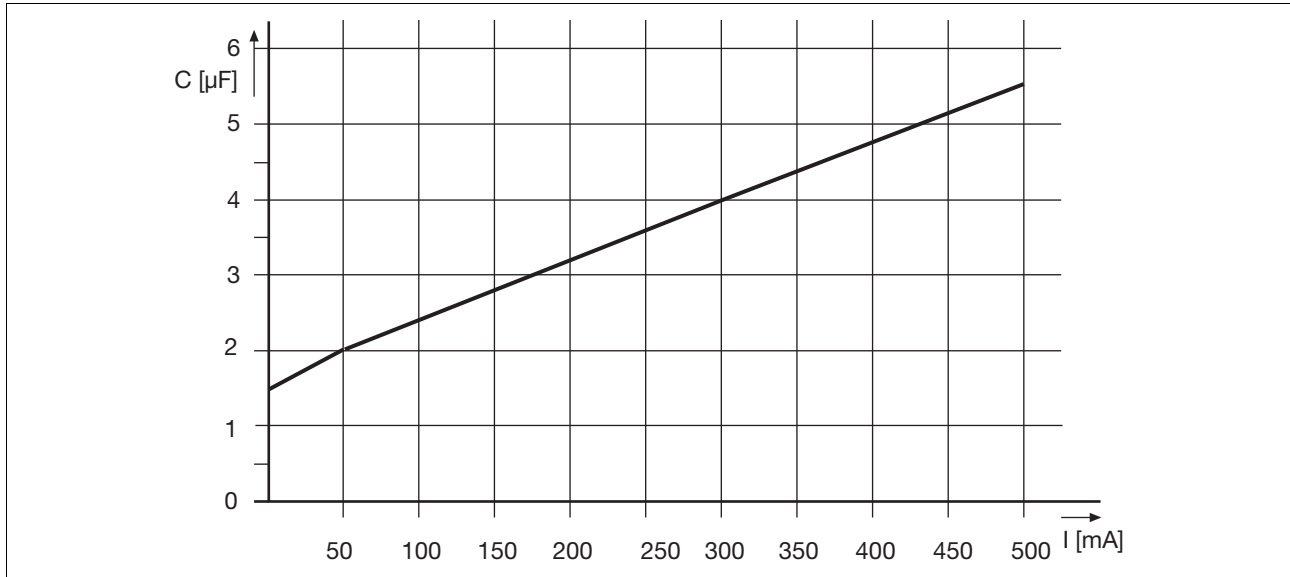
Testing for shorts

- ▶ A test is regularly carried out to check for shorts between the outputs.
- ▶ For applications in accordance with Category 4, PL e and SIL 3, detection of shorts between contacts must be guaranteed either via the on/off test or through other measures (e.g. asynchronous switching). A short between contacts must be simulated during commissioning.

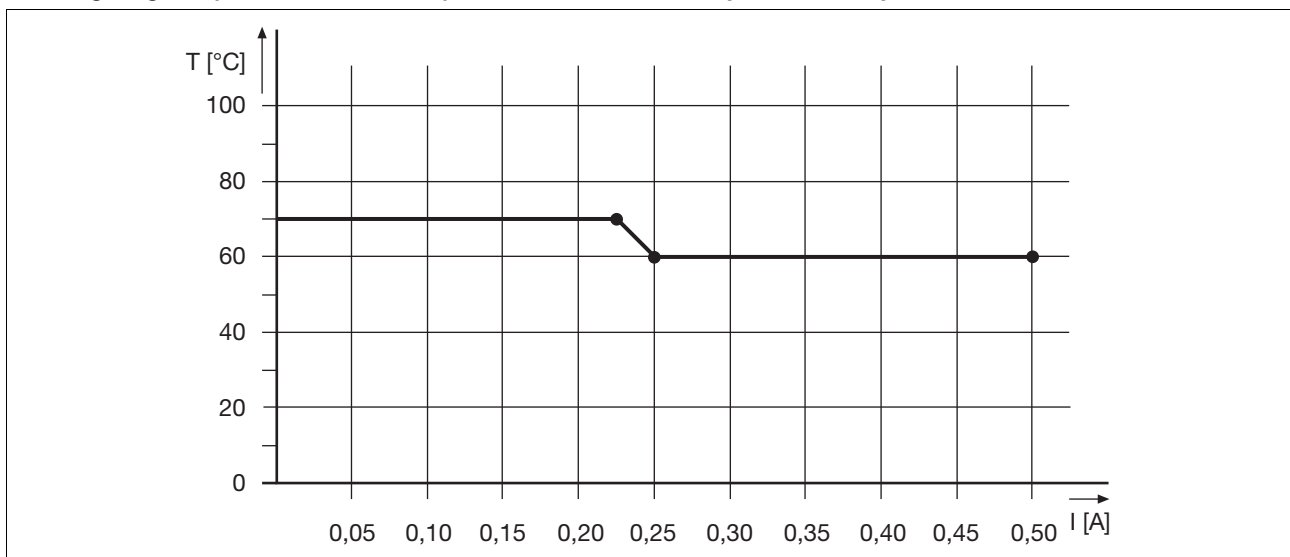
Timing diagram



- ▶ t_1 Pulse duration on power-up test (see Technical details)
- ▶ t_2 Scan time of power-up test when test is repeated (ca. 4 ms)
- ▶ t_3 Scan time of power-up test under normal circumstances (ca. 5 min.)

Digital input/output (failsafe)**PSSu E F 4DO 0.5(-T)****Characteristic: Output capacitance C dependent on load current I**

3.5

Derating diagram (PSSu E F 4DO 0,5-T): Permitted ambient temperature T dependent on load current I

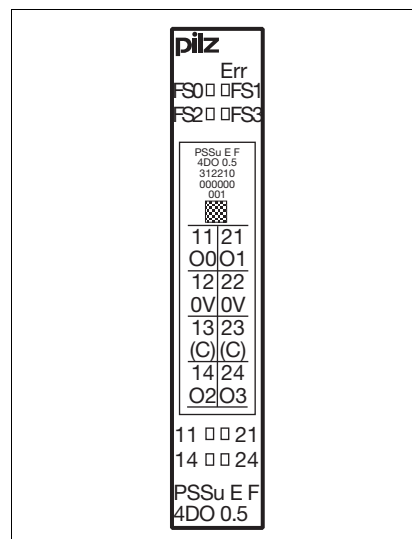
Digital input/output (failsafe) PSSu E F 4DO 0.5(-T)

Wiring

- ▶ If short circuits occur between the cable from the output to the load and a supply line, it will no longer be possible to switch off the load. Possible remedies:
 - Use separate multicore cable for supply voltages
 - Use dual actuators, e.g. two contactors in series
 - Use an additional shutdown device such as a main contactor
- ▶ Use appropriate wiring to exclude short circuits between the outputs!
- ▶ With single-channel operation for applications up to Category 3 in accordance with EN 954-1: use a feedback loop!

- ▶ When used for Category 4 applications in accordance with EN 954-1: connect two actuators connected in series to two different outputs!
- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: 0 V periphery supply (13-23 linked within the base module) 14: Output O2 24: Output O3	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23 linked within the base module) 14: Output O2 24: Output O3	

Digital input/output (failsafe)
PSSu E F 4DO 0.5(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Output O0 21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Output O2 24: Output O3 15-25: 0 V periphery supply (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

3.5

Connection

Output circuit	Without C-rail	With C-rail
Single-channel actuator		

Digital input/output (failsafe)
PSSu E F 4DO 0.5(-T)

Single-channel actuator		
Dual-channel operation Redundant actuator With feedback loop		

3.5

Digital input/output (failsafe)

PSSu E F 4DO 0.5(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0C01h
Number of FS output bits	4
Support in system environment A	
from FS firmware version for other head modules	4
from FS firmware version PSSu H F PN	1
Support in system environment B	
from head module FS firmware version	1.0.0

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	56 mA
Module's power consumption	0.28 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	37 mA
Module's power consumption with no load	0.90 W
Max. power dissipation of the module	1.50 W

Outputs

Number of positive-switching single-pole semiconductor outputs	4
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	0.50 A
Monitoring threshold of semiconductor output	6.0 V
Permitted current range	0.00 - 0.62 A
Max. pulsed current for $t < 100$ ms	6 A
Residual current at "0" signal	0.02 mA
Max. duration of on time during self test	200 μs
Max. duration of off time during self test	350 μs
Permitted loads	inductive, capacitive, resistive

Times

Max. processing time for semiconductor output when signal changes from "1" to "0"	0.020 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms

Environmental data

Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)

Digital input/output (failsafe)

PSSu E F 4DO 0.5(-T)

Environmental data	
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	36 g
Mechanical coding	
Type	E
Colour	yellow

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
SC outputs (1-pin)	single-channel	PL d (Cat. 2)	Cat. 3	SIL CL 2	9.00E-09	20
SC outputs (1-pin)	dual-channel	PL e (Cat. 4)	Cat. 4	SIL CL 3	1.13E-09	20

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

The standards current on **2005-04** apply.

Digital input/output (failsafe)

PSSu E F 4DO 0.5(-T)

Order reference	
Description	Order no.
PSSu E F 4DO 0.5 (Electronic module)	312 210
PSSu E F 4DO 0.5-T (Electronic module, coated version)	314 210
Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (failsafe)

PSSu E F 2DO 2(-T)



Electronic module with digital single-pole outputs for failsafe applications

Approvals

	PSSu E F 2DO 2
	◆
	◆
	◆

Module features

- ▶ **2 Digital outputs**
 - Semiconductor technology
 - Single-pole
 - Positive-switching
 - Current load capacity per output: **2.00 A**
 - Short circuit-proof
 - Overload-proof
 - Free from feedback
- ▶ **LEDs for:**
 - Switch status per output
 - FS enable per output
 - Module error
- ▶ **For failsafe applications in system environment A and B**
- ▶ **Coated version of the module: PSSu E F 2DO 2-T: for increased environmental requirements**

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**. It provides type 1 failsafe outputs in accordance with IEC 61131-2. The outputs may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

The module may be used for failsafe applications in system environment A and B (automation system PSS 4000). The module **PSSu E F 2DO 2-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

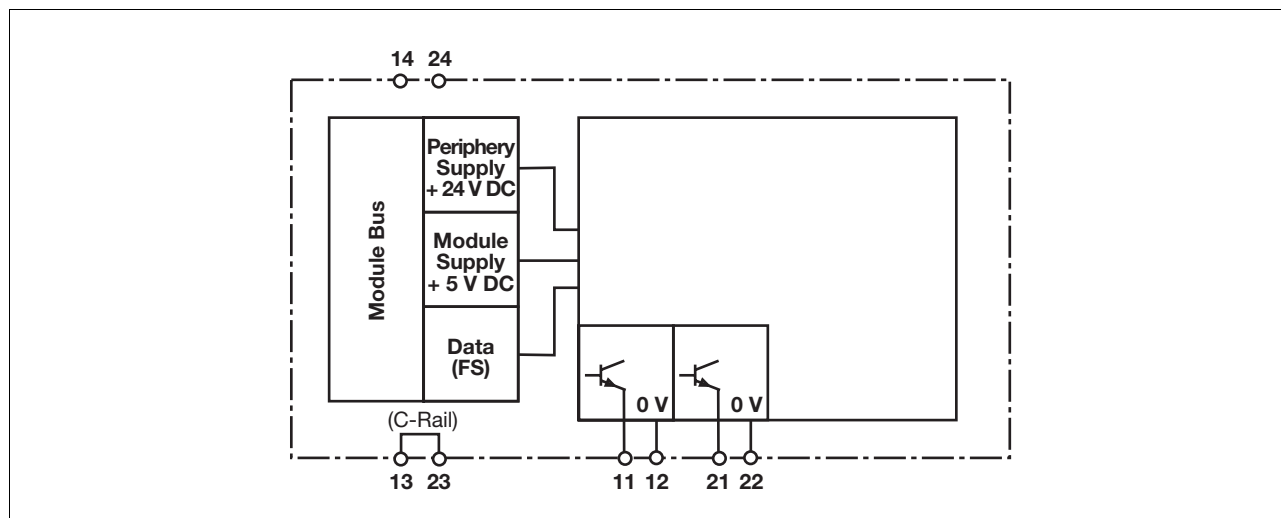
The module has the following protection mechanisms:

- ▶ Common second shutdown route, tested regularly
- ▶ Cyclical output tests
- ▶ Tests for shorts between the outputs

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error
- ▶ Temperature error: Too warm
- ▶ Output error

Block diagram



Digital input/output (failsafe) PSSu E F 2DO 2(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "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

Periphery supply

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

Outputs

- ▶ The head module sets the output status via the module bus.
- ▶ The max. capacity at an output depends on the load (see characteristic). Connecting a higher capacity may lead to an error.
- ▶ Operation with electronic contactors has not been tested and may

lead to errors. Please contact our Customer Support team if you are using electronic contactors.

Output test

- ▶ Outputs that are switched on are checked via regular off tests.
 - Test pulses for outputs that are switched on: see Technical Details
 - Outputs that are switched on are switched off for the duration of the test pulse.
 - The load must not switch off because of the test.
- ▶ Outputs that are switched off are checked via regular on tests.
 - Test pulses for outputs that are switched off: see Technical Details
 - Outputs that are switched off are switched on for the duration of the test pulse.
 - The load must not switch on because of the test.

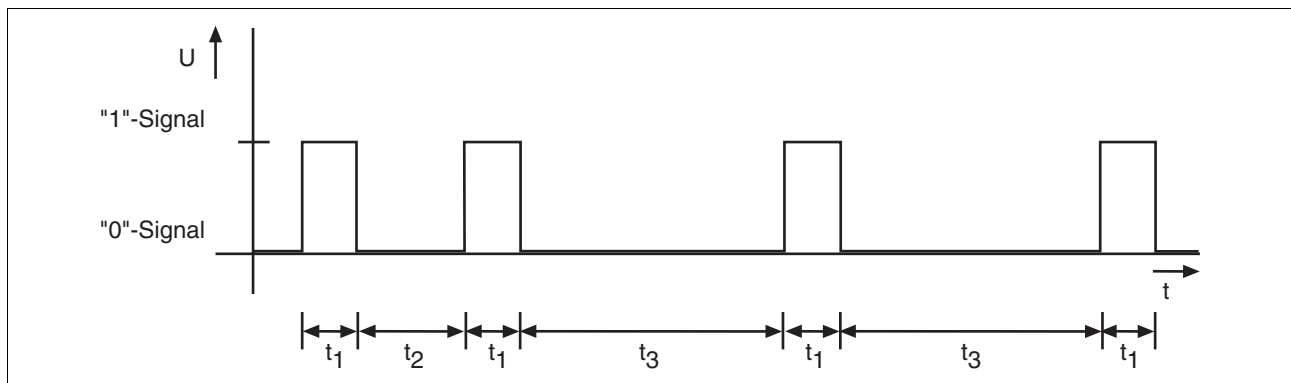
Excluding individual outputs from the output test:

- ▶ If a plant is particularly sensitive to the test pulses, they may be switched off for individual outputs.
- ▶ The test must be replaced by other measures, depending on the safety requirement.
- ▶ When test pulses are switched off:
 - The correct switch status is always checked.
 - The output's ability to switch will not 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.
- ▶ For applications in accordance with Category 4, PL e and SIL 3, detection of shorts between contacts must be guaranteed either via the on/off test or through other measures (e.g. asynchronous switching). A short between contacts must be simulated during commissioning.

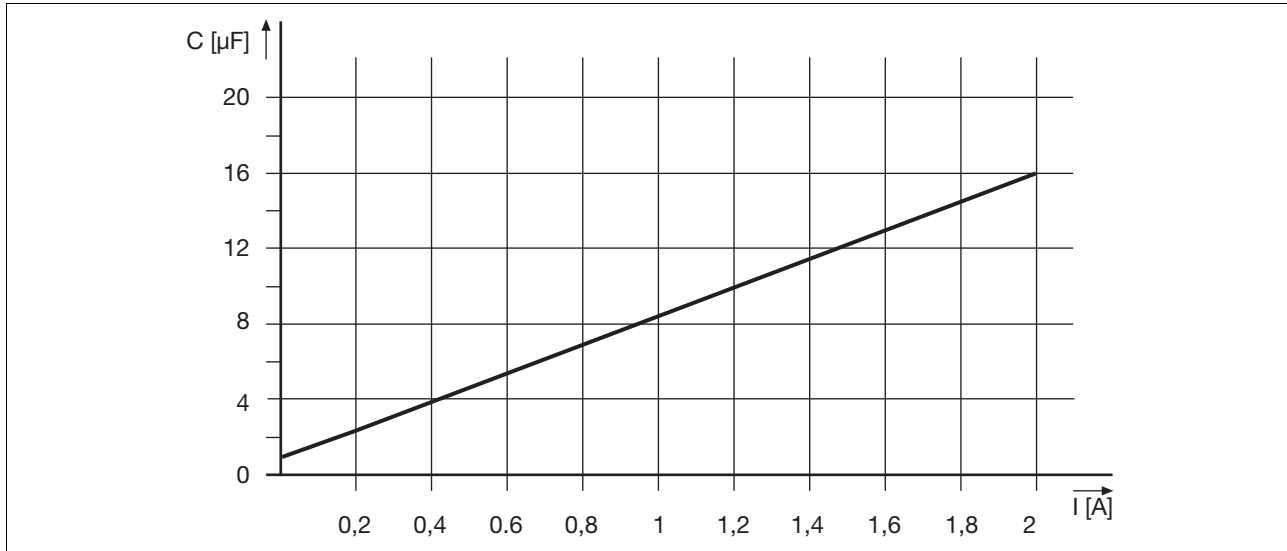
Timing diagram



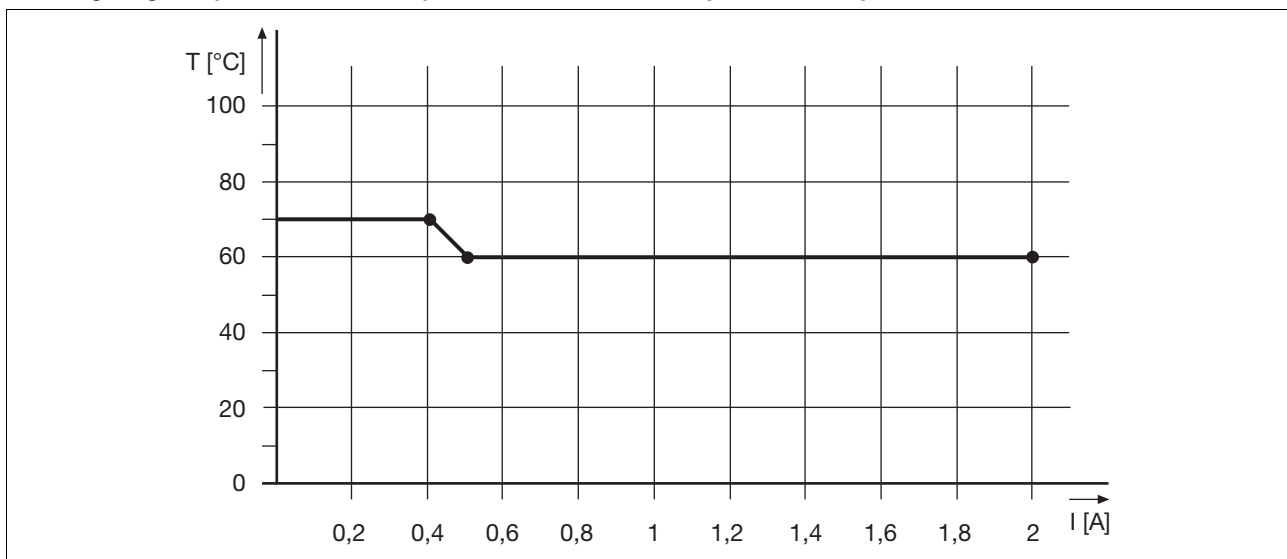
- ▶ t_1 Pulse duration on power-up test (see Technical details)
- ▶ t_2 Scan time of power-up test when test is repeated (ca. 4 ms)
- ▶ t_3 Scan time of power-up test under normal circumstances (ca. 5 min.)

Digital input/output (failsafe) PSSu E F 2DO 2(-T)

Characteristic: Output capacitance C dependent on load current I



Derating diagram (PSSu E F 2DO 2-T): Permitted ambient temperature T dependent on load current I



3.5

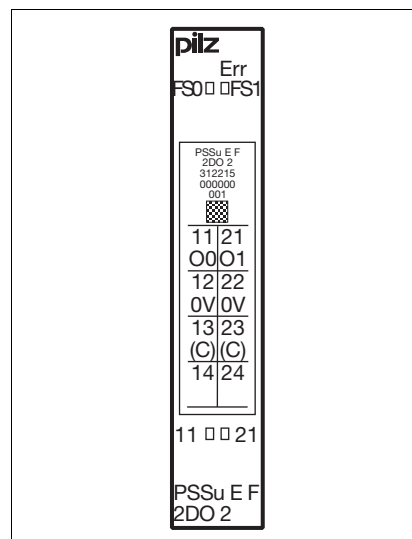
Digital input/output (failsafe) PSSu E F 2DO 2(-T)

Wiring

- ▶ If short circuits occur between the cable from the output to the load and a supply line, it will no longer be possible to switch off the load. Possible remedies:
 - Use separate multicore cable for supply voltages
 - Use dual actuators, e.g. two contactors in series
 - Use an additional shutdown device such as a main contactor
- ▶ Use appropriate wiring to exclude short circuits between the outputs!
- ▶ With single-channel operation for applications up to Category 3 in accordance with EN 954-1: use a feedback loop!

- ▶ When used for Category 4 applications in accordance with EN 954-1: connect two actuators connected in series to two different outputs!
- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: 0 V periphery supply (13-23 linked within the base module) 14: Not connected 24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23 linked within the base module) 14: Not connected 24: Not connected	

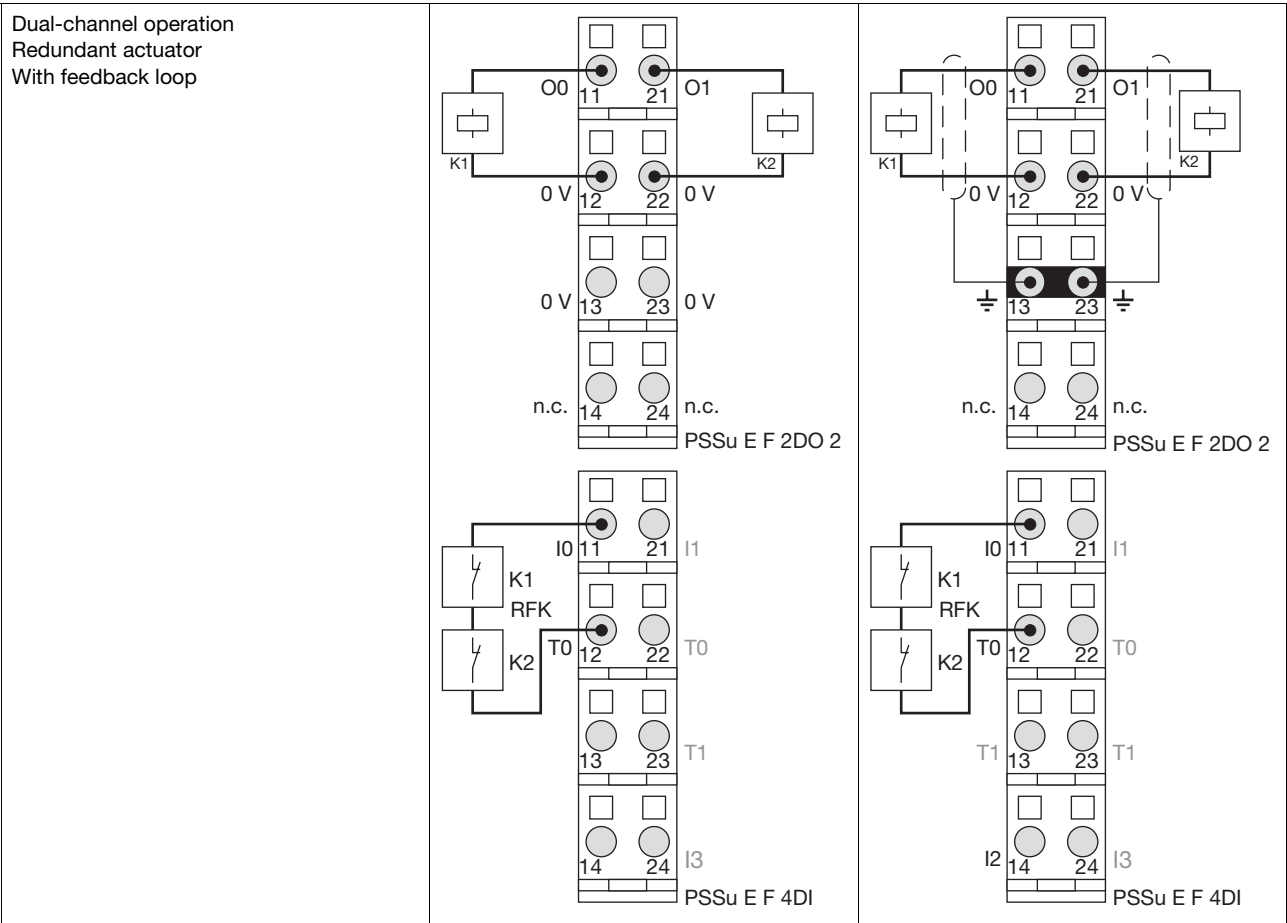
Digital input/output (failsafe) PSSu E F 2DO 2(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11: Output O0 21: Output O1 12-22: 0 V periphery supply (12-22 linked within the base module) 13-23: C-rail supply (13-23-16-26 linked within the base module) 14: Not connected 24: Not connected 15-25: 0 V periphery supply (15-25 linked within the base module) 16-26: C-rail supply (13-23-16-26 linked within the base module)	

Connection

Output circuit	Without C-rail	With C-rail
Single-channel actuator		

Digital input/output (failsafe)
PSSu E F 2DO 2(-T)



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0C00h
Number of FS output bits	2
Support in system environment A	
from FS firmware version for other head modules	4
from FS firmware version PSSu H F PN	1
Support in system environment B	
from head module FS firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	45 mA
Module's power consumption	0.23 W

Digital input/output (failsafe)

PSSu E F 2DO 2(-T)

Electrical data	
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	30 mA
Module's power consumption with no load	0.72 W
Max. power dissipation of the module	1.50 W
Outputs	
Number of positive-switching single-pole semiconductor outputs	2
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	2.00 A
Monitoring threshold of semiconductor output	6.0 V
Permitted current range	0.00 - 2.50 A
Max. pulsed current for $t < 100$ ms	12 A
Residual current at "0" signal	0.02 mA
Max. duration of on time during self test	200 μ s
Max. duration of off time during self test	350 μ s
Permitted loads	inductive, capacitive, resistive
Times	
Max. processing time for semiconductor output when signal changes from "1" to "0"	0.020 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.010 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA

Digital input/output (failsafe)

PSSu E F 2DO 2(-T)

Mechanical data

Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	35 g
Mechanical coding	
Type	F
Colour	yellow

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
SC outputs (1-pin)	single-channel	PL d (Cat. 2)	Cat. 3	SIL CL 2	9.00E-09	20
SC outputs (1-pin)	dual-channel	PL e (Cat. 4)	Cat. 4	SIL CL 3	1.13E-09	20

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

The standards current on **2005-04** apply.

Order reference

Description	Order no.
PSSu E F 2DO 2 (Electronic module)	312 215
PSSu E F 2DO 2-T (Electronic module, coated version)	314 215

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619

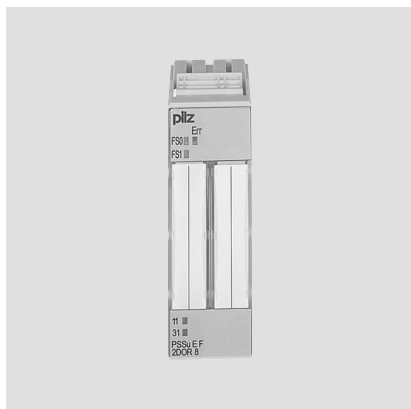
Digital input/output (failsafe)

PSSu E F 2DO 2(-T)

Base modules	Order no.
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Digital input/output (failsafe)

PSSu E F 2DOR 8(-T)



Electronic module with monitored relay outputs for failsafe applications

Approvals

	PSSu E F 2DOR 8
	◆
	◆
	◆

Module features

- ▶ **2 Relay contacts**
 - N/O contact
 - Volt-free
 - Current load capacity per output: **8.0 A**
- ▶ **LEDs for:**
 - Switch status per output
 - FS enable per output
 - Module error
- ▶ For failsafe applications in system environment A and B
- ▶ Coated version of the module: **PSSu E F 2DOR 8-T**: for increased environmental requirements

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

It provides failsafe outputs in accordance with IEC 61131-2. One relay contact is sufficient for a circuit in accordance with EN 954-1, Category 2. Prerequisite: An additional output switches to a safe condition in the event of an error or, if that is impossible, signals a hazardous condition. Category 4 requires two relay contacts in series.

The module may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads

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

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

Integrated protection mechanisms

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

The module has the following protection mechanisms:

- ▶ 1 monitored relay contact per output
- ▶ Safe separation between both relay contacts (see Technical details)

- ▶ Safe separation between both relay contacts and the periphery supply as well as the module supply, in accordance with DIN VDE 0110 over-voltage category 2 in a protected industrial network

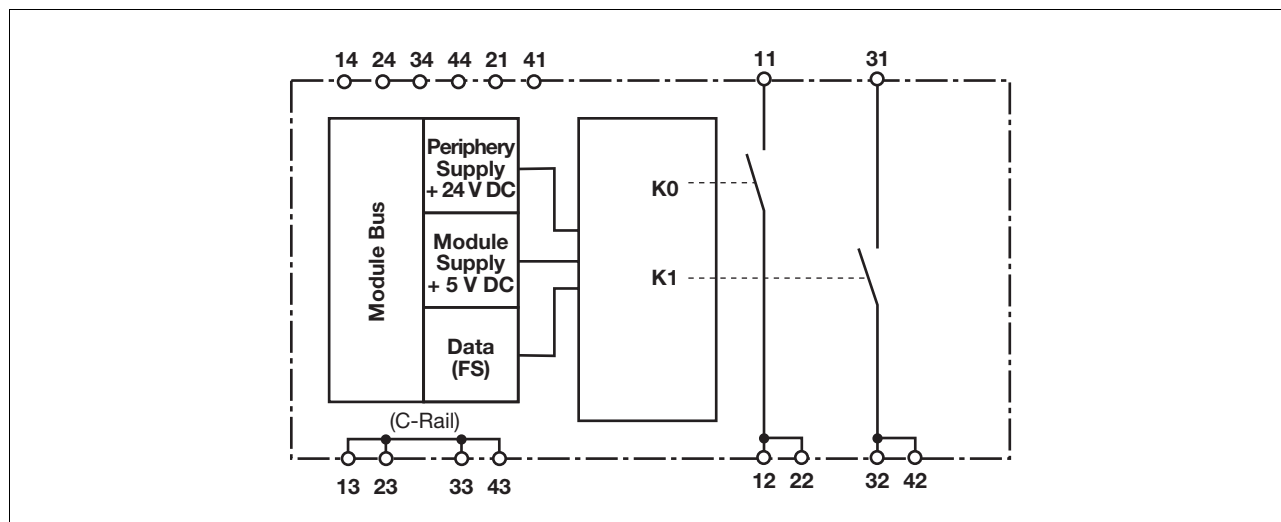
- ▶ Temperature monitoring

The module provides the following diagnostic data:

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

Digital input/output (failsafe) PSSu E F 2DOR 8(-T)

Block diagram



Function description

Module supply

- ▶ The module supply provides the module with voltage.

Outputs

- ▶ The head module sets the output status via the module bus.

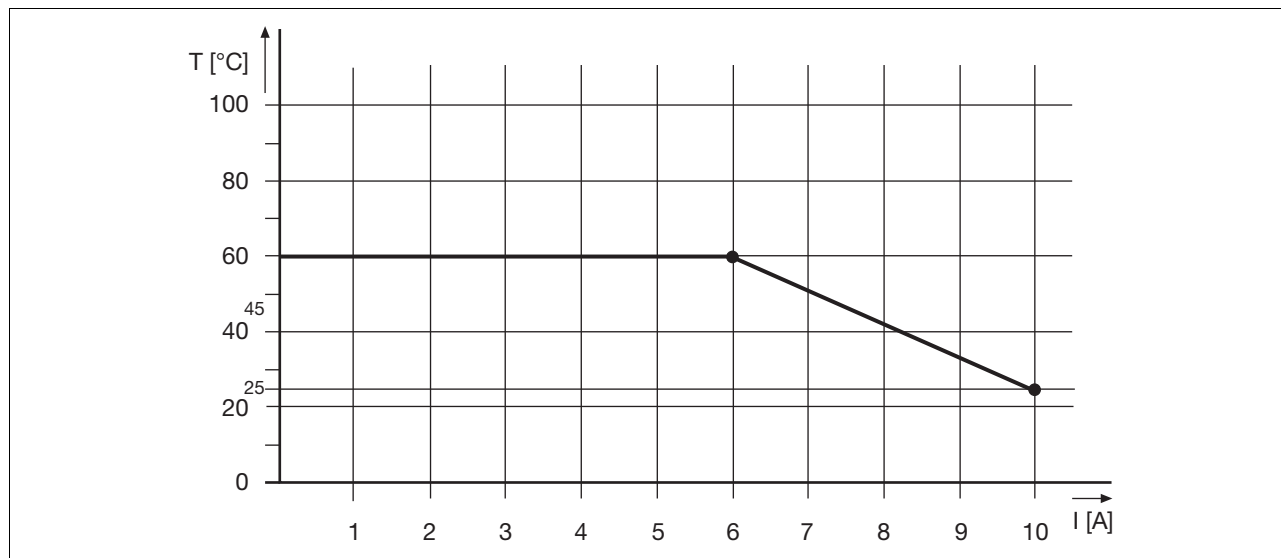
- ▶ The relationship between the load current and the operating temperature is illustrated in the following derating diagram. The operating point should be below the characteristic curve.

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



Digital input/output (failsafe) PSSu E F 2DOR 8(-T)

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

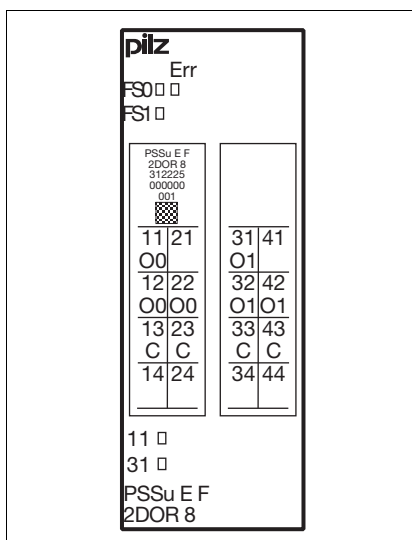


Wiring

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

- For safety reasons, only the protective earth (PE) may be connected to the C-rail of the supply group.
- ▶ Use copper wiring.

Front view



Digital input/output (failsafe)
PSSu E F 2DOR 8(-T)

Terminal configuration

Base module	Terminal configuration
With C-rail	11: Output O0 Relay contact 1 21: Not assigned 12-22: Output O0 Relay contact 2 (12-22 linked within the base module) 13-23: C-rail supply (13-23-33-43 linked within the base module) 14-24: Not assigned 31: Output O1 Relay contact 1 41: Not assigned 32-42: Output O1 Relay contact 2 (32-42 linked within the base module) 34-44: Not assigned
Without C-rail	11: Output O0 Relay contact 1 21: Not assigned 12-22: Output O0 Relay contact 2 (12-22 linked within the base module) 14-24: Not assigned 31: Output O1 Relay contact 1 41: Not assigned 32-42: Output O1 Relay contact 2 (32-42 linked within the base module) 34-44: Not assigned

Digital input/output (failsafe) PSSu E F 2DOR 8(-T)

Connection

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

Notice

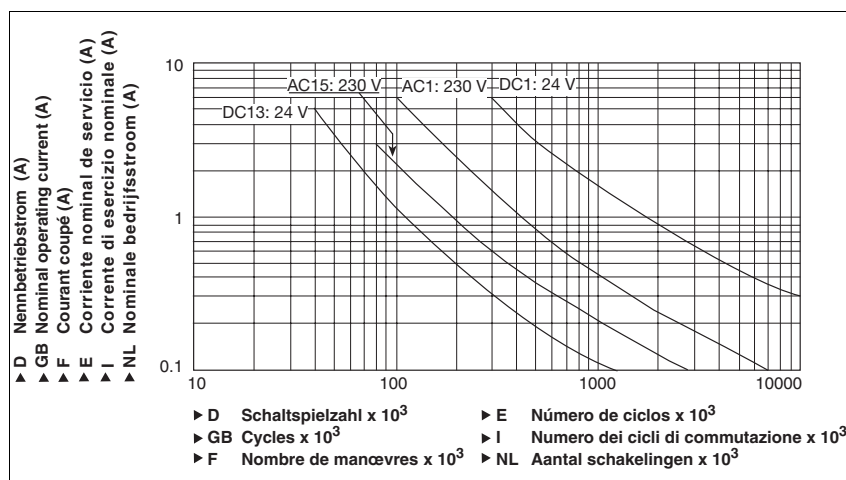
This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Digital input/output (failsafe)

PSSu E F 2DOR 8(-T)

Service life graph

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



Example

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

Provided the application requires fewer than 1 000 000 cycles, the PFH val-

ue (see technical details) can be used in the calculation.

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

freewheel diodes for spark suppression.

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

Technical details

Application range	Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0C03h
Number of FS output bits	2
Support in system environment A	
from FS firmware version for other head modules	4
from FS firmware version PSSu H F PN	1
Support in system environment B	
from head module FS firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	40 mA
Module's power consumption	0.20 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	60 mA
Module's power consumption with no load	1.50 W
Max. power dissipation of the module	2.50 W

Digital input/output (failsafe)

PSSu E F 2DOR 8(-T)

Outputs	
Number of relay outputs	2
Contact material	AgCuNi + 0.2 µm Au
External contact fuse protection ($I_K = 1$ kA) to VDE 0660	
quick	10 A
slow	6 A
Potential isolation between relay contact and periphery supply	4900 V (safe separation)
Potential isolation between relay contact and module supply	4900 V (safe separation)
Potential isolation between relay contact and C-rail	3050 V (basic insulation)
Potential isolation between relay contact 1 and relay contact 2	4900 V (safe separation)
Utilisation category in accordance with EN 60947-4-1	
Safety contacts: AC1 at 250 V	$I_{min}: 10.00$ mA , $I_{max}: 8.0$ A $P_{max}: 2000$ VA
Safety contacts: DC1 at 24 V	$I_{min}: 10.00$ mA , $I_{max}: 8.0$ A $P_{max}: 192$ W
Utilisation category in accordance with EN 60947-5-1	
Safety contacts: AC15 at 230 V	$I_{max}: 3.0$ A
Safety contacts: DC13 at 24 V (6 cycles/min)	$I_{max}: 5.0$ A
Switching capability in accordance with UL 508	
240 V AC G. P.	3.0 A
24 V DC G. P.	3.0 A
Pilot Duty	B300, R300
Permitted loads	inductive, resistive
Times	
Max. processing time for relay output when signal changes from "1" to "0"	120 ms
Max. processing time for relay output when signal changes from "0" to "1"	60 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 60 °C coated version (-T)
Max. ambient temperature in accordance with UL 508	60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes, only with protective extra low voltage coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	III
Pollution degree	2

Digital input/output (failsafe)

PSSu E F 2DOR 8(-T)

Mechanical data		
Housing material		
Front		PC
Bottom		PC
Coding		PA
Dimensions		
Height		76.0 mm
Width		25.4 mm
Depth		60.2 mm
Weight		91 g
Mechanical coding		
Type		H
Colour		yellow

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
relay outputs	single-channel	PL c (Cat. 1)	Cat. 2	-	7.60E-08	20
relay outputs	dual-channel	PL e (Cat. 4)	Cat. 4	SIL CL 3	7.78E-10	20

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

The PFH value depends on the switching frequency and the load on the relay output.
If the service life graphs are not accessible, the stated PFH value can be

used irrespective of the switching frequency and the load, as the PFH value already considers the relay's B10d value as well as the failure rates of the other components.

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

The standards current on **2005-08** apply.

Order reference	
Description	Order no.
PSSu E F 2DOR 8 (Electronic module)	312 225
PSSu E F 2DOR 8-T (Electronic module, coated version)	314 225

Base modules	Order no.
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16S-T (Base module without C-rail with screw terminals, coated version)	314 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP 2/16C-T (Base module without C-rail with cage clamp terminals, coated version)	314 629

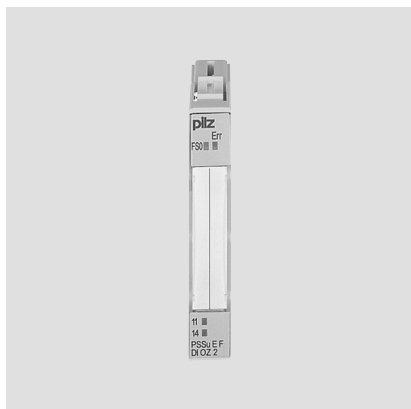
Digital input/output (failsafe)

PSSu E F 2DOR 8(-T)

Base modules	Order no.
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16S-T (Base module with C-rail and screw terminals, coated version)	314 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631
PSSu BP-C 2/16C-T (Base module with C-rail and cage clamp terminals, coated version)	314 631

Digital input/output (failsafe)

PSSu E F DI OZ 2(-T)



Electronic module with digital dual-pole outputs for failsafe applications

Approvals

	PSSu E F DI OZ 2
	◆
	◆
	◆

Module features

- ▶ 1 dual-pole digital output
 - Semiconductor technology
 - Switches to 24 V (O0+) and 0 V (O0-)
 - Current load capacity: **2.0 A**
 - Short circuit-proof
 - Overload-proof
 - Free from feedback
- ▶ 1 digital input
 - Preferably used to form a feedback loop
- ▶ 1 output, which can be configured as:
 - Test pulse output (periphery supply)
 - Output with constant voltage (periphery supply)
- ▶ LEDs for:
 - Switch status of input
 - Switch status of output
 - FS enable per output
 - Module error
- ▶ For failsafe applications in system environment A and B
- ▶ Coated version of the module: **PSSu E F DI OZ 2-T**: for increased environmental requirements

Module description

The module meets the requirements of EN IEC 61508 up to **SIL3** and EN 954-1 up to Category **4**.

It provides a dual-pole type 1 failsafe output and a type 1 failsafe input in accordance with IEC 61131-2.

The dual-pole output may be used to switch:

- ▶ Resistive loads
- ▶ Inductive loads
- ▶ Capacitive loads

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

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

Integrated protection mechanisms

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

The module has the following protection mechanisms:

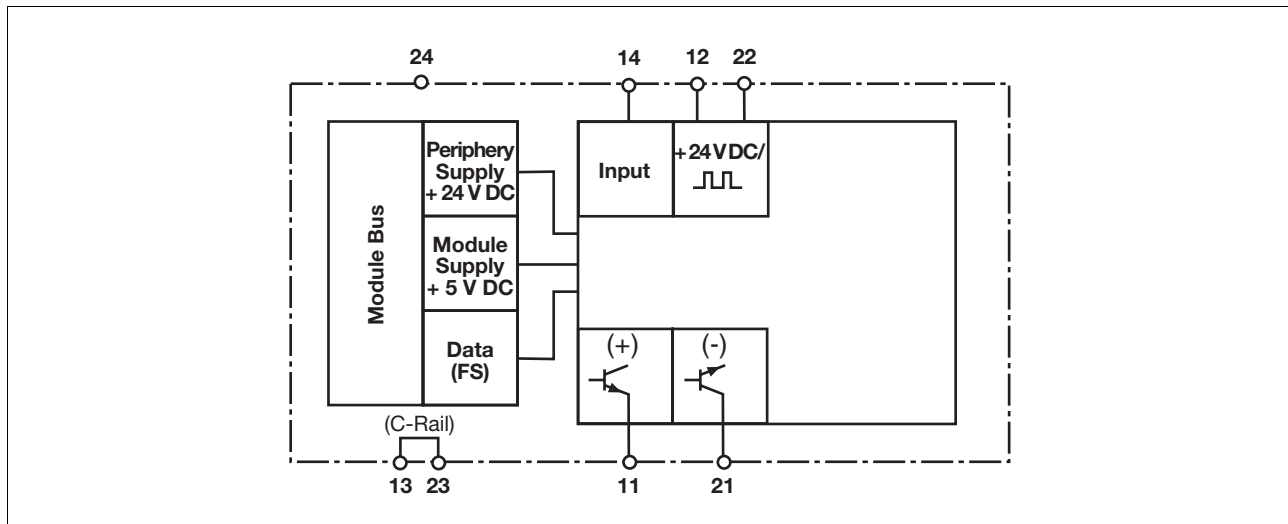
- ▶ Cyclical output tests
- ▶ Tests for shorts across the output
- ▶ Test pulse signals are always buffered for 20 ms.

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error
- ▶ Temperature error: Too warm
- ▶ Output error
- ▶ Test pulse error
- ▶ Input error

Digital input/output (failsafe) PSSu E F DI OZ 2(-T)

Block diagram



Function description

Module supply

- ▶ The module supply provides the module with voltage.

Signals at the output

- ▶ "0" signal (0 V) at the output (O0+/O0-):
 - Output is high impedance
 - No current to the load
- ▶ "1" signal (+24 V) at the output (O0+/O0-):
 - Output is low impedance
 - Current is supplied to the load

Periphery supply

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

Input

- ▶ The input status is signalled to the head module via the module bus.
- ▶ The input has an input filter.

Output

- ▶ The head module sets the output status via the module bus.
- ▶ The max. capacity at an output depends on the load (see characteristic). Connecting a higher capacity may lead to an error.
- ▶ Operation with electronic contactors has not been tested and may lead to errors. Please contact our Customer Support team if you are using electronic contactors.
- ▶ Open circuit detection

- ▶ Cannot be used as a single-pole output

Test pulse output

- ▶ Test pulses can be switched on or off.
- ▶ Test pulses are switched off in the default setting.
- ▶ When test pulses are switched off, the periphery supply is constantly available at the output.

Output test

- ▶ An output that is switched on is checked via regular off tests.
 - Test pulses for outputs that are switched on: see technical details
 - Outputs that are switched on are switched off for the duration of the test pulse.
 - The load must not switch off because of the test.
 - The output tests cannot be switched off.

Open circuit detection

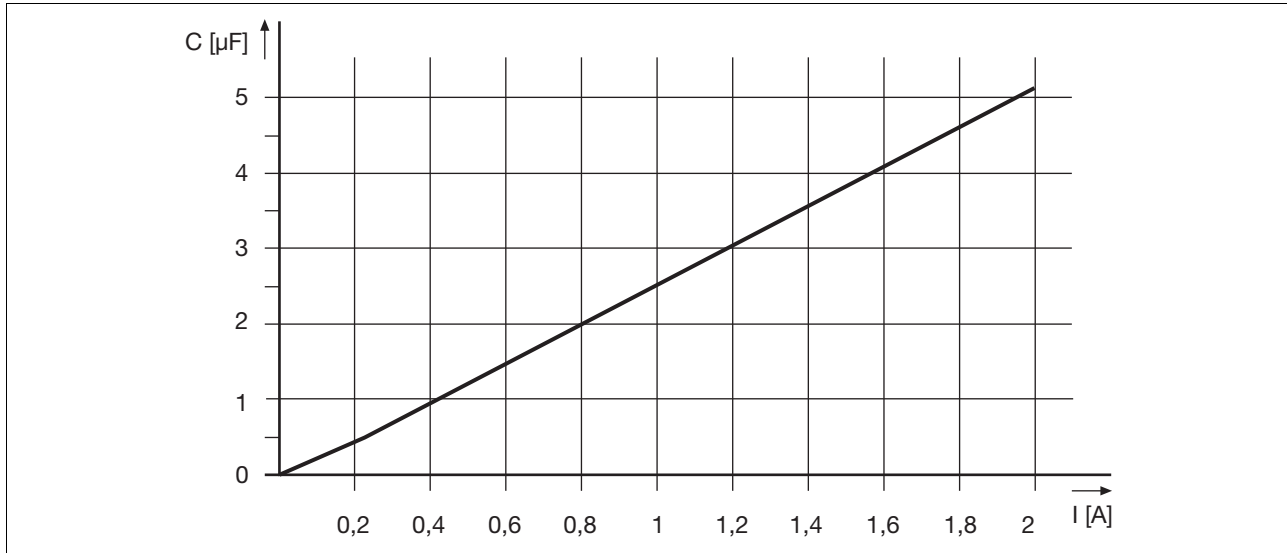
- ▶ The module will detect an open circuit between outputs O0+ and O0-.
- ▶ The result of open circuit detection is signaled to the head module via a virtual input. The result is available within the user program:
 - No open circuit detected: Status bit set
 - Open circuit detected: Status bit not set

- ▶ Loads over 3 kOhm may mistakenly be detected as an open circuit.

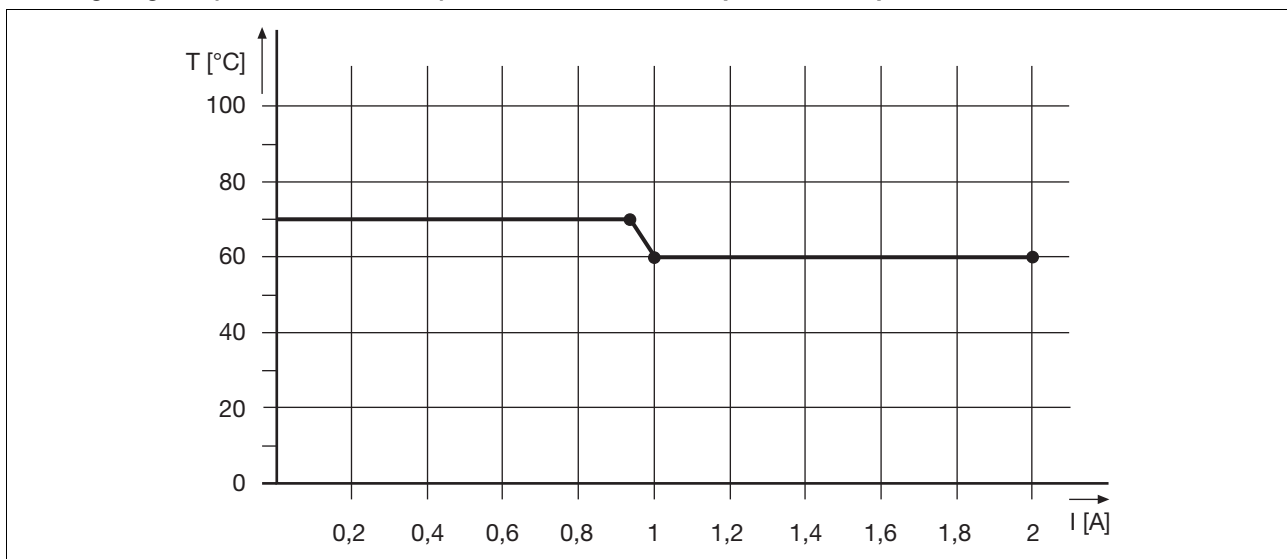
Digital input/output (failsafe)

PSSu E F DI OZ 2(-T)

Characteristic: Output capacitance C dependent on load current I



Derating diagram (PSSu E F DI OZ 2-T): Permitted ambient temperature T dependent on load current I



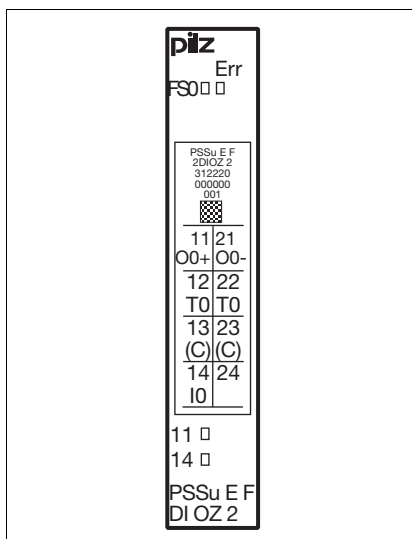
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Digital input/output (failsafe) PSSu E F DI OZ 2(-T)

Wiring

- ▶ When used for Category 4 applications in accordance with EN 954-1: connect two actuators connected in series within the load circuit!
- ▶ The actuators may be connected using unshielded cables.
- ▶ The outputs do not need suppression for inductive loads.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: O0+ output, dual-pole positive-switching	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: O0- output, dual-pole negative-switching 12-22: T0 test pulse output or +24 V output (periphery supply, 12-22 linked within the base module) 13-23: Not connected (13-23 linked within the base module) 14: Input I0 24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: O0+ output, dual-pole positive-switching	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: O0- output, dual-pole negative-switching 12-22: T0 test pulse output or +24 V output (periphery supply, 12-22 linked within the base module) 13-23: C-rail supply (13-23 linked within the base module) 14: Input I0 24: Not connected	

Digital input/output (failsafe)
PSSu E F DI OZ 2(-T)

Connection

Output circuit	Without C-rail
Single-channel operation Redundant actuator	The diagram illustrates a single-channel wiring setup. Two terminal blocks are shown side-by-side. The left block's terminals are labeled O0+, T0, RFK, and IO, corresponding to pin numbers 11, 12, 13, and 14. The right block's terminals are labeled O0-, T0, n.c., and n.c., corresponding to pin numbers 21, 22, 23, and 24. A common horizontal rail connects the top of both blocks. A switch K1 is wired between O0+ and O0-. A switch K2 is wired between T0 and RFK. A motor symbol M is connected between the L1 supply line and the IO terminal.
Dual-channel operation Redundant actuator	This diagram shows a dual-channel configuration. It features two identical terminal blocks from the previous diagram. Each block has its own switch K1 connecting O0+ to O0- and switch K2 connecting T0 to RFK. In this setup, the motor M is connected between the L1 supply line and the IO terminal of the second terminal block.

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Digital input/output (failsafe)

PSSu E F DI OZ 2(-T)

Technical details

Application range	Failsafe
Maximum achievable category in accordance with EN 954-1	4
Maximum achievable SIL value	SIL3
Module's device code	0E00h
Number of FS input bits	2
Number of FS output bits	1
Support in system environment A from FS firmware version for other head modules	4
from FS firmware version PSSu H F PN	1
Support in system environment B from head module FS firmware version	1.0.0

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	30 mA
Module's power consumption	0.15 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	28 mA
Module's power consumption with no load	0.67 W
Max. power dissipation of the module	1.50 W

Inputs

Number	1
Input voltage	24 V DC
Input current	2.6 - 7.8 mA
Min. threshold voltage when signal changes from "1" to "0"	9.0 V
Max. threshold voltage when signal changes from "0" to "1"	10.0 V
Potential isolation between input and voltage for the internal module bus	yes
Number of test pulse outputs	1
Number of outputs that can be configured as test pulses	1
Max. output current at "1" signal	0.25 A
Short circuit-proof	yes
Max. cable runs between test pulse output and input	200 m
Standard for voltage interruptions	DIN V EN V 1954, EN61131-2, EN61496-1

Outputs

Number of dual-pole semiconductor outputs	1
Short circuit-proof	yes
Potential isolation between semiconductor output and voltage for the internal module bus	yes
Typ. output current at "1" signal and rated voltage of semiconductor output	2.0 A
Permitted current range	0.00 - 2.50 A
Max. pulsed current for $t < 100$ ms	12 A
Residual current at "0" signal	0.02 mA
Max. duration of off time during self test	800 μs
Permitted loads	inductive, capacitive, resistive

Times

Max. processing time for input when signal changes from "1" to "0"	1.00 ms
Max. processing time for input when signal changes from "0" to "1"	1.00 ms

Digital input/output (failsafe)

PSSu E F DI OZ 2(-T)

Times	
Min. processing time for input when signal changes from "1" to "0"	0.50 ms
Min. processing time for input when signal changes from "0" to "1"	0.50 ms
Max. processing time for semiconductor output when signal changes from "1" to "0"	0.020 ms
Max. processing time for semiconductor output when signal changes from "0" to "1"	0.020 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	35 g
Mechanical coding	
Type	G
Colour	yellow

Digital input/output (failsafe)

PSSu E F DI OZ 2(-T)

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Input						
digital inputs	single-channel	PL d (Cat. 2)	Cat. 2	SIL CL 2	9.10E-09	20
digital inputs	dual-channel	PL e (Cat. 3)	Cat. 3	SIL CL 3	3.10E-09	20
digital inputs	light beam device	PL e (Cat. 4)	Cat. 4	SIL CL 3	2.91E-09	20
Output						
SC outputs (2-pin)	dual-channel	PL e (Cat. 4)	Cat. 4	SIL CL 3	1.37E-09	20

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

The standards current on **2005-08** apply.

Order reference

Description	Order no.
PSSu E F DI OZ 2 (Electronic module)	312 220
PSSu E F DI OZ 2-T (Electronic module, coated version)	314 220

Base modules

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619

Digital input/output (failsafe)**PSSu E F DI OZ 2(-T)**

Base modules	Order no.
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

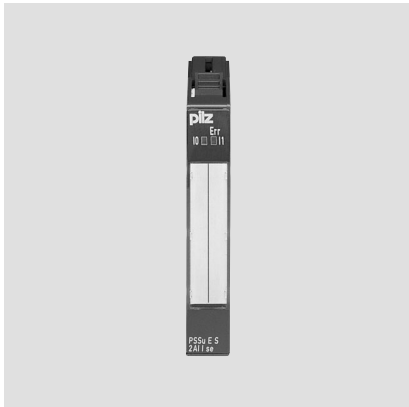
Analogue input/output (standard)

Analogue input/output (standard)

Contents	Page
Analogue input/output (standard)	
PSSu E S 2AI I se(-T)	3.6-2
PSSu E S 4AI U(-T)	3.6-8
PSSu E S 2AI U(-T)	3.6-15
PSSu E S 2AO I(-T)	3.6-22
PSSu E S 4AO U(-T)	3.6-28
PSSu E S 2AO U(-T)	3.6-35
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PSSu E AI SHT1	3.6-56

Analogue input/output (standard)

PSSu E S 2AI I se(-T)



Electronic module with analogue inputs for standard applications

Module features

- ▶ **2** analogue current inputs
- ▶ Configurable current ranges:
 - 0 ... 20 mA single-pole, referenced to earth (single-ended)
 - 4 ... 20 mA single-pole, referenced to earth (single-ended)
- ▶ Resolution: **12 bit**
- ▶ LEDs for:
 - Operating status per input
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 2AI I se-T**: for increased environmental requirements

The module **PSSu E S 2AI I se-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Approvals

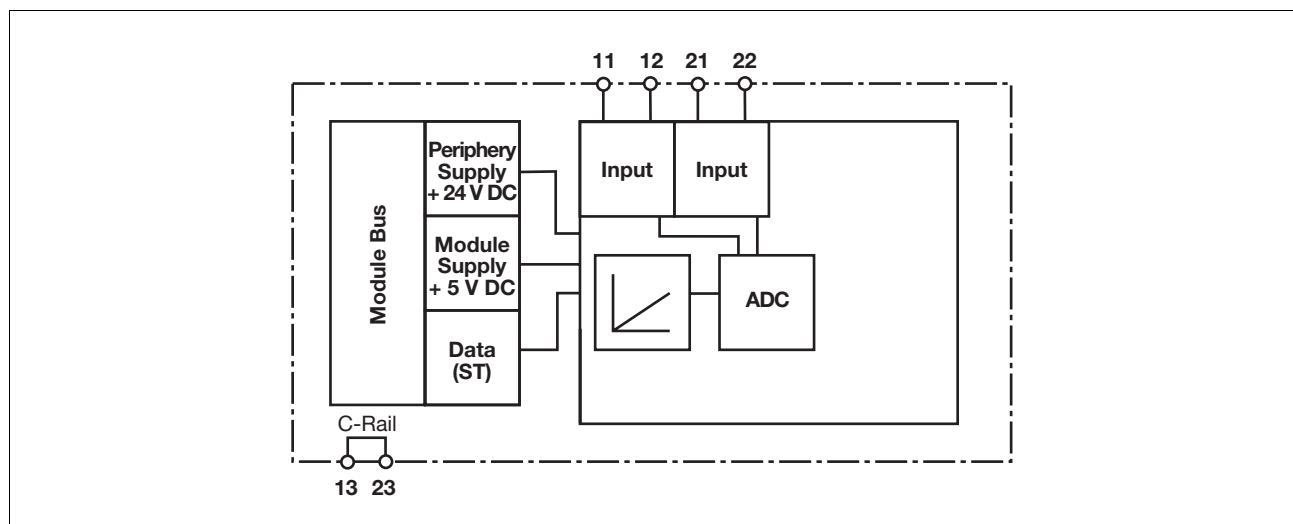
	PSSu E S 2AI I se
	◆

Module description

The module provides analogue inputs. It may be used as an input module for standard functions.

The module may be used for standard applications in system environment A and B.

Block diagram



Analogue input/output (standard)

PSSu E S 2AI I se(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Inputs

- ▶ Current ranges (configurable per module):
 - 0 ... 20 mA single-pole, referenced to earth (single-ended)
 - 4 ... 20 mA single-pole, referenced to earth (single-ended)

The input signals are read in, analogue prefiltered and converted into digital signals. The resolution is 12 bits (4095 steps) and is converted into a 16 Bit value. Additional signal processing can be defined using the system software (see schematic representation of signal processing):

- ▶ Digital filters
 - You can select one of the following filters:
 - First order FIR filter (notch mode

- can be selected)
 - Second order FIR filter (default setting)
 - First order IIR filter (upper cutoff frequency can be selected)
 - No filter

Scaling

Each input channel is calibrated externally in order to correct component dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$

- There are two scaling levels:
- manufacturer scaling and
 - user scaling.

Limit values

You can define two limit values for each input (limit value 1, limit value 2). The result of the comparison is entered in the status information if a value is above or below a limit value.

Range monitoring

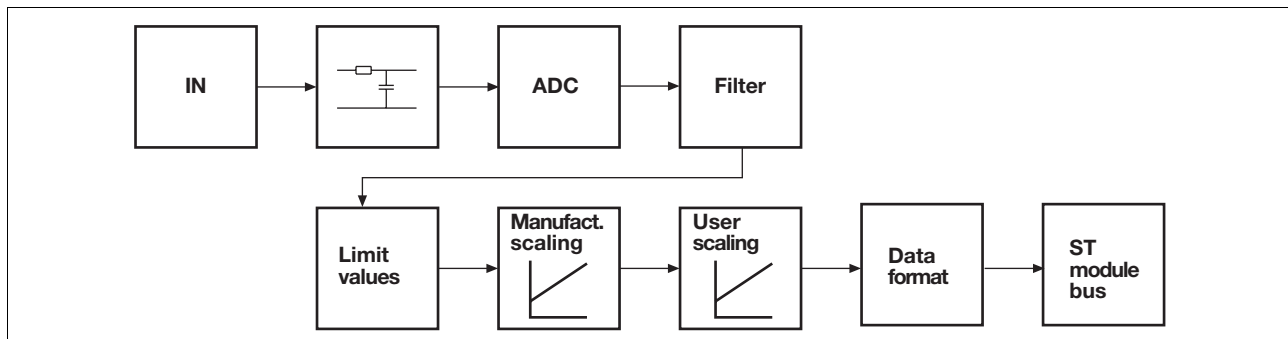
The module monitors the upper and lower limit value for each input. The evaluation is displayed in the status information.

Data formats (configurable per input)

- Two's complement (default)
- Sign and magnitude representation

The input data is transmitted to the head module via the ST module bus. As an option the module can send one piece of status information per input, either in addition to the input data or instead of the input data.

Schematic representation of signal processing:



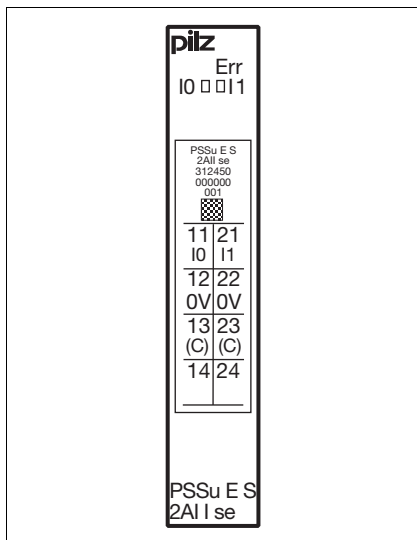
Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

The module connects the shield to the mounting rail.
- Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Analogue input/output (standard) PSSu E S 2AI I se(-T)

Front view



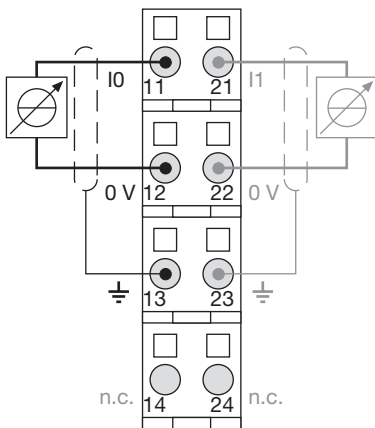
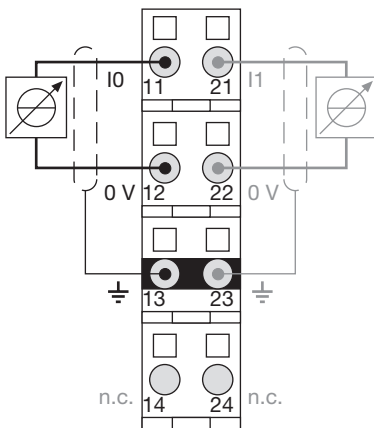
Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Input I0 21: Input I1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: Cable shield (13-23 linked within the base module) 14: Not connected 24: Not connected	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	With C-rail: 11: Input I0 21: Input I1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: C-rail supply, cable screening (13-23 linked within the base module) 14: Not connected 24: Not connected	

Analogue input/output (standard)

PSSu E S 2AI I se(-T)

Connection

Input circuit	Without C-rail	With C-rail
Current range 0 ... 20 mA Current range 4 ... 20 mA single-pole, referenced to earth		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Standard
Module's device code	0310h
Number of ST input bits	32
Number of ST status bits	16
Support in system environment A	
from ST firmware version for other head modules	7
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	4
Support in system environment B	
from head module ST firmware version	1.0.0

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	43 mA
Module's power consumption	0.22 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	1.50 W

Inputs

Number of analogue inputs	2
Type of analogue inputs	Current
Input range	0 .. 20 mA, 4 .. 20 mA
Resolution (without sign bit)	12 Bit
Max. continuous current	35 mA
Input resistance (current input)	115.000 Ohm

Analogue input/output (standard)

PSSu E S 2AI I se(-T)

Inputs	
Deviations from the measuring range limit value	
Linearity error	0.05 %
Output variable error at 25° C	0.2 %
Temperature coefficient	0.0200 %/K
Max. measurement error during EMC test	2.5 %
Analogue input filter	RC filter
Cutoff frequency	130 Hz
Potential isolation between input and voltage for the internal module bus	yes
Potential isolation between input and periphery supply	yes
Times	
Typ. processing time	1.0 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	37 g
Mechanical coding	
Type	D
Colour	dark grey

The standards current on **2005-04** apply.

Analogue input/output (standard)

PSSu E S 2AI I se(-T)

Order reference	
Description	Order no.
PSSu E S 2AI I se (Electronic module)	312 450
PSSu E S 2AI I se-T (Electronic module, coated version)	314 450
Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (standard) PSSu E S 4AI U(-T)



Electronic module with analogue inputs for standard applications

Approvals

	PSSu E S 4AI U
	◆

Module features

- ▶ **4** Analogue voltage inputs
- ▶ Voltage range:
 - 0 ... +10 V single-pole, referenced to earth (single-ended)
- ▶ Resolution: **12 bit**
- ▶ LEDs for:
 - Operating status per input
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 4AI U-T**: for increased environmental requirements

Integrated protection mechanisms

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

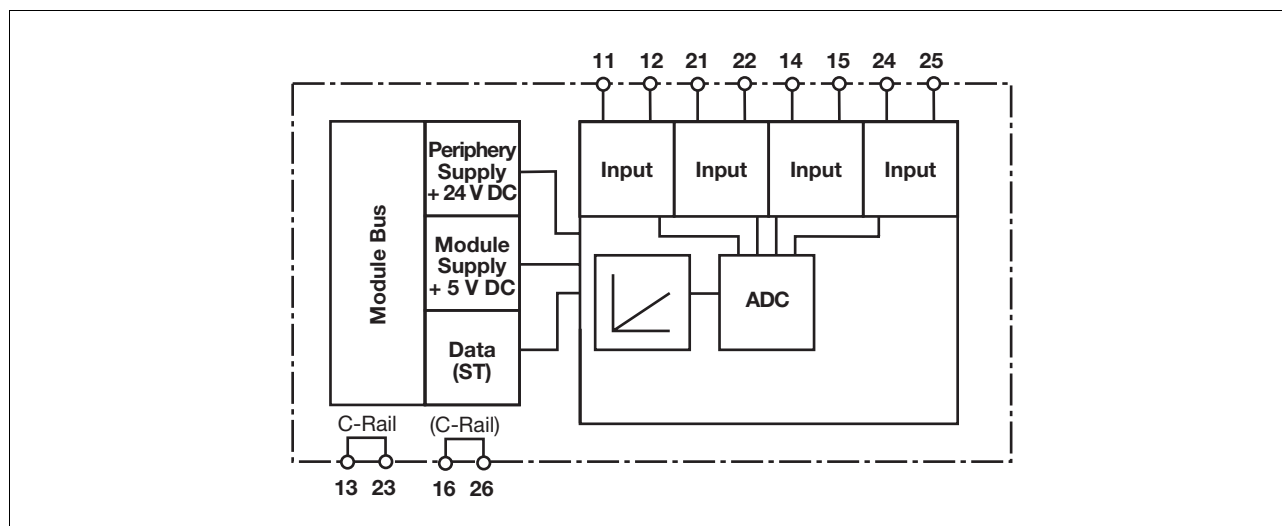
The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Module description

The module provides analogue inputs. It may be used as an input module for standard functions.

Block diagram



Analogue input/output (standard) PSSu E S 4AI U(-T)

Function description

Module supply

- The module supply provides the module with voltage.

Inputs

- Voltage range:
 - 0 ... +10 V single-pole, referenced to earth (single-ended)

The input signals are read in, analogue prefiltered and converted into digital signals. The resolution is 12 bits (4095 steps) and is converted into a 16 Bit value. Additional signal processing can be defined using the system software (see schematic representation of signal processing):

► Scaling

Each input channel is calibrated ex-works in order to correct compo-

nent dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$

There are two scaling levels:

- manufacturer scaling and
- user scaling.

► Limit values

You can define two limit values for each input (limit value 1, limit value 2). The result of the comparison is entered in the status information if a

value is above or below a limit value.

► Range monitoring

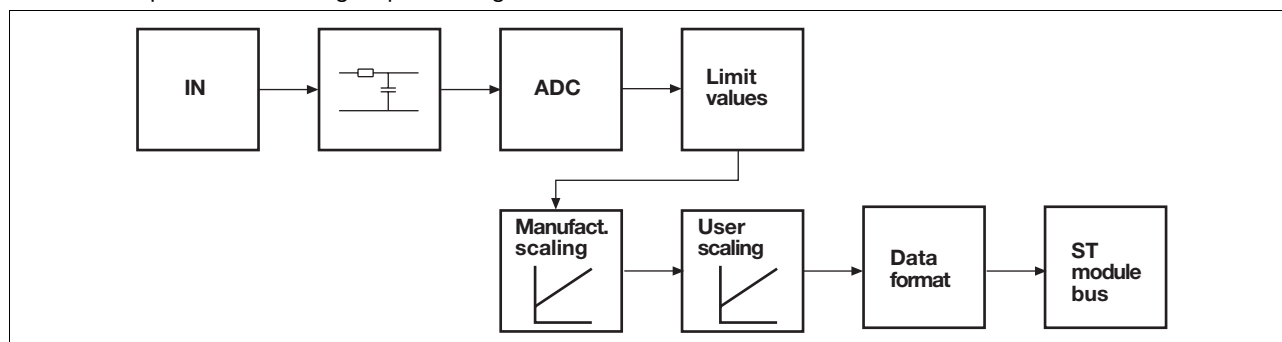
The module monitors the upper and lower limit value for each input. The evaluation is displayed in the status information.

► Data formats (configurable per input)

- Two's complement (default)
- Sign and magnitude representation

The input data is transmitted to the head module via the ST module bus. As an option the module can send one piece of status information per input, either in addition to the input data or instead of the input data.

Schematic representation of signal processing:

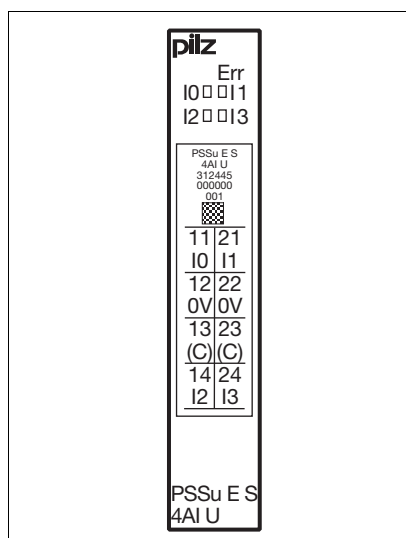


Wiring

- Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- We recommend that you use shielded signal lines.
- On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the mounting rail.
 - Connect the mounting rail to the functional earth via an earthing terminal.

- In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- Use copper wiring.
- The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Analogue input/output (standard)

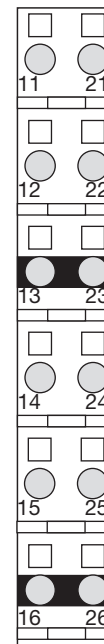
PSSu E S 4AI U(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Input I1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: Cable shield (13-23 linked within the base module) 14: Input I2 24: Input I3	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	21: Input I1 12-22: 0 V analogue (12-22-15-25 linked within the base module) 13-23: Cable shield (13-23-16-26 linked within the base module) 14: Input I2 24: Input I3 15-25: 0 V analogue (12-22-15-25 linked within the base module) 16-26: Cable shield (13-23-16-26 linked within the base module)	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Input I0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Input I1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: C-rail supply, cable screening (13-23 linked within the base module) 14: Input I2 24: Input I3	

Analogue input/output (standard) PSSu E S 4AI U(-T)

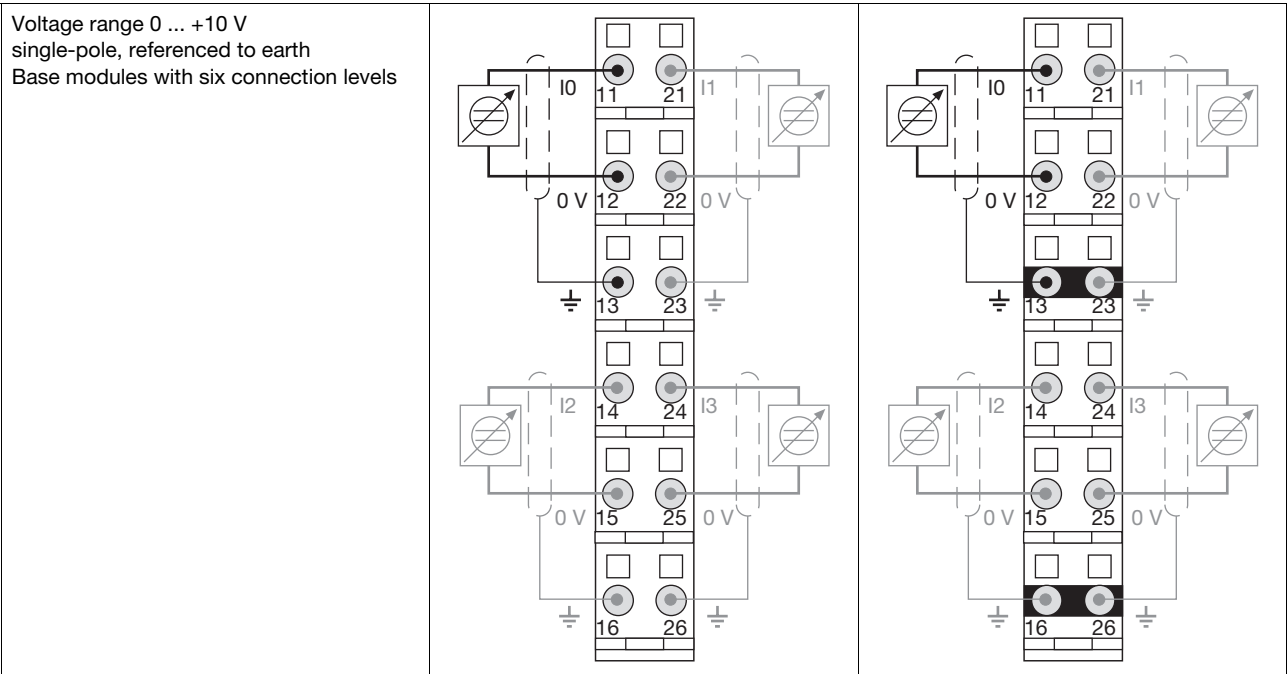
Base module	Terminal configuration
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Input I0 21: Input I1 12-22: 0 V analogue (12-22-15-25 linked within the base module) 13-23: C-rail supply, cable screening (13-23-16-26 linked within the base module) 14: Input I2 24: Input I3 15-25: 0 V analogue (12-22-15-25 linked within the base module) 16-26: C-rail supply, cable screening (13-23-16-26 linked within the base module)
Cage clamp terminals: PSSu BP-C 1/12C PSSu BP-C 1/12C-T	



Connection

Input circuit	Without C-rail	With C-rail
Voltage range 0 ... +10 V single-pole, referenced to earth Base modules with four connection levels		

Analogue input/output (standard)
PSSu E S 4AI U(-T)



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

3.6

Technical details	
Application range	Standard
Module's device code	0301h
Number of ST input bits	64
Number of ST status bits	32
Support in system environment A	
from ST firmware version for other head modules	7
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	4
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	53 mA
Module's power consumption	0.26 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	0.50 W
Inputs	
Number of analogue inputs	4
Type of analogue inputs	Voltage
Input range	0 .. 10 V (single-ended)
Resolution (without sign bit)	12 Bit
Max. continuous voltage	12 V
Input resistance (voltage input)	100 kOhm

Analogue input/output (standard)

PSSu E S 4AI U(-T)

Inputs	
Deviations from the measuring range limit value	
Linearity error	0.05 %
Output variable error at 25° C	0.2 %
Temperature coefficient	0.0200 %/K
Max. measurement error during EMC test	1.0 %
Analogue input filter	RC filter
Cutoff frequency	130 Hz
Potential isolation between input and voltage for the internal module bus	yes
Potential isolation between input and periphery supply	yes
Times	
Typ. processing time	1.0 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	37 g
Mechanical coding	
Type	D
Colour	dark grey

The standards current on **2005-04** apply.

Analogue input/output (standard)

PSSu E S 4AI U(-T)

Order reference	
Description	Order no.
PSSu E S 4AI U (Electronic module)	312 445
PSSu E S 4AI U-T (Electronic module, coated version)	314 445
Base modules	
Description	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (standard) PSSu E S 2AI U(-T)



Electronic module with analogue inputs for standard applications

Approvals

	PSSu E S 2AI U
	◆

Module features

- ▶ **2** Analogue voltage inputs
- ▶ Configurable voltage ranges:
 - 0 ... +10 V single-pole, referenced to earth (single-ended)
 - 0 ... +10 V dual-pole, differential input
 - -10 V ... +10 V dual-pole, differential input
- ▶ Resolution: **12 Bit** plus sign bit
- ▶ LEDs for:
 - Operating status per input
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 2AI U-T**: for increased environmental requirements

Module description

The module provides analogue inputs. It may be used as an input module for standard functions.

The module may be used for standard applications in system environment A and B.

The module **PSSu E S 2AI U-T** is suitable for use where there are increased environmental requirements (see Technical Details).

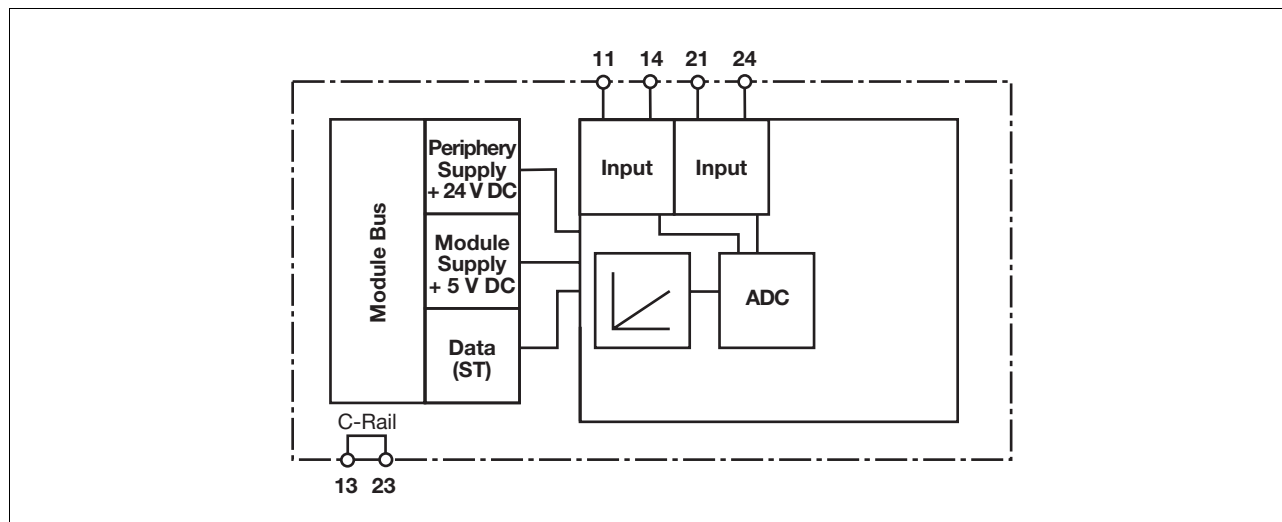
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Analogue input/output (standard)

PSSu E S 2AI U(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Inputs

- ▶ Voltage ranges (configurable per module):
 - 0 ... +10 V single-pole, referenced to earth (single-ended)
 - 0 ... +10 V dual-pole, differential input
 - -10 V ... +10 V dual-pole, differential input

The input signals are read in, analogue prefiltered and converted into digital signals. The resolution is 12 bits (4095 steps) and is converted into a 16 Bit value. Additional signal processing can be defined using the system software (see schematic representation of signal processing):

- ▶ Digital filters
 - You can select one of the following filters:

- First order FIR filter (notch mode can be selected)
- Second order FIR filter (default setting)
- First order IIR filter (upper cutoff frequency can be selected)
- No filter

Scaling

Each input channel is calibrated externally in order to correct component dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$

There are two scaling levels:

- manufacturer scaling and
- user scaling.

Limit values

You can define two limit values for each input (limit value 1, limit value 2). The result of the comparison is entered in the status information if a value is above or below a limit value.

Range monitoring

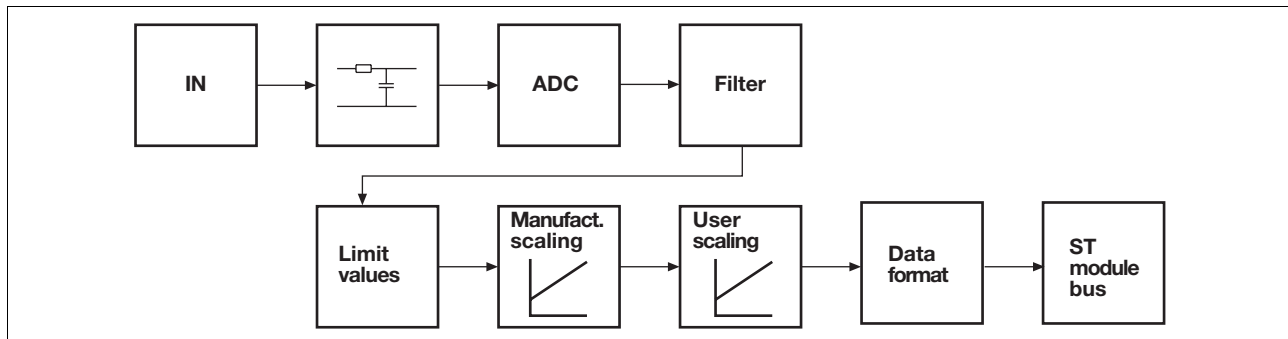
The module monitors the upper and lower limit value for each input. The evaluation is displayed in the status information.

Data formats (configurable per input)

- Two's complement (default)
- Sign and magnitude representation

The input data is transmitted to the head module via the ST module bus. As an option the module can send one piece of status information per input, either in addition to the input data or instead of the input data.

Schematic representation of signal processing:



Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

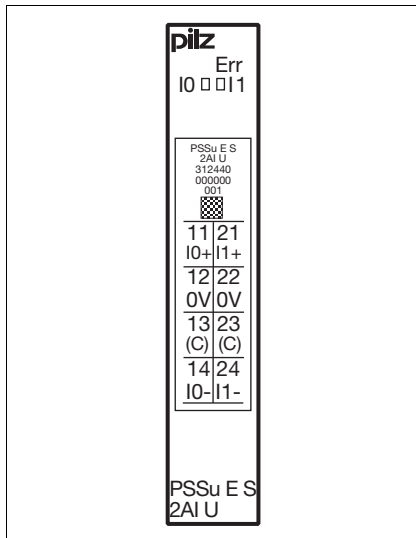
The module connects the shield to the mounting rail.

- Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Analogue input/output (standard)

PSSu E S 2AI U(-T)

Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail:	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Input I1+ 12-22: 0 V analogue (12-22 linked within the base module) 13-23: Cable shield (13-23 linked within the base module) 14: Input IO- 24: Input I1-	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail:	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Input I1+ 12-22: 0 V analogue (12-22 linked within the base module) 13-23: C-rail supply, cable screening (13-23 linked within the base module) 14: Input IO- 24: Input I1-	

Analogue input/output (standard) PSSu E S 2AI U(-T)

Connection

Input circuit	Without C-rail	With C-rail
Voltage range 0 ... +10 V single-pole, referenced to earth		
Voltage range 0 ... +10 V Voltage range -10 V ... +10 V dual-pole, differential input		
Voltage range -10 V ... +10 V Differential measurement referenced to earth In a noise susceptible environment		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Analogue input/output (standard)

PSSu E S 2AI U(-T)

Technical details	
Application range	Standard
Module's device code	0300h
Number of ST input bits	32
Number of ST status bits	16
Support in system environment A	
from ST firmware version for other head modules	7
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	4
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	43 mA
Module's power consumption	0.22 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	0.50 W
Inputs	
Number of analogue inputs	2
Type of analogue inputs	Voltage
Input range	0 .. 10 V (differential input), 0 .. 10 V (single-ended), -10 .. 10 V (differential input)
Resolution (without sign bit)	12 Bit
Max. continuous voltage	12 V
Max. common mode voltage	5 V
Input resistance (voltage input)	100 kOhm
Deviations from the measuring range limit value	
Linearity error	0.05 %
Output variable error at 25° C	0.2 %
Temperature coefficient	0.0200 %/K
Max. measurement error during EMC test	1.0 %
Analogue input filter	RC filter
Cutoff frequency	130 Hz
Potential isolation between input and voltage for the internal module bus	yes
Potential isolation between input and periphery supply	yes
Times	
Typ. processing time	1.0 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4

Analogue input/output (standard)

PSSu E S 2AI U(-T)

Environmental data	
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	37 g
Mechanical coding	
Type	D
Colour	dark grey

The standards current on **2005-04** apply.

Order reference	
Description	Order no.
PSSu E S 2AI U (Electronic module)	312 440
PSSu E S 2AI U-T (Electronic module, coated version)	314 440

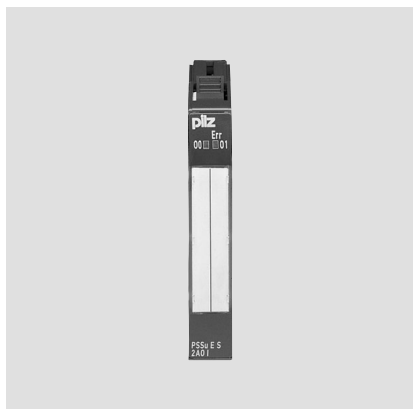
Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611

Analogue input/output (standard) PSSu E S 2AI U(-T)

Base modules	Order no.
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (standard)

PSSu E S 2AO I(-T)



Electronic module with analogue outputs for standard applications

Module features

- ▶ 2 analogue current outputs
- ▶ Configurable current ranges:
 - 0 ... 20 mA single-pole, referenced to earth (single-ended)
 - 4 ... 20 mA single-pole, referenced to earth (single-ended)
- ▶ Resolution: **12 bit**
- ▶ LEDs for:
 - Operating status per output
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 2AO I-T**: for increased environmental requirements

The module **PSSu E S 2AO I-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Approvals

	PSSu E S 2AO I
	◆

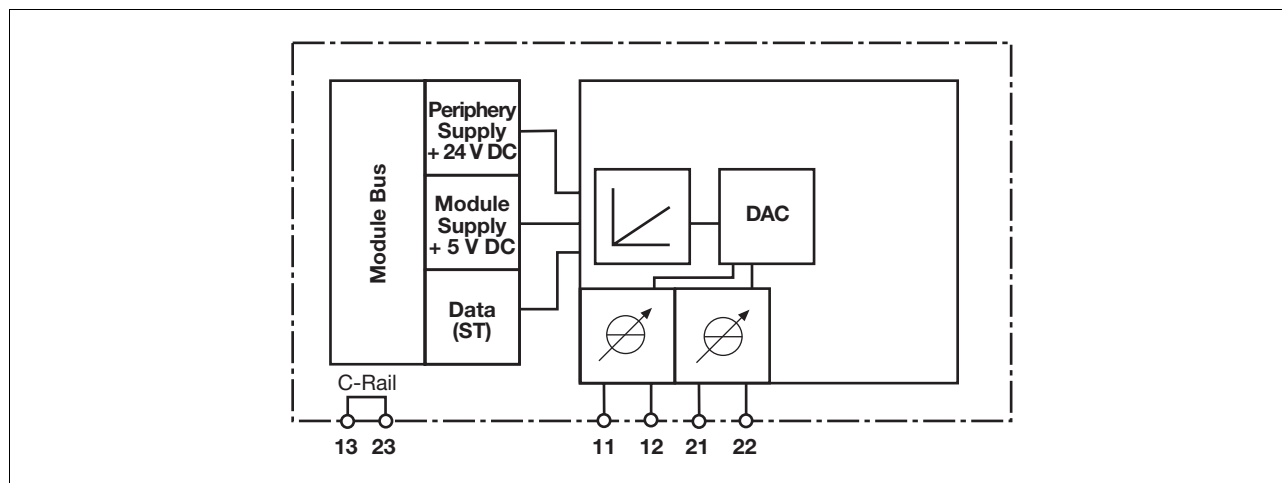
Module description

The module provides analogue outputs. It may be used as an output module for standard functions.

The module may be used for standard applications in system environment A and B.

3.6

Block diagram



Analogue input/output (standard) PSSu E S 2AO I(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The supply for the outputs is generated from the periphery supply.
- ▶ The periphery supply and the outputs are galvanically isolated.

Outputs

- ▶ Current ranges (configurable per module):
 - 0 ... 20 mA single-pole, referenced to earth (single-ended)
 - 4 ... 20 mA single-pole, referenced to earth (single-ended)

Timeout monitoring

- ▶ If the module does not receive any data from the module bus, the outputs are reset to a configurable switch-on value.

The output signals for each output are transmitted to the output module via the ST module bus. The resolution is 12 bits (4095 steps). Additional signal processing can be defined using the system software (see schematic representation of signal processing):

- ▶ Data formats (configurable per output)
 - Two's complement (default)
 - Sign and magnitude representation

Scaling

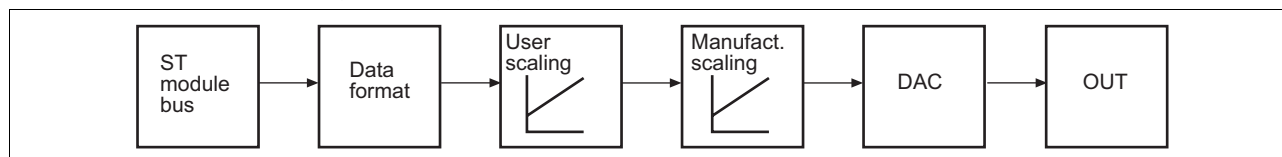
Each output channel is calibrated ex-works in order to correct component dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$

There are two scaling levels:

- manufacturer scaling and
- user scaling.

Schematic representation of signal processing:



Wiring

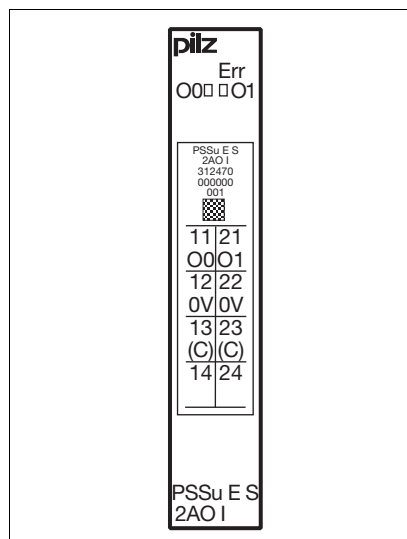
- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

The module connects the shield to the mounting rail.

 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Front view



Analogue input/output (standard)

PSSu E S 2AO I(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0 21: Output O1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: Cable shield (13-23 linked within the base module) 14: Not connected 24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	With C-rail: 11: Output O0 21: Output O1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: C-rail supply, cable shield (13-23 linked within the base module) 14: Not connected 24: Not connected	

Connection

Output circuit	Without C-rail	With C-rail
Current range 0 ... 20 mA Current range 4 ... 20 mA single-pole, referenced to earth		

Analogue input/output (standard)

PSSu E S 2AO I(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0510h
Number of ST output bits	32
Support in system environment A	
from ST firmware version for other head modules	7
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	4
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	43 mA
Module's power consumption	0.22 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	54 mA
Module's power consumption with no load	1.29 W
Max. power dissipation of the module	0.50 W
Outputs	
Number of analogue outputs	2
Type of analogue outputs	Current
Output range	0 .. 20mA, 4 .. 20mA
Resolution (without sign bit)	12 Bit
Permitted loads	inductive, resistive
Max. permitted resistive load	500 Ohm
Max. open circuit voltage	14 V
Deviations from the measuring range limit value	
Linearity error	0.15 %
Output variable error at 25° C	0.3 %
Temperature coefficient	0.02 %/K
Potential isolation between output and voltage for the internal module bus	yes
Potential isolation between output and periphery supply	yes
Times	
Typ. processing time	1.0 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4

Analogue input/output (standard)

PSSu E S 2AO I(-T)

Environmental data	
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	38 g
Mechanical coding	
Type	E
Colour	dark grey

The standards current on **2005-04** apply.

Order reference	
Description	Order no.
PSSu E S 2AO I (Electronic module)	312 470
PSSu E S 2AO I-T (Electronic module, coated version)	314 470

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611

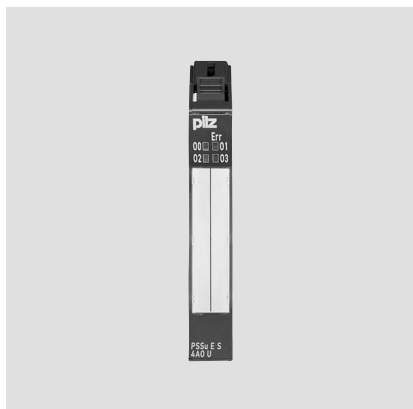
Analogue input/output (standard)

PSSu E S 2AO I(-T)

Base modules	Order no.
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (standard)

PSSu E S 4AO U(-T)



Electronic module with analogue outputs for standard applications

Approvals

	PSSu E S 4AO U
	◆

Module features

- ▶ 4 analogue voltage outputs
- ▶ Voltage range:
 - 0 ... +10 V single-pole, referenced to earth (single-ended)
- ▶ Resolution: **12 bit**
- ▶ LEDs for:
 - Operating status per output
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 4AO U-T**: for increased environmental requirements

environmental requirements (see Technical Details).

Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

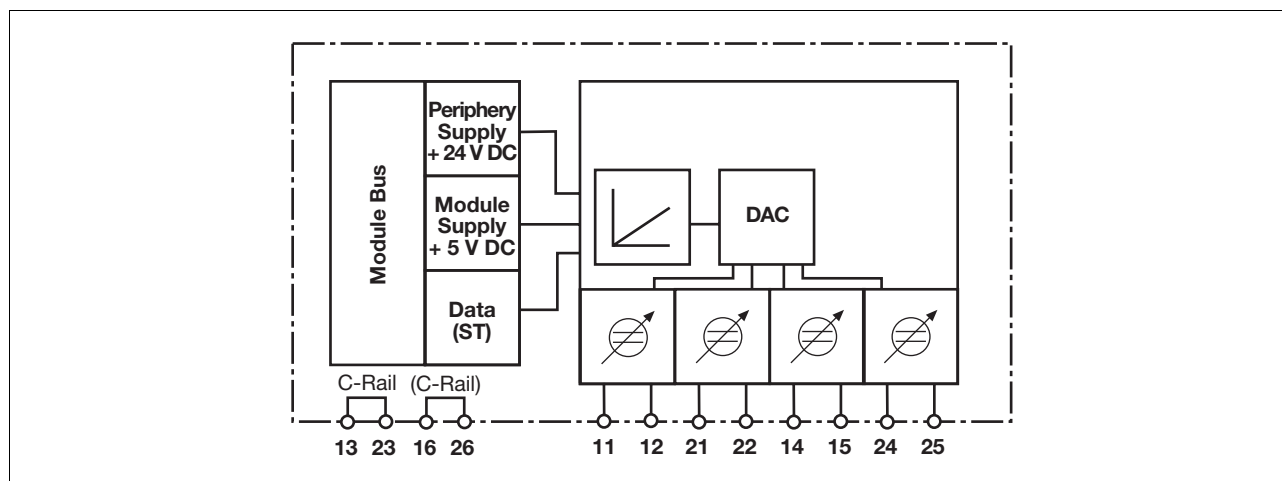
Module description

The module provides analogue outputs. It may be used as an output module for standard functions.

The module may be used for standard applications in system environment A and B.

The module **PSSu E S 4AO U-T** is suitable for use where there are increased

Block diagram



Analogue input/output (standard) PSSu E S 4AO U(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The supply for the outputs is generated from the periphery supply.
- ▶ The periphery supply and the outputs are galvanically isolated.

Outputs

- ▶ Voltage range:
 - 0 ... +10 V single-pole, referenced to earth (single-ended)

Timeout monitoring

- ▶ If the module does not receive any data from the module bus, the out-

puts are reset to a configurable switch-on value.

The output signals for each output are transmitted to the output module via the ST module bus. The resolution is 12 bits (4095 steps). Additional signal processing can be defined using the system software (see schematic representation of signal processing):

- ▶ Data formats (configurable per output)
 - Two's complement (default)
 - Sign and magnitude representation
- ▶ Scaling
 - Each output channel is calibrated ex-works in order to correct com-

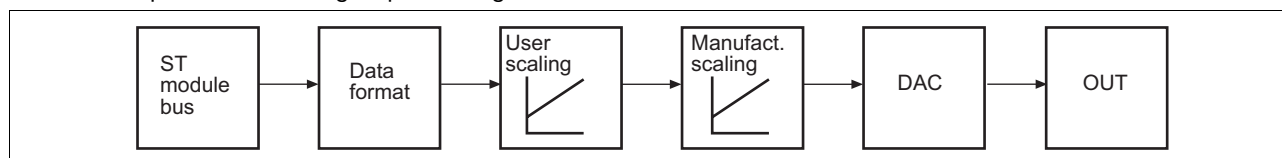
ponent dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$

There are two scaling levels:

- manufacturer scaling and
- user scaling.

Schematic representation of signal processing:

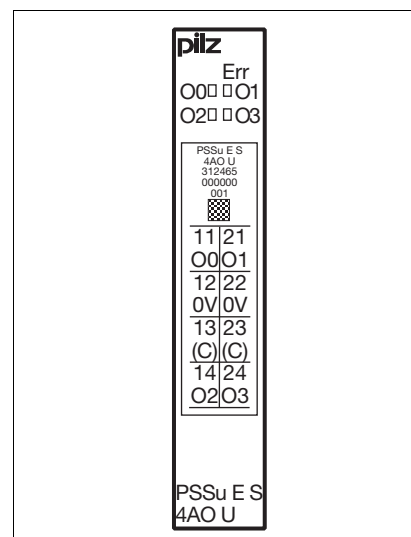


Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the mounting rail.
 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Front view



Analogue input/output (standard) PSSu E S 4AO U(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: Cable shield (13-23 linked within the base module) 14: Output O2 24: Output O3	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	21: Output O1 12-22: 0 V analogue (12-22-15-25 linked within the base module) 13-23: Cable shield (13-23-16-26 linked within the base module) 14: Output O2 24: Output O3 15-25: 0 V analogue (12-22-15-25 linked within the base module) 16-26: C-rail supply, cable shield (13-23-16-26 linked within the base module)	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1 12-22: 0 V analogue (12-22 linked within the base module) 13-23: C-rail supply, cable shield (13-23 linked within the base module) 14: Output O2 24: Output O3	

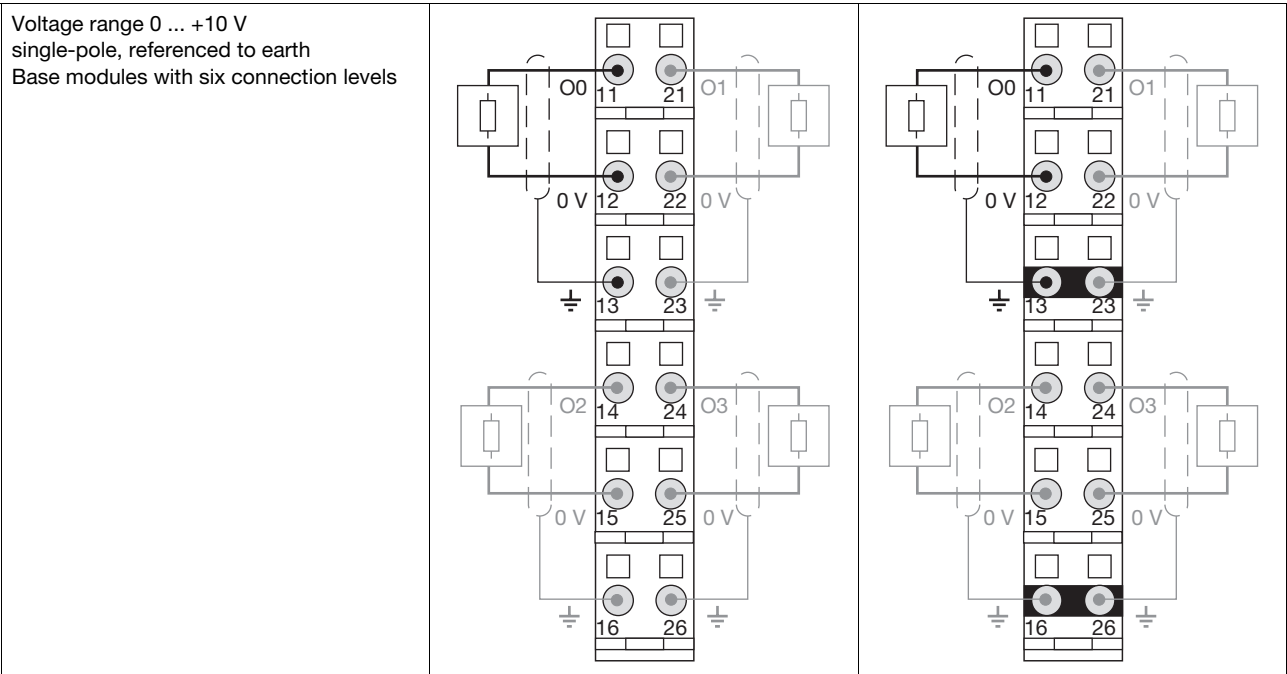
Analogue input/output (standard) PSSu E S 4AO U(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Output O0 21: Output O1 12-22: 0 V analogue (12-22-15-25 linked within the base module) 13-23: C-rail supply, cable shield (13-23-16-26 linked within the base module) 14: Output O2 24: Output O3 15-25: 0 V analogue (12-22-15-25 linked within the base module) 16-26: C-rail supply, cable shield (13-23-16-26 linked within the base module)	

Connection

Output circuit	Without C-rail	With C-rail
Voltage range 0 ... +10 V single-pole, referenced to earth Base modules with four connection levels		

Analogue input/output (standard)
PSSu E S 4AO U(-T)



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0501h
Number of ST output bits	64
Support in system environment A	
from ST firmware version for other head modules	7
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	4
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	53 mA
Module's power consumption	0.26 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	0.50 W
Outputs	
Number of analogue outputs	4
Type of analogue outputs	Voltage
Output range	0 .. 10V
Resolution (without sign bit)	12 Bit
Permitted loads	capacitive, resistive
Min. permitted resistive load	5 kOhm
Max. short circuit current	25 mA

Analogue input/output (standard)

PSSu E S 4AO U(-T)

Outputs	
Deviations from the measuring range limit value	
Linearity error	0.05 %
Output variable error at 25° C	0.2 %
Temperature coefficient	0.02 %/K
Potential isolation between output and voltage for the internal module bus	yes
Potential isolation between output and periphery supply	yes
Times	
Typ. processing time	1.0 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	37 g
Mechanical coding	
Type	E
Colour	dark grey

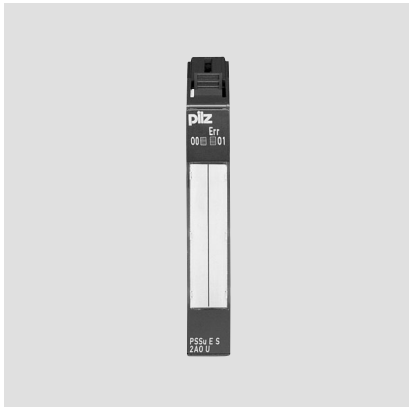
The standards current on **2005-04** apply.

Analogue input/output (standard)

PSSu E S 4AO U(-T)

Order reference	
Description	Order no.
PSSu E S 4AO U (Electronic module)	312 465
PSSu E S 4AO U-T (Electronic module, coated version)	314 465
Base modules	
Order no.	
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (standard) PSSu E S 2AO U(-T)



Electronic module with analogue outputs for standard applications

Module features

- ▶ 2 analogue voltage outputs
- ▶ Configurable voltage ranges:
 - 0 ... +10 V single-pole, referenced to earth (single-ended)
 - -10 V ... +10 V single-pole, referenced to earth (single-ended)
- ▶ Resolution: **12 Bit** plus sign bit
- ▶ LEDs for:
 - Operating status per output
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S 2AO U-T**: for increased environmental requirements

The module **PSSu E S 2AO U-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

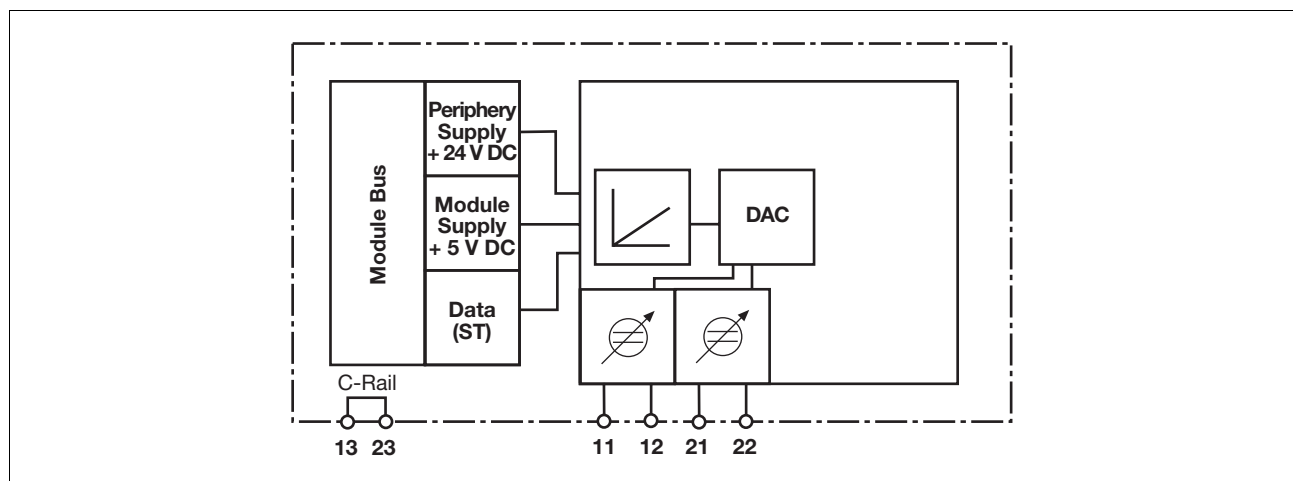
Approvals

	PSSu E S 2AO U
	◆

Module description

The module provides analogue outputs. It may be used as an output module for standard functions. The module may be used for standard applications in system environment A and B.

Block diagram



Analogue input/output (standard) PSSu E S 2AO U(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The supply for the outputs is generated from the periphery supply.
- ▶ The periphery supply and the outputs are galvanically isolated.

Outputs

- ▶ Voltage ranges (configurable per module):
 - 0 ... +10 V single-pole, referenced to earth (single-ended)
 - -10 V ... +10 V single-pole, referenced to earth (single-ended)

Timeout monitoring

- ▶ If the module does not receive any data from the module bus, the outputs are reset to a configurable switch-on value.

The output signals for each output are transmitted to the output module via the ST module bus. The resolution is 12 bits (4095 steps). Additional signal processing can be defined using the system software (see schematic representation of signal processing):

- ▶ Data formats (configurable per output)
 - Two's complement (default)
 - Sign and magnitude representation

Scaling

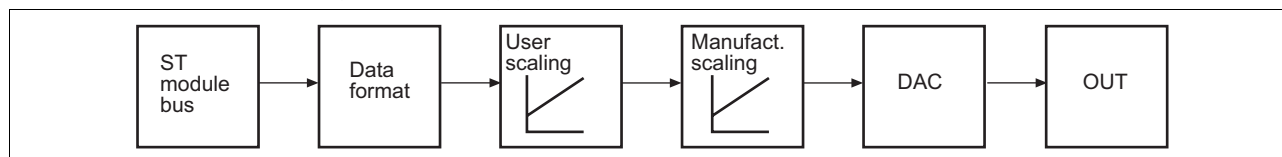
Each output channel is calibrated ex-works in order to correct component dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$

There are two scaling levels:

- manufacturer scaling and
- user scaling.

Schematic representation of signal processing:



3.6

Wiring

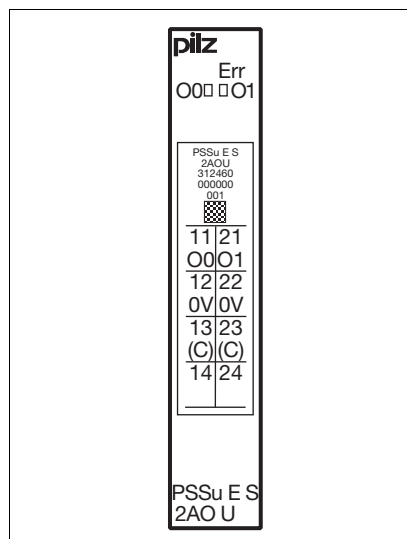
- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

The module connects the shield to the mounting rail.

 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Front view



Analogue input/output (standard)
PSSu E S 2AO U(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1	
	12-22: 0 V analogue (12-22 linked within the base module)	
	13-23: Cable shield (13-23 linked within the base module)	
	14: Not connected	
	24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output O0	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1	
	12-22: 0 V analogue (12-22 linked within the base module)	
	13-23: C-rail supply, cable shield (13-23 linked within the base module)	
	14: Not connected	
	24: Not connected	

Connection

Output circuit	Without C-rail	With C-rail
Voltage range 0 ... +10 V Voltage range -10 V ... +10 V single-pole, referenced to earth		

Analogue input/output (standard)

PSSu E S 2AO U(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0500h
Number of ST output bits	32
Support in system environment A	
from ST firmware version for other head modules	7
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	4
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	43 mA
Module's power consumption	0.22 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	0.50 W
Outputs	
Number of analogue outputs	2
Type of analogue outputs	Voltage
Output range	-10 .. 10V, 0 .. 10V
Resolution (without sign bit)	12 Bit
Permitted loads	capacitive, resistive
Min. permitted resistive load	5 kOhm
Max. short circuit current	25 mA
Deviations from the measuring range limit value	
Linearity error	0.05 %
Output variable error at 25° C	0.2 %
Temperature coefficient	0.02 %/K
Potential isolation between output and voltage for the internal module bus	yes
Potential isolation between output and periphery supply	yes
Times	
Typ. processing time	1.0 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4

Analogue input/output (standard)

PSSu E S 2AO U(-T)

Environmental data	
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	37 g
Mechanical coding	
Type	E
Colour	dark grey

The standards current on **2005-04** apply.

Order reference	
Description	Order no.
PSSu E S 2AO U (Electronic module)	312 460
PSSu E S 2AO U-T (Electronic module, coated version)	314 460
Base modules	
Order no.	
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611

Analogue input/output (standard) PSSu E S 2AO U(-T)

Base modules	Order no.
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (standard)

PSSu E S 2AI RTD(-T)



Electronic module with analogue inputs to connect temperature sensors for standard applications.

Approvals

	PSSu E S 2AI RTD
	◆

Module features

- ▶ Analogue ST inputs: 2
- ▶ Type of inputs: Resistance thermometer
- ▶ Corresponding sensors (configurable):
 - Pt100
 - Pt200
 - Pt500
 - Pt1000
 - Ni100
 - Ni120
 - Ni1000
- ▶ Resistance measurement (configurable):
 - 0 ... 4000 Ohm
- ▶ Max. resolution:
 - 0.0625 °C
 - 0.0625 Ohm
- ▶ Open circuit detection
- ▶ LEDs for:
 - Operating status per input
 - Module error
- ▶ Communication via:
 - Standard fieldbus
- ▶ For standard applications in system environment A

Module description

The module provides analogue inputs. It may be used as an input module for standard functions.

The module may be used for standard applications in system environment A. The module **PSSu E S 2AI RTD-T** is suitable for use where there are increased environmental requirements (see Technical Details).

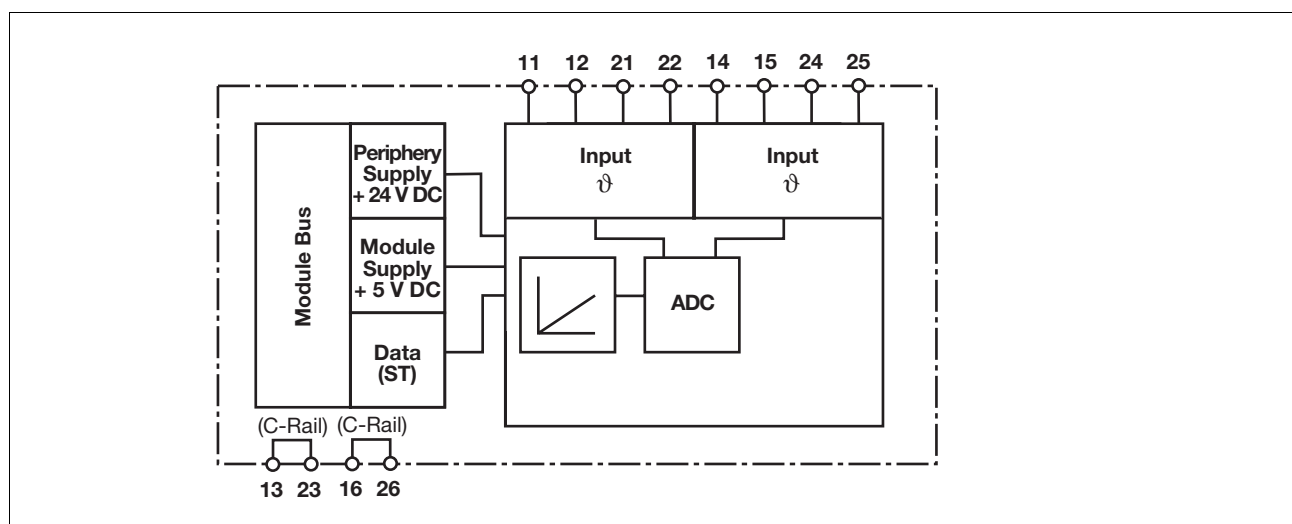
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Analogue input/output (standard) PSSu E S 2AI RTD(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The periphery supply provides the analogue section with voltage.

Inputs

- ▶ Measuring ranges (configurable per input):
 - Pt100
 - Pt200
 - Pt500
 - Pt1000
 - Ni100
 - Ni120
 - Ni1000
 - 0 ... 4000 Ohm (resistance measurement)
- ▶ Measuring circuits (configurable per input):
 - 2-wire measurement
 - 3-wire measurement
 - Connection for 4-wire sensor

The input signals are read in and converted into digital signals. The resolution depends on the configured

measuring range. Additional signal processing can be defined using the PSSuniversal Assistant (see schematic representation of signal processing):

- ▶ Digital filters
 - The filter characteristic is configurable.
- ▶ Scaling
 - Each input channel is calibrated ex-works in order to correct component dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$
 There are two scaling levels:
 - manufacturer scaling and
 - user scaling.

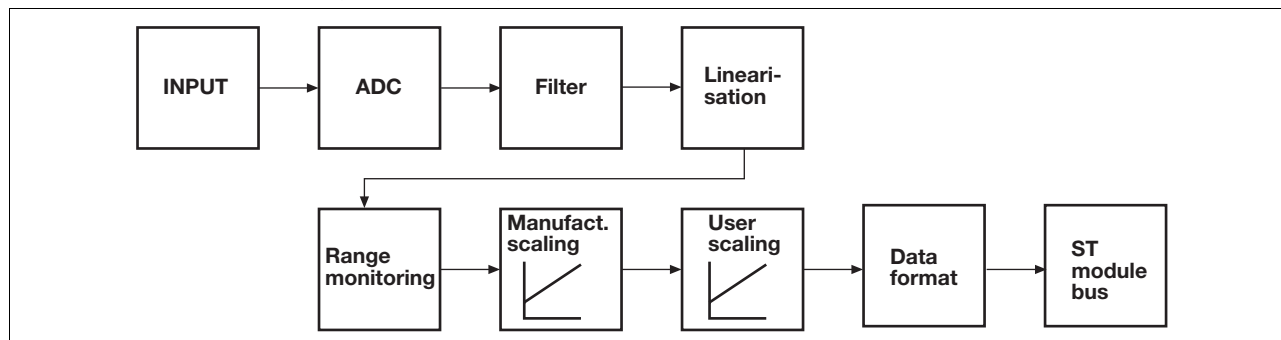
Range monitoring

The module monitors the upper and lower limit value for each input. The limit values refer to the measuring range of the sensor which is configured for the input. The evaluation is displayed in the status byte.

- ▶ Data formats (configurable per input)
 - Two's complement (default)
 - Sign and magnitude representation
- ▶ The module can output the raw value of the wire or sensor.
- ▶ The module will detect an open circuit on the measuring lines (limited when connected for a 4-wire sensor).

The input data is transmitted to the head module via the ST module bus as one 16 bit data word per input. The measured value can be read in the PII in 1/10 °C, provided the correct measuring range has been configured and the default scaling is used. As an option the module can send one status byte per input in addition to the input data.

Schematic representation of signal processing:



Wiring

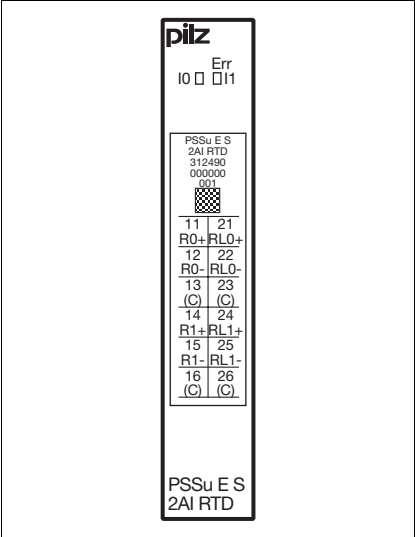
- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:

- Connect the shield as shown in the terminal configuration section. The module connects the shield to the mounting rail.
- Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Analogue input/output (standard)
PSSu E S 2AI RTD(-T)

Front view

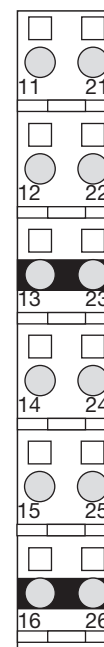


Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Input R0+ 21: Input RL0+ 12: Input R0- 22: Input RL0- 13-23: Cable shield (13-23-16-26 linked within the base module) 14: Input R1+ 24: Input RL1+ 15: Input R1- 25: Input RL1- 16-26: Cable shield (13-23-16-26 linked within the base module)	

Analogue input/output (standard) PSSu E S 2AI RTD(-T)

Base module	Terminal configuration
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Input R0+ 21: Input RL0+ 12: Input R0- 22: Input RL0- 13-23: C-rail supply, cable shield (13-23-16-26 linked within the base module) 14: Input R1+ 24: Input RL1+ 15: Input R1- 25: Input RL1- 16-26: C-rail supply, cable shield (13-23-16-26 linked within the base module)
Cage clamp terminals: PSSu BP-C 1/12C PSSu BP-C 1/12C-T	



3.6

Connection

Input circuit	Without C-rail	With C-rail
2-wire measurement		

Analogue input/output (standard)

PSSu E S 2AI RTD(-T)

3-wire measurement		
Connection for 4-wire sensor		

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Analogue input/output (standard)

PSSu E S 2AI RTD(-T)

Technical details

Application range	Standard
Module's device code	0303h
Number of ST input bits	32
Number of ST status bits	16
Support in system environment A	
from ST firmware version for other head modules	14
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	6
Support in system environment B	no

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	125 mA
Module's power consumption	0.63 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption	15 mA
Module's power consumption	0.36 W
Max. power dissipation of the module	1.00 W

Inputs

Number of analogue inputs	2
Type of analogue inputs	Resistance thermometer
Input range	
Platinum sensors in accordance with DIN EN 60751	Pt100, Pt200, P5100, Pt1000
Nickel sensors in accordance with DIN 43760	Ni100, Ni120, Ni1000
	Resistance
Typ. conversion time per input	404 ms
Resolution (LSB temperature)	0.0625 °C
Resolution (LSB resistance)	0.0625 Ohm
Measuring ranges	
Pt100	-200 - 850 °C
Pt200	-200 - 850 °C
P5100	-200 - 850 °C
Pt1000	-200 - 850 °C
Ni100	-60 - 250 °C
Ni120	-60 - 250 °C
Ni1000	-60 - 250 °C
Resistance	0 - 4000 Ohm
Filter time per input (2-wire) with attenuation	
90 dB (60 Hz)	103 ms
80 dB (50 Hz)	122 ms
65 dB (50 Hz, 60 Hz)	122 ms
69 dB (50 Hz, 60 Hz)	202 ms
74 dB (50 Hz, 60 Hz)	482 ms
Max. continuous voltage	5 V
Max. measuring current	500 µA
Input resistance	100 MOhm
Deviations from the measuring range limit value	
Output variable error at 25° C	0.3 %
Temperature coefficient	0.0040 %/K
Potential isolation between input and voltage for the internal module bus	yes
Potential isolation between input and periphery supply	yes
Times	
Typ. processing time	808.0 ms

Analogue input/output (standard)

PSSu E S 2AI RTD(-T)

Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	25g coated version (-T) 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	36 g 38 g coated version (-T)
Mechanical coding	
Type	G
Colour	dark grey

The standards current on **2008-06** apply.

Analogue input/output (standard)

PSSu E S 2AI RTD(-T)

Order reference

Description	Order no.
PSSu E S 2AI RTD (Electronic module)	312 490
PSSu E S 2AI RTD-T (Electronic module, coated version)	314 490

Base modules	Order no.
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (standard)

PSSu E S 2AI TC(-T)



Electronic module with analogue inputs to connect temperature sensors for standard applications.

Approvals

	PSSu E S 2AI TC
	◆

Module features

- ▶ Analogue ST inputs: 2
- ▶ Type of inputs: Thermocouples in accordance with EN 60584-1
- ▶ Corresponding sensors are thermocouples (configurable) with the letter codes:
 - R, S, B, J, T, E, K, N
- ▶ Voltage measurement (configurable):
 - -30 ... 30 mV
 - -60 ... 60 mV
 - -120 ... 120 mV
- ▶ Max. resolution:
 - 0.0625°C
 - 1 µV (-30 ... 30 mV)
 - 2 µV (-60 ... 60 mV)
 - 4 µV (-120 ... 120 mV)
- ▶ Reference temperature measurement
- ▶ Open circuit detection
- ▶ LEDs for:
 - Operating status per input
 - Module error
- ▶ Communication via:
 - Standard fieldbus
- ▶ For standard applications in system environment A

The module **PSSu E S 2AI TC-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Module description

The module provides analogue inputs. It may be used as an input module for standard functions.

The module may be used for standard applications in system environment A. The module **PSSu E S 2AI TC-T** is suitable for use where there are increased environmental requirements (see Technical Details).

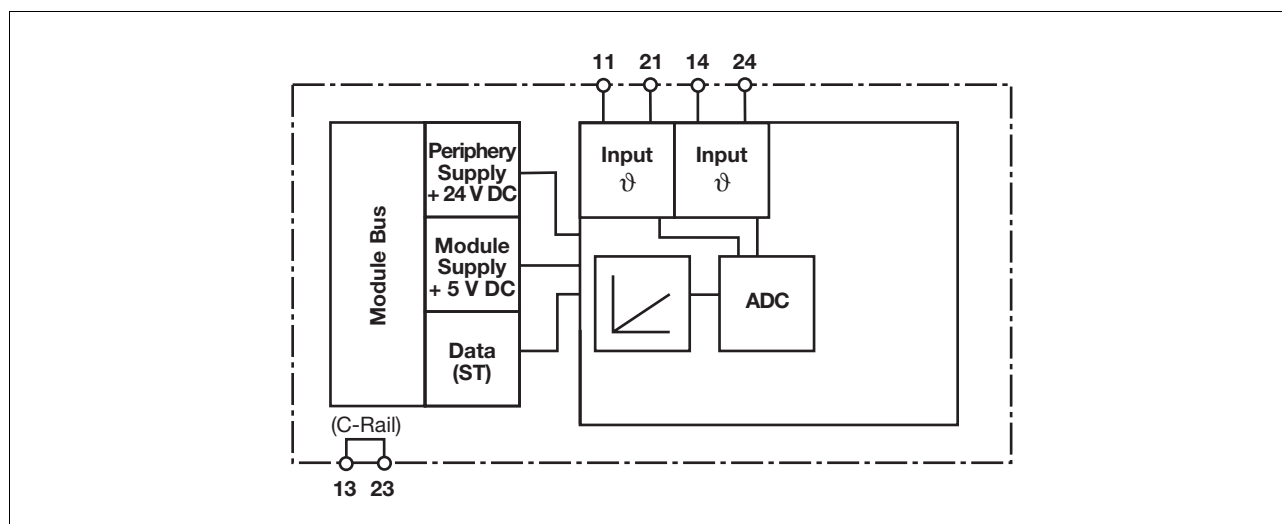
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Analogue input/output (standard) PSSu E S 2AI TC(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The periphery supply provides the analogue section with voltage.

Inputs (configurable per input)

- ▶ Corresponding sensors are thermocouples with the letter codes:
 - R, S, B, J, T, E, K, N
- ▶ Voltage measurement (configurable):
 - -30 ... 30 mV
 - -60 ... 60 mV
 - -120 ... 120 mV

The input signals are transmitted to the head module via the ST module bus as one 16 bit data word per input. Additional signal processing can be defined using the PSSUniversal Assistant (see schematic representation of signal processing):

Digital filters

The filter characteristic is configurable.

Scaling

Each input channel is calibrated ex-works in order to correct component dispersion and other influences. You can amend the scaling to correct local influences. The scaling is used to define the offset (zero point compensation) and gain (amplification factor) of the digital signal. The relationship between the signal before scaling (x), the signal after scaling (y), the offset (b) and the gain (a) is:

$$y = a * x + b$$

There are two scaling levels:

- manufacturer scaling and
- user scaling.

Open circuit detection

In the event of an open circuit on the measuring lines, the module outputs the measured value 8000_H and registers the fact that the upper limit value has been exceeded in the status byte.

Range monitoring

The module monitors the upper and lower limit value for each input. The limit values refer to the measuring range of the sensor which is configured for the input. The evaluation is displayed in the status byte.

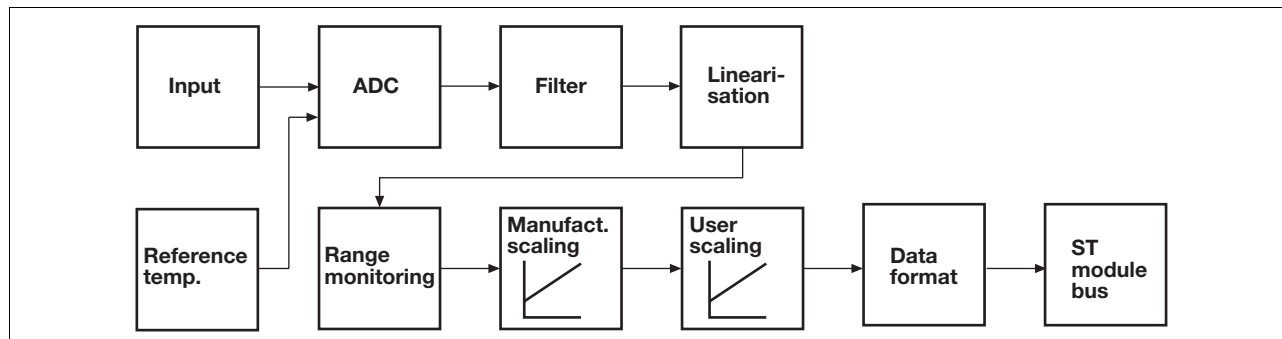
Reference temperature

In the base module, the reference temperatures at the input connection points are measured using Pt sensors.

Data formats (configurable per input)

- Two's complement (default)
- Sign and magnitude representation

Schematic representation of signal processing:



Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

The module connects the shield

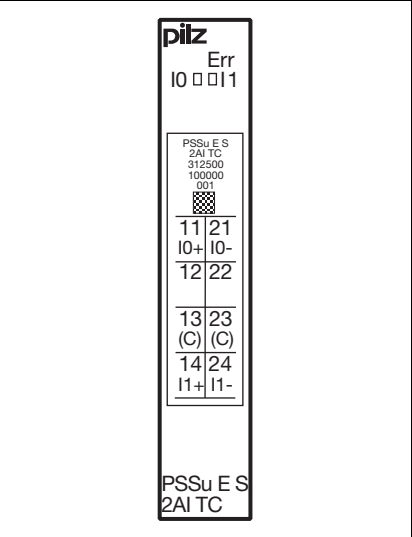
to the mounting rail.

- Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ If comparative measurement is activated, please note:
 - Use insulated thermocouples
 - Do not earth thermocouples
- ▶ With voltage measurement: Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the tech-

nical documentation applies for all other base modules.

Analogue input/output (standard)
PSSu E S 2AI TC(-T)

Front view



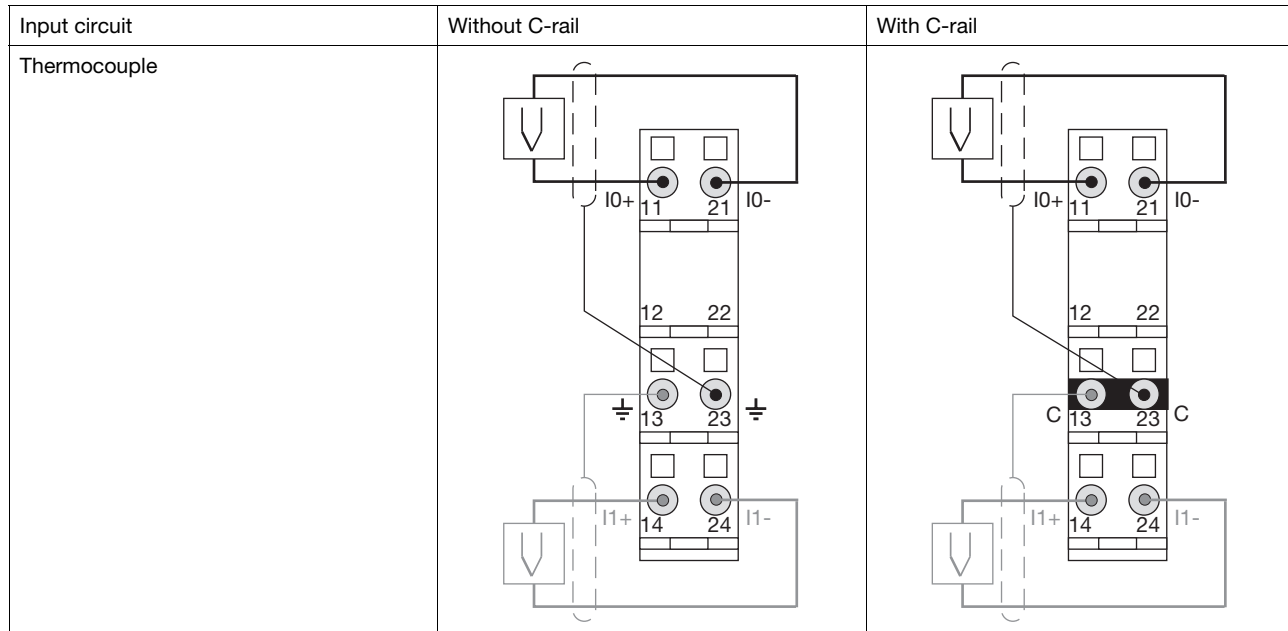
Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S-J PSSu BP 1/8S-TJ	Without C-rail: 11: Input IO+ 21: Input IO- 12-22: n. n. 13-23: Cable shield (13-23 linked within the base module) 14: Input I1+ 24: Input I1-	
Screw terminals: PSSu BP-C 1/8S-J PSSu BP-C 1/8S-TJ	With C-rail: 11: Input IO+ 21: Input IO- 12-22: n. n. 13-23: C-rail supply, cable screening (13-23 linked within the base module) 14: Input I1+ 24: Input I1-	

Analogue input/output (standard)

PSSu E S 2AI TC(-T)

Connection



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Standard
Module's device code	0304h
Number of ST input bits	32
Number of ST status bits	16
Support in system environment A	
from ST firmware version for other head modules	17
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	6
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	125 mA
Module's power consumption	0.63 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption	15 mA
Module's power consumption	0.36 W
Max. power dissipation of the module	1.00 W
Inputs	
Number of analogue inputs	2
Type of analogue inputs	Thermocouple
Input range	
Thermocouples in accordance with EN 60584-1	Type R, Type S, Type B, Type J, Type T, Type E, Type K, Type N
	Voltage

Analogue input/output (standard)

PSSu E S 2AI TC(-T)

Inputs	
Typ. conversion time per input	404 ms
Resolution (LSB temperature)	0.0625 °C
Resolution (LSB voltage)	1 µV (+/-30 mV), 2 µV (+/-60 mV), 4 µV (+/-120 mV)
Measuring ranges	
Type R	-50 - 1768 °C
Type S	-50 - 1768 °C
Type B	600 - 1820 °C
Type J	-210 - 1200 °C
Type T	-200 - 400 °C
Type E	-200 - 1000 °C
Type K	-200 - 1372 °C
Type N	-200 - 1300 °C
Voltage	+/-30 mV, +/-60 mV, +/-120 mV
Output variable measurement error at 25 °C across the whole measuring range	
Types R, S, J, E, K, N	0.5 %
Type T	1.3 %
Type B	0.1 %
+/-30 mV, +/-60 mV, +/-120 mV	0.1 %
Measurement error with positive measured values	
Types R, S, J, E, K, N	0.3 %
Type T	0.7 %
Filter time per input (2-wire) with attenuation	
90 dB (60 Hz)	103 ms
80 dB (50 Hz)	122 ms
65 dB (50 - 60 Hz)	122 ms
69 dB (50 - 60 Hz)	202 ms
74 dB (50 - 60 Hz)	482 ms
Max. continuous voltage	5 V
Input resistance	100 MOhm
Deviations from the measuring range limit value	
Temperature coefficient	
Types R, S, J, E, K, N	0.0040 %/K
Type T	0.0090 %/K
Type B	0.0020 %/K
+/-30 mV, +/-60 mV, +/-120 mV	0.0020 %/K
Potential isolation between input and voltage for the internal module bus	yes
Potential isolation between input and periphery supply	yes
Times	
Typ. processing time	808.0 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
	-40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)
Max. operating height above sea level	2000 m
	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2

Analogue input/output (standard)

PSSu E S 2AI TC(-T)

Environmental data	
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	35 g 36 g coated version (-T)
Mechanical coding	
Type	H
Colour	dark grey

The standards current on **2009-03** apply.

Order reference	
Description	Order no.
PSSu E S 2AI TC (Electronic module)	312 500
PSSu E S 2AI TC-T (Electronic module, coated version)	314 500
Base modules	Order no.
PSSu BP 1/8S-J (Base module without C-rail with screw terminals, integrated cold junction compensation)	312 602
PSSu BP 1/8S-TJ (Base module without C-rail with screw terminals, integrated cold junction compensation, coated version)	314 602
PSSu BP 1/8C-J (Base module without C-rail with cage clamp terminals, integrated cold junction compensation)	312 603
PSSu BP 1/8C-TJ (Base module without C-rail with cage clamp terminals, integrated cold junction compensation, coated version)	314 603

Analogue input/output (standard)

PSSu E S 2AI TC(-T)

Base modules	Order no.
PSSu BP-C 1/8S-J (Base module with C-rail and screw terminals, integrated cold junction compensation)	312 612
PSSu BP-C 1/8S-TJ (Base module with C-rail and screw terminals, integrated cold junction compensation, coated version)	314 612
PSSu BP-C 1/8C-J (Base module with C-rail and cage clamp terminals, integrated cold junction compensation)	312 613
PSSu BP-C 1/8C-TJ (Base module with C-rail and cage clamp terminals, integrated cold junction compensation, coated version)	314 613

Analogue input/output (standard) PSSu E AI SHT1



Electronic module to scale current for analogue current input modules

Module features

The product has the following features:

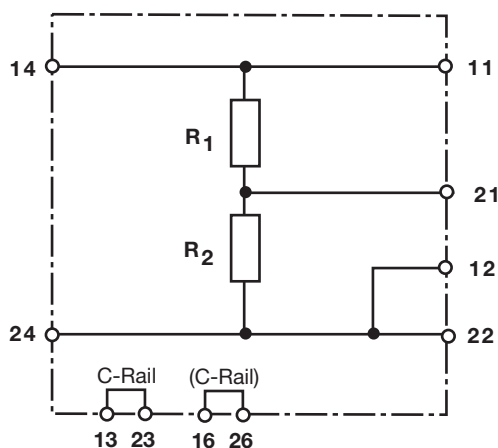
- ▶ **1** Analogue current input
Current range:
0 ... 0.6 A, single-pole, referenced to earth
- ▶ **2** analogue current outputs
Current range:
0 .. 20mA, single-pole, referenced to earth
 - Scaling of input current **1:100** and **1:200**
 - Evaluation via analogue input module with an input resistance = 115 Ohm, (e.g. PSSu E F AI I)
- ▶ For standard applications in system environment A

Module description

The module provides shunts to scale the current for analogue inputs. The module may be used in conjunction with analogue current inputs (e.g. PSSu E F AI I).

The module may be used for standard applications in system environment A.

Block diagram



Analogue input/output (standard) PSSu E AI SHT1

Function description

The electronic module **PSSu E AI SHT1** contains two shunts for scaling an input current I_{I0} (connection I0). The two current outputs I_{O0} (connection O0+) and I_{O1} (connection O1+) are evaluated by analogue current inputs.

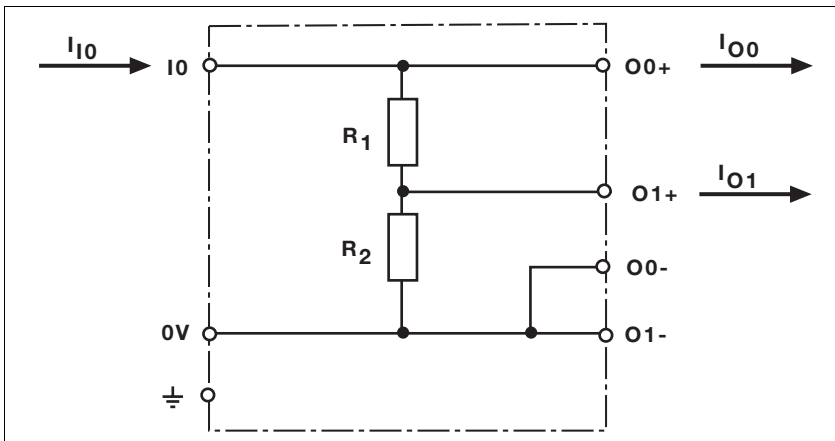
Scaling is applied during evaluation via an analogue input module with an input resistance of 115 Ohm, (e.g. PSSu E F AI I)

- ▶ Scaling factor with resistance $R_1 + R_2 = 1.163 \text{ Ohm}$ (connections O0+/O0-):
 $I_{O0} : I_{I0} = 1:100$

- ▶ Scaling factor with resistance $R_2 = 0.583 \text{ Ohm}$ (connections O1+/O1-):
 $I_{O1} : I_{I0} = 1:200$

Example:

- ▶ Input current $I_{I0} = 500 \text{ mA}$
- ▶ Output current I_{O0} at $R_1 + R_2 = 5 \text{ mA}$
- ▶ Output current I_{O1} at $R_2 = 2.5 \text{ mA}$

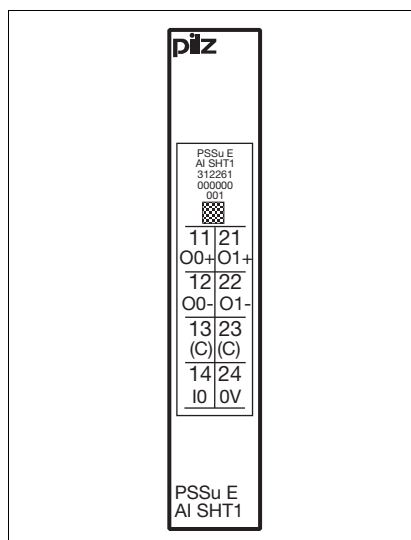


Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the mounting rail.
 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Front view

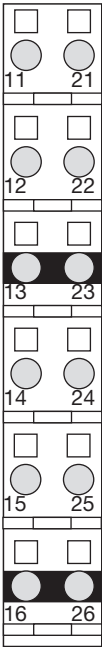


Analogue input/output (standard) PSSu E AI SHT1

Terminal configuration

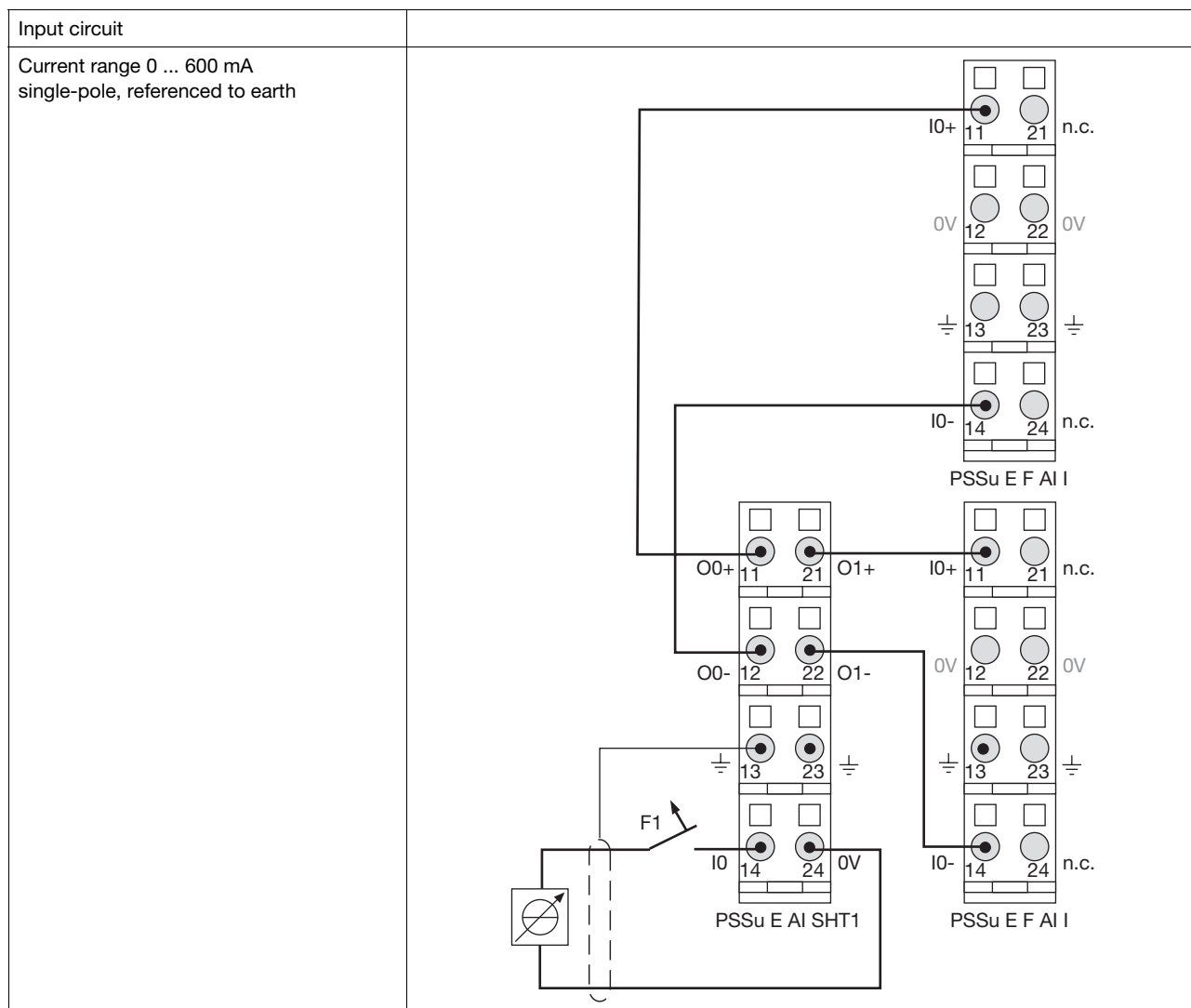
Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output O0+	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Output O1+ 12: Output O0- 22: Output O1- 13-23: Shield connection (13-23 linked within the base module) 14: Input I0 24: 0 V analogue	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output O0+	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Output O1+ 12: Output O0- 22: Output O1- 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Input I0 24: 0 V analogue	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Output O0+	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	21: Output O1+ 12: Output O0- 22: Output O1- 13-23: Shield connection (13-23-16-26 linked within the base module) 14: Input I0 24: 0 V analogue 15: Output O0- 25: Output O1- 16-26: Shield connection (13-23-16-26 linked within the base module)	

Analogue input/output (standard)
PSSu E AI SHT1

Base module	Terminal configuration	
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Output O0+ 21: Output O1+ 12: Output O0- 22: Output O1- 13-23: C-rail supply, shield connection (13-23-16-26 linked within the base mod- ule) 14: Input I0 24: 0 V analogue 15: Output O0- 25: Output O1- 16-26: C-rail supply, shield connection (13-23-16-26 linked within the base mod- ule)	

Analogue input/output (standard) PSSu E AI SHT1

Connection



NOTICE

Input I0 must be protected with a circuit breaker F1, 1 A, characteristic C.

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Analogue input/output (standard)

PSSu E AI SHT1

Technical details

Application range	Standard
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	no

Electrical data

Inputs	
Number of analogue inputs	1
Type of analogue inputs	Current
Input range	0 ... 0.6 A
Max. power dissipation of the module	0.50 W
Max. current for max.120 s	2.0 A

Outputs	
Number of analogue outputs	2
Output range	0 .. 20mA
Output variable error at 25° C	1.0 %
Scaling	
Analogue output O0	1:100
Analogue output O1	1:200
Internal resistance	
Connection O0+/O0-	1.163 Ohm
Connection O1+/O1-	0.583 Ohm

Environmental data

Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP 20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2

Analogue input/output (standard)

PSSu E AI SHT1

Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	29 g
Mechanical coding	
Type	E
Colour	light grey

The standards current on **2005-04** apply.

Order reference	
Description	Order no.
PSSu E AI SHT1 (Electronic module)	312 261

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP-C 1/12S (Base module with C-rail and screw terminals)	312 620
PSSu BP-C 1/12C (Base module with C-rail and cage clamp terminals)	312 621



Analogue input/output (failsafe)

Analogue input/output (failsafe)

Contents	Page
Analogue input/output (failsafe)	
PSSu E F AI I(-T)	3.7-2
PSSu E F AI U(-T)	3.7-12

Analogue input/output (failsafe)

PSSu E F AI I(-T)



Electronic module with analogue input for failsafe applications.

Approvals

	PSSu E F AI I
	◆
	◆
	◆

Module features

- ▶ 1 Analogue current input
- ▶ Current range:
0 ... 25,59375 mA Single-pole, referenced to earth
- ▶ Resolution:
12 Bit (representation of negative values in the two's complement)
- ▶ LEDs for:
 - Operating status per input
 - Module error
- ▶ For failsafe applications in system environment B (automation system PSS 4000)
- ▶ Coated version of the module:
PSSu E F AI I-T: for increased environmental requirements

Module description

The module provides an analogue input.

The analogue input meets the requirements of EN IEC 62061: **SIL CL 2**. To achieve higher safety values, two analogue inputs will need to be used. **PL e (Cat. 4)** and **SIL CL 3** can be achieved as a result of redundant input data.

The module guarantees functional safety, but not the safety of the entire process.

Please note the following during configuration and within the user program:

- ▶ With 1-channel operation, check the feasibility of the measured value with an anticipated measured value in order to detect measurement errors and offset errors on the sensor, or to detect open circuit and short circuit between sensor and module.
- ▶ With 1-channel operation, use a sensor that meets the requirements of EN IEC 62061: SIL CL 2.
- ▶ With 2-channel operation, check the feasibility by using two inputs and two sensors. Take appropriate measures to avoid common cause errors in the sensor technology, by using diverse sensors or a separate supply voltage for the sensors, for example.
- ▶ Monitor a defined measuring range to detect open circuit or short circuit: we recommend 4 ... 20 mA.

The measured value is attenuated through the input filter. At the cutoff frequency, the amplitude of the measured value is 70 % of the amplitude of the input signal.

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

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

Integrated protection mechanisms

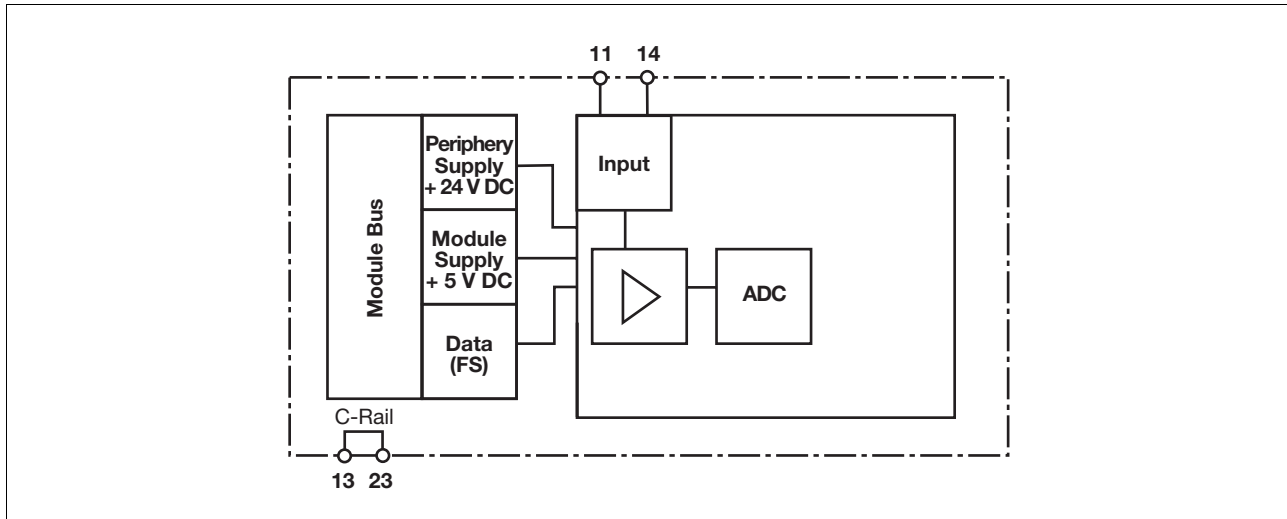
When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error

Analogue input/output (failsafe) PSSu E F AI I(-T)

Block diagram



Function description

Module supply

- The module supply provides the module with voltage.

Input signal processing

- The analogue input signal is prefiltered, amplified and stored as a digital measured value.
- A "dynamised" value is also generated. This value is formed from the

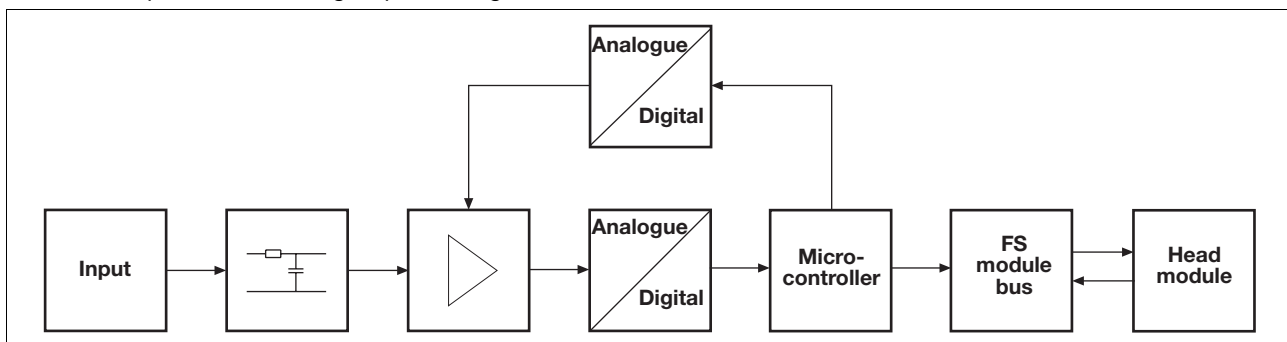
sum of the measured value and a test value.

- For the feasibility check, the test value is subtracted from the measured value. The measured value that has been read in is then compared with the "dynamised" value.
- The feasibility of the value is checked in the head module. It is

feasible if it varies at most by a small, defined tolerance value.

- If the difference between the two values lies within a certain tolerance, the measured value is valid. If the difference lies outside that tolerance, the measured value will be re-recorded. If this value also lies outside the tolerance, an error message will be issued.

Schematic representation of signal processing:



Analogue input/output (failsafe) PSSu E F AI I(-T)

Resolution of analogue-digital converter

- ▶ The resolution of the analogue-digital converter is 12 bits and therefore has 4096 quantisation levels.
- ▶ With 1-channel operation, a resolution of 16 levels is safe and tested.
- ▶ The safety-related accuracy within the module is max. 5 % of the measuring range limit value. It must be considered across the whole measuring range, particularly in the zero point range.

WARNING!

Limit values selected in the user program too low or too high!

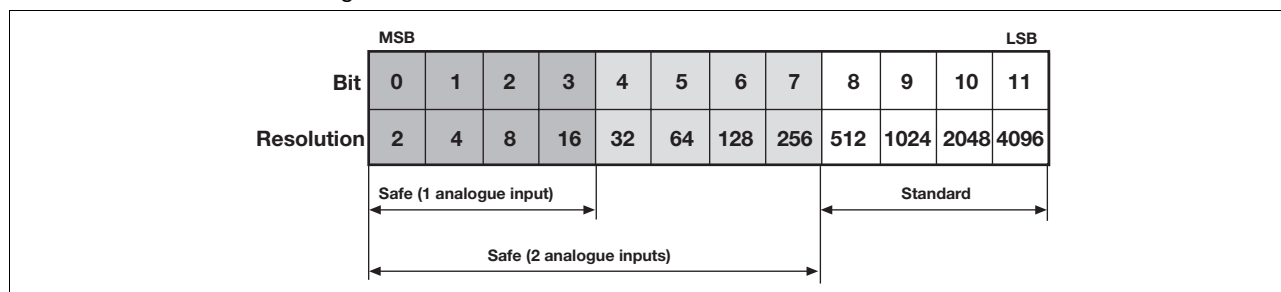
Risk of serious injury and death!

- ▶ Take into account the max. safety-related accuracy when defining the limit values in the user program.
- ▶ For safe resolution up to 256 levels you will need to use two analogue inputs and to carry out a feasibility test.
- ▶ With 2-channel mode, the achievable safety-related accuracy will de-

pend on the module's measuring accuracy and sensors.

- ▶ The module's measuring accuracy is calculated by adding all deviations from the measuring range limit value (see chapter entitled "Technical Details"). With 2-channel, diverse operation, this value is doubled in the worst case.

Illustration of the resolution ranges:

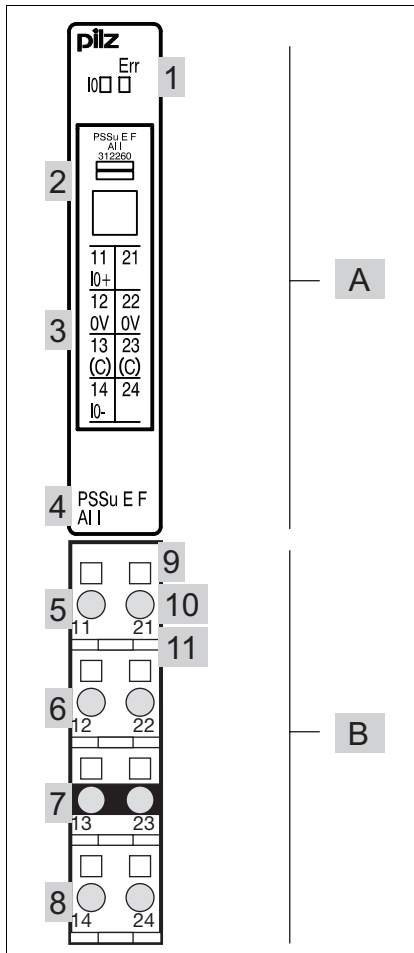


Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the mounting rail.
 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Analogue input/output (failsafe) PSSu E F AI I(-T)

Front view



Analogue input/output (failsafe) PSSu E F AI I(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Input I0+	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Not connected 12-22: 0 V analogue (12-22 linked within the base module) 13-23: Shield connection (13-23 linked within the base module) 14: Input I0- 24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Input I0+	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Not connected 12-22: 0 V analogue (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Input I0- 24: Not connected	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Input I0+	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	21: Not connected 12-22: GND (12-22-15-25 linked within the base module) 13-23: Shield connection (13-23-16-26 linked within the base module) 14: Input I0- 24: Not connected 15-25: GND (12-22-15-25 linked within the base module) 16-26: Shield connection (13-23-16-26 linked within the base module)	

Analogue input/output (failsafe)
PSSu E F AI I(-T)

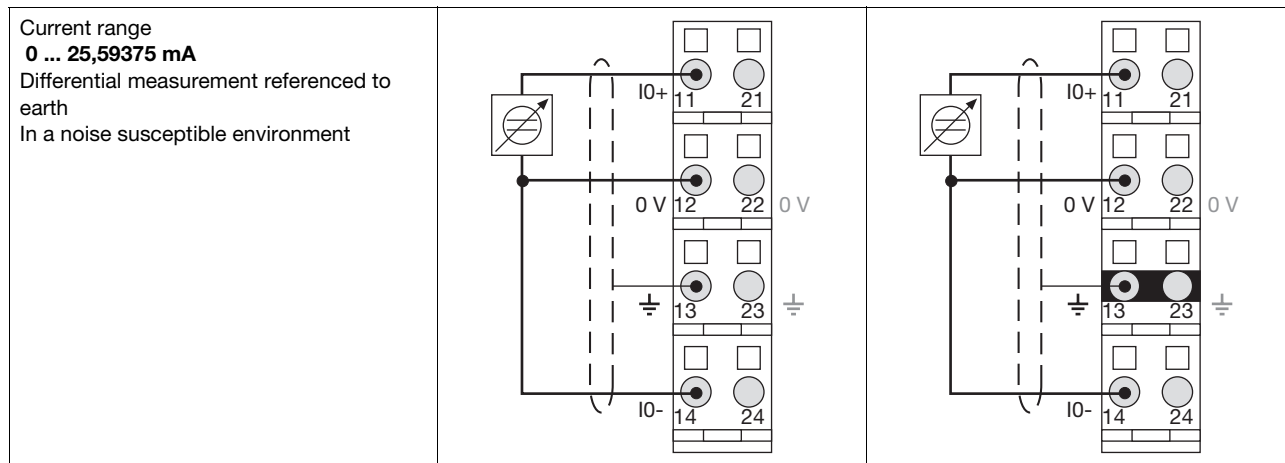
Base module	Terminal configuration	
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Input I0+ 21: Not connected 12-22: GND (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Input I0- 24: Not connected 15-25: GND (12-22-15-25 linked within the base module) 16-26: C-rail supply, shield connection (13-23-16-26 linked within the base module)	

Connection

Input circuit	Without C-rail	With C-rail
Current range 0 ... 25,59375 mA single-pole, differential input		

Analogue input/output (failsafe)

PSSu E F AI I(-T)



INFORMATION

To achieve the safety values **PL e** (Cat. 4) and **SIL CL 3**, two analogue inputs will need to be used.

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Failsafe
Module's device code	0B10h
Number of FS input bits	16
Number of FS status bits	1
Support in system environment A	no
Support in system environment B	
from head module FS firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	45 mA
Module's power consumption	0.22 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	34 mA
Module's power consumption with no load	0.58 W
Max. power dissipation of the module	0.80 W
Inputs	
Number of analogue inputs	1
Type of analogue inputs	Current
Input range	0 ... 25.59375 mA
Resolution (without sign bit)	12 Bit
Safety-related accuracy (1 input)	5 %
Max. continuous current	40 mA
Input resistance (current input)	115.000 Ohm

Analogue input/output (failsafe)

PSSu E F AI I(-T)

Inputs	
Deviations from the measuring range limit value	
Linearity error	0.05 %
Output variable error at 25° C	0.4 %
Temperature coefficient	0.0030 %/K
Max. measurement error during EMC test	1.0 %
Analogue input filter	RC filter
Cutoff frequency	71 Hz
Potential isolation between input and voltage for the internal module bus	yes
Potential isolation between input and periphery supply	yes
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP 20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	37 g 38 g coated version (-T)
Mechanical coding	
Type	K
Colour	yellow

Analogue input/output (failsafe)

PSSu E F AI I(-T)

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
analogue inputs	single-channel			SIL CL 2	1.56E-08	20
analogue inputs	dual-channel	PL e (Cat. 4)	Cat. 4	SIL CL 3	4.37E-09	20

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

The standards current on **2005-04** apply.

Order reference

Description	Order no.
PSSu E F AI I (Electronic module)	312 260
PSSu E F AI I-T (Electronic module, coated version)	314 260

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620

Analogue input/output (failsafe)

PSSu E F AI I(-T)

Base modules	Order no.
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Analogue input/output (failsafe)

PSSu E F AI U(-T)



Electronic module with analogue input for failsafe applications.

Approvals

	PSSu E F AI U
	◆
	◆
	◆

Module features

- ▶ **1** Analogue voltage input
- ▶ Voltage range:
-10.24 ... 10.2375 V Dual-pole, differential input
- ▶ Resolution:
13 Bit (representation of negative values in the two's complement)
- ▶ LEDs for:
 - Operating status per input
 - Module error
- ▶ For failsafe applications in system environment B (automation system PSS 4000)
- ▶ Coated version of the module:
PSSu E F AI U-T: for increased environmental requirements

Module description

The module provides an analogue input.

To guarantee safety integrity you will need to use 2 analogue input modules (2 PSSu E F AI U or one PSSu E F AI U + one PSSu E F AI I). **PL e (Cat. 4)** and **SIL CL 3** can be achieved as a result of redundant input data.

The module guarantees functional safety, but not the safety of the entire process.

Please note the following during configuration and within the user program:

- ▶ With 2-channel operation, check the feasibility by using two inputs and two sensors. Take appropriate measures to avoid common cause errors in the sensor technology, by using diverse sensors or a separate supply voltage for the sensors, for example.
- ▶ We recommend that you monitor a defined measuring range of 2 ... 10 V, as an open circuit or short circuit cannot be detected at 0 V, for example.

The measured value is attenuated through the input filter. At the cutoff frequency, the amplitude of the measured value is 70 % of the amplitude of the input signal.

The module may be used for failsafe applications in system environment B (automation system PSS 4000). The module **PSSu E F AI U-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

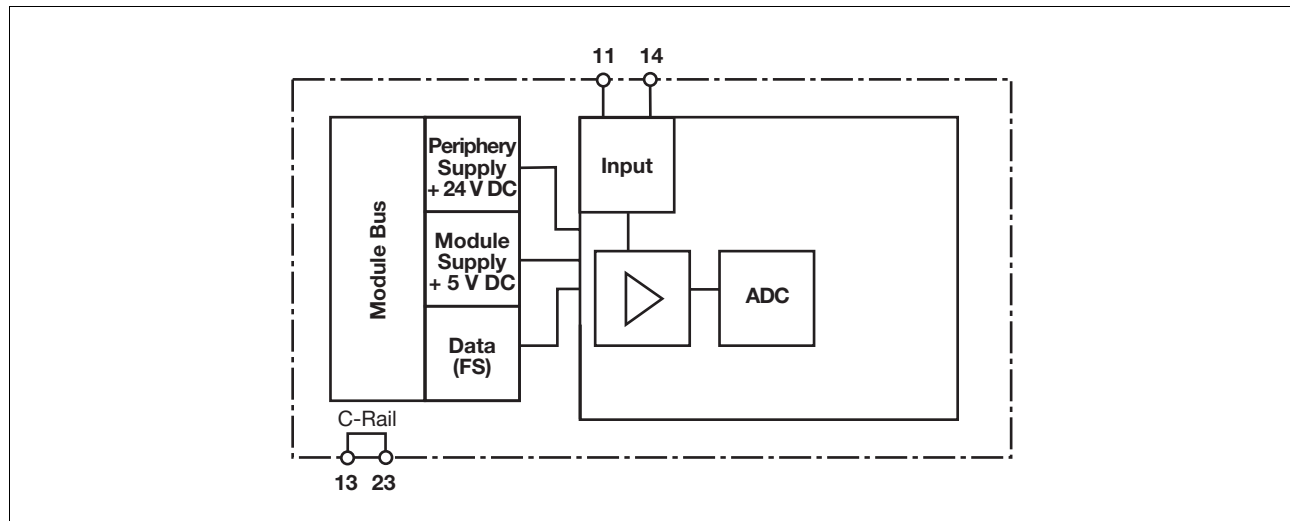
The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ FS communication error
- ▶ Bus termination error

Analogue input/output (failsafe)

PSSu E F AI U(-T)

Block diagram



Function description

Module supply

- ▶ The module supply provides the module with voltage.

Input signal processing

- ▶ The analogue input signal is prefiltered, amplified and stored as a digital measured value.
- ▶ A "dynamised" value is also generated. This value is formed from the

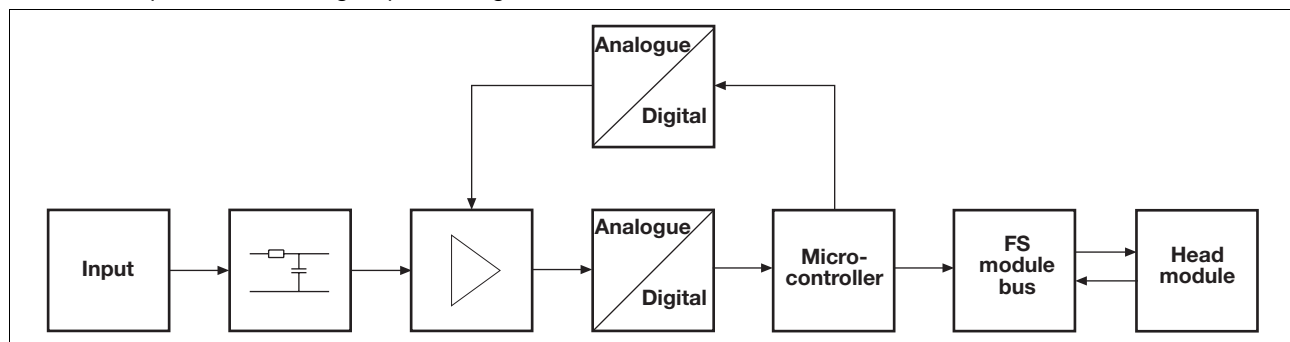
sum of the measured value and a test value.

- ▶ For the feasibility check, the test value is subtracted from the measured value. The measured value that has been read in is then compared with the "dynamised" value.
- ▶ The feasibility of the value is checked in the head module. It is

feasible if it varies at most by a small, defined tolerance value.

- ▶ If the difference between the two values lies within a certain tolerance, the measured value is valid. If the difference lies outside that tolerance, the measured value will be re-recorded. If this value also lies outside the tolerance, an error message will be issued.

Schematic representation of signal processing:



Analogue input/output (failsafe) PSSu E F AI U(-T)

Resolution of analogue-digital converter

- ▶ The resolution of the analogue-digital converter is 13 bits and therefore has 8192 quantisation levels.
- ▶ With 1-channel operation, a resolution of 32 levels is safe and tested.
- ▶ The safety-related accuracy within the module is max. 5 % of the measuring range limit value. It must be considered across the whole measuring range, particularly in the zero point range.

WARNING!

Limit values selected in the user program too low or too high!

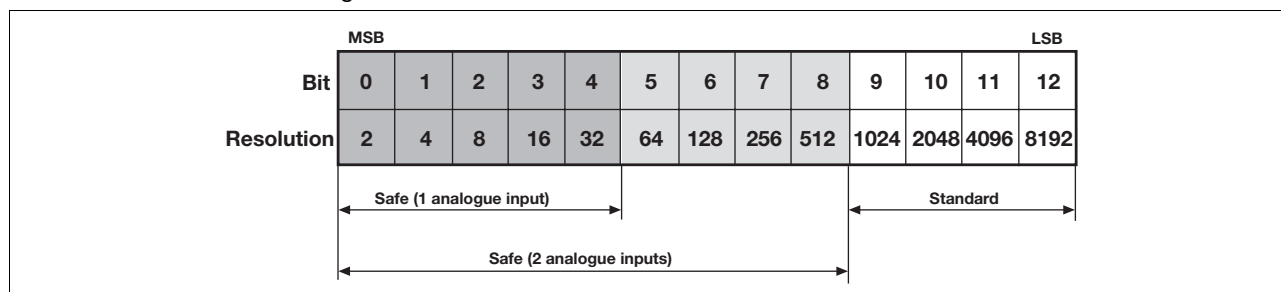
Risk of serious injury and death!

- ▶ Take into account the max. safety-related accuracy when defining the limit values in the user program.
- ▶ For safe resolution up to 512 levels you will need to use two analogue inputs and to carry out a feasibility test.
- ▶ With 2-channel mode, the achievable safety-related accuracy will de-

pend on the module's measuring accuracy and sensors.

- ▶ The module's measuring accuracy is calculated by adding all deviations from the measuring range limit value (see chapter entitled "Technical Details"). With 2-channel, diverse operation, this value is doubled in the worst case.

Illustration of the resolution ranges:

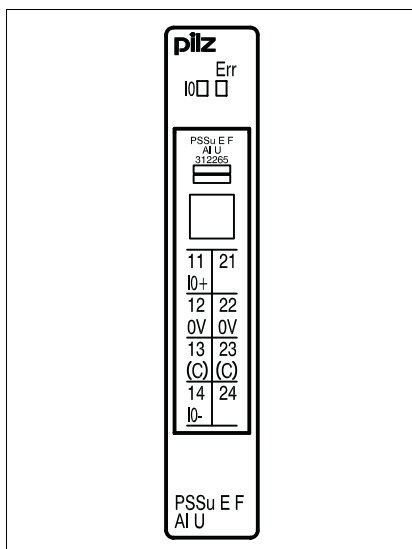


Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section. The module connects the shield to the mounting rail.
 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Front view



Analogue input/output (failsafe) PSSu E F AI U(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Input I0+	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	21: Not connected 12-22: 0 V analogue (12-22 linked within the base module) 13-23: Shield connection (13-23 linked within the base module) 14: Input I0- 24: Not connected	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Input I0+	
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	21: Not connected 12-22: 0 V analogue (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Input I0- 24: Not connected	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Input I0+	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	21: Not connected 12-22: GND (12-22-15-25 linked within the base module) 13-23: Shield connection (13-23-16-26 linked within the base module) 14: Input I0- 24: Not connected 15-25: GND (12-22-15-25 linked within the base module) 16-26: Shield connection (13-23-16-26 linked within the base module)	

Analogue input/output (failsafe) PSSu E F AI U(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Input I0+ 21: Not connected 12-22: GND (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Input I0- 24: Not connected 15-25: GND (12-22-15-25 linked within the base module) 16-26: C-rail supply, shield connection (13-23-16-26 linked within the base module)	

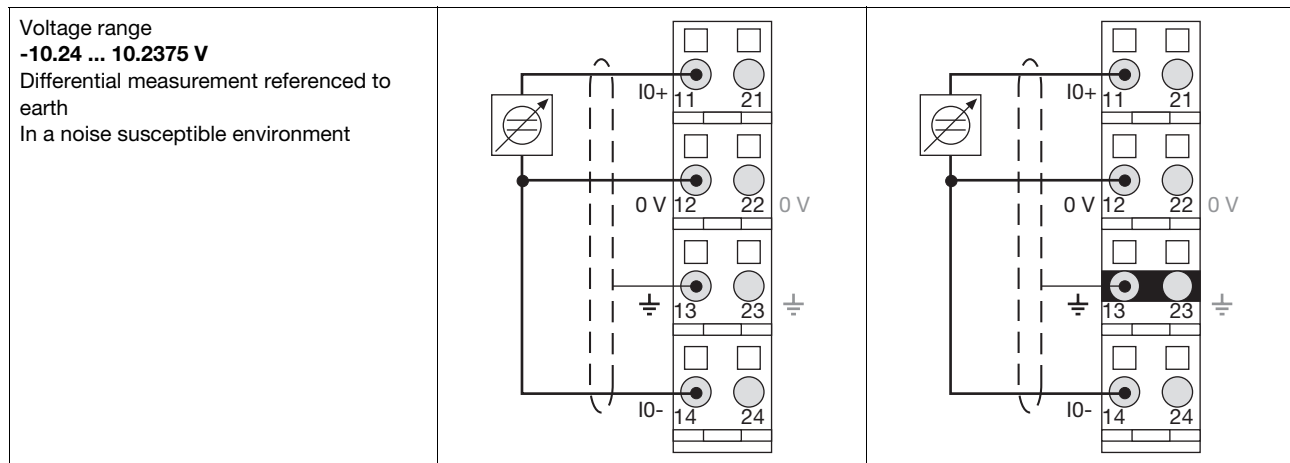
Connection

3.7

Input circuit	Without C-rail	With C-rail
Voltage range -10.24 ... 10.2375 V dual-pole, differential input		

Analogue input/output (failsafe)

PSSu E F AI U(-T)



INFORMATION

To achieve the safety values **PL e (Cat. 4)** and **SIL CL 3**, two analogue inputs will need to be used.

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Failsafe
Module's device code	0B00h
Number of FS input bits	16
Number of ST status bits	1
Support in system environment A	no
Support in system environment B	
from head module FS firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	45 mA
Module's power consumption	0.22 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	34 mA
Module's power consumption with no load	0.58 W
Max. power dissipation of the module	0.80 W
Inputs	
Number of analogue inputs	1
Type of analogue inputs	Voltage
Input range	-10.24 ... 10.2375 V
Resolution (without sign bit)	13 Bit
Safety-related accuracy (1 input)	5 %
Max. continuous voltage	60 V
Max. common mode voltage	40 V
Input resistance (voltage input)	57 kOhm

Analogue input/output (failsafe)

PSSu E F AI U(-T)

Inputs	
Deviations from the measuring range limit value	
Linearity error	0.05 %
Output variable error at 25° C	0.4 %
Temperature coefficient	0.0030 %/K
Max. measurement error during EMC test	1.0 %
Analogue input filter	RC filter
Cutoff frequency	82 Hz
Potential isolation between input and voltage for the internal module bus	yes
Potential isolation between input and periphery supply	yes
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP 20
Airgap creepage in accordance with IEC 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	37 g 38 g coated version (-T)
Mechanical coding	
Type	M
Colour	yellow

Analogue input/output (failsafe)

PSSu E F AI U(-T)

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
analogue inputs	dual-channel	PL e (Cat. 4)	Cat. 4	SIL CL 3	4.37E-09	20

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

The standards current on **2005-04** apply.

Order reference

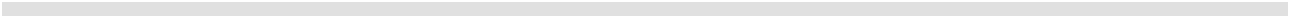
Description	Order no.
PSSu E F AI U (Electronic module)	312 265
PSSu E F AI U-T (Electronic module, coated version)	314 265

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619

Analogue input/output (failsafe)

PSSu E F AI U(-T)

Base modules	Order no.
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621



Serial interfaces (standard)

Serial interfaces (standard)

Contents	Page
Serial interfaces (standard)	
PSSu E S RS232(-T)	3.8-2
PSSu E S RS485(-T)	3.8-9

Serial interfaces (standard)

PSSu E S RS232(-T)



Electronic module with serial interface for standard applications

Approvals

	PSSu E S RS232
	◆

Module features

- ▶ Serial interface: RS 232
- ▶ Communication channels: 2 (Tx/Rx, full duplex)
- ▶ Configurable transmission rates
- ▶ Receive buffer: 1023 Byte
- ▶ Send buffer: 127 Byte
- ▶ Max. number per system: 6
- ▶ LEDs for:
 - Operational readiness
 - Module error
 - Data transmission
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S RS232-T**: for increased environmental requirements

Module description

The module provides a serial interface, which is intended for communication in non-safety-related applications. The module may be used for standard applications in system environment A and B.

The module **PSSu E S RS232-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

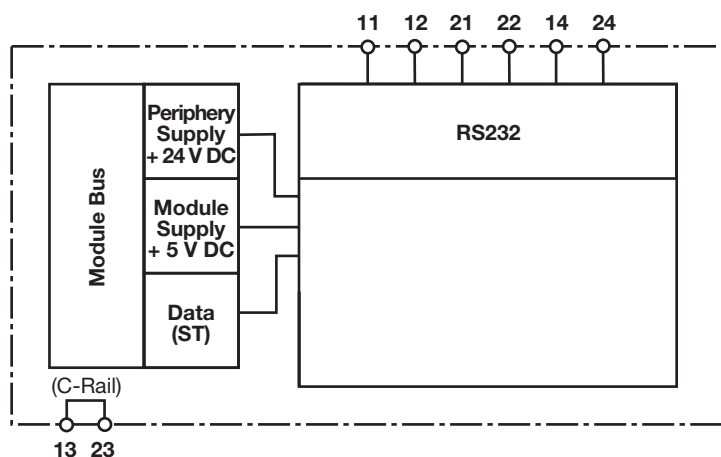
Data exchange

A function block is required for data exchange between the bus subscribers.

INFORMATION

The necessary function block is available from technical support (telephone: +49 711 3409-444).

Block diagram



Serial interfaces (standard)

PSSu E S RS232(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The periphery supply provides the serial interface with voltage.

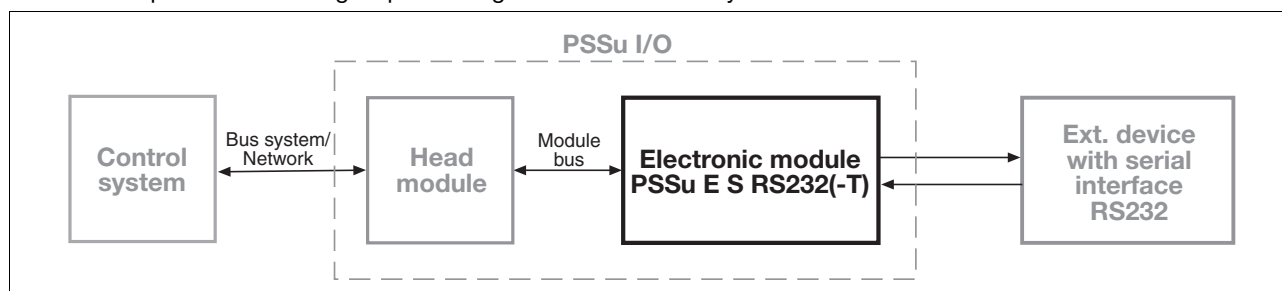
Signal processing

- ▶ In each cycle, a max. of 8 Bytes of data can be transferred in both directions between control system and module. The data to be transferred is stored temporarily in a send and receive buffer.
- ▶ Two additional status bytes and control bytes are available in the

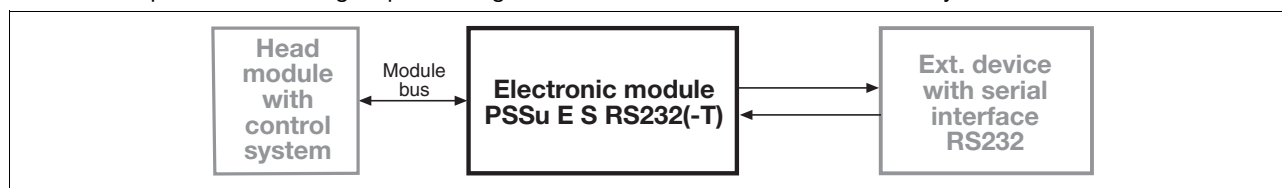
process image for data exchange between control system and module.

- ▶ All the configuration data is stored in the head module and is assigned to the module on restart. This way the configuration data is retained even if you change the module.

Schematic representation of signal processing with decentralised system PSSu I/O:



Schematic representation of signal processing with the PSSu PLC/PSSu multi control system:

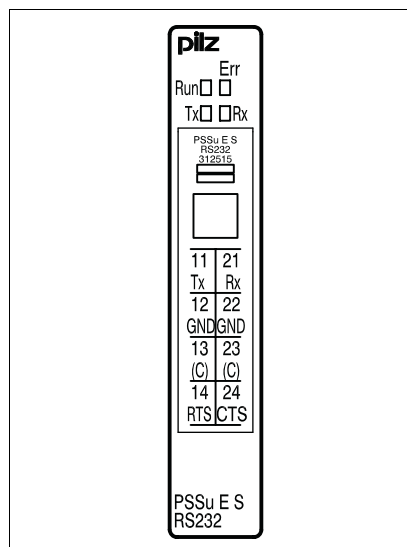


Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the mounting rail.
 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Front view



Serial interfaces (standard)

PSSu E S RS232(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output Tx (send data) 21: Input Rx (receive data) 12-22: GND (12-22 linked within the base module) 13-23: Shield connection (13-23 linked within the base module) 14: Output RTS 24: Input CTS	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output Tx (send data) 21: Input Rx (receive data) 12-22: GND (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Output RTS 24: Input CTS	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Output Tx (send data) 21: Input Rx (receive data) 12-22: GND (12-22-15-25 linked within the base module) 13-23: Cable shield (13-23-16-26 linked within the base module) 14: Output RTS 24: Input CTS 15-25: GND (12-22-15-25 linked within the base module) 16-26: Cable shield (13-23-16-26 linked within the base module)	

Serial interfaces (standard)

PSSu E S RS232(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Output Tx (send data) 21: Input Rx (receive data) 12-22: GND (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Output RTS 24: Input CTS 15-25: GND (12-22-15-25 linked within the base module) 16-26: C-rail supply, cable shield (13-23-16-26 linked within the base module)	

Connection

Input and output circuit	Without C-rail	With C-rail
With hardware handshake		
With hardware handshake		

Serial interfaces (standard)

PSSu E S RS232(-T)

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0720h
Number of ST input bits	64
Number of ST output bits	64
Number of ST status bits	16
Number of ST control bits	16
Support in system environment A	
from ST firmware version for other head modules	17
from ST firmware version PSSu H S PN	1
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	125 mA
Module's power consumption	0.63 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption	20 mA
Module's power consumption	0.48 W
Max. power dissipation of the module	1.20 W
Serial interface	
Number of RS232 interfaces	1
Transmission rate (configurable)	1.2 kBit/s, 19.2 kBit/s, 2.4 kBit/s, 300 Bit/s, 4.8 kBit/s, 600 Bit/s, 9.6 kBit/s
Max. cable run	15 m
Size of receive buffer	1,023 Byte
Size of send buffer	127 Byte
Potential isolation between interface and Module Supply	yes
Potential isolation between interface and Periphery Supply	yes
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T) -25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-40 - 70 °C coated version (-T) 93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)

Serial interfaces (standard)

PSSu E S RS232(-T)

Environmental data	
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	25g coated version (-T)
	16 ms
	6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	36 g
	37 g coated version (-T)
Mechanical coding	
Type	K
Colour	dark grey

The standards current on **2009-03** apply.

Order reference	
Description	Order no.
PSSu E S RS232 (Electronic module)	312 515
PSSu E S RS232-T (Electronic module, coated version)	314 515

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619

Serial interfaces (standard)**PSSu E S RS232(-T)**

Base modules	Order no.
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

Serial interfaces (standard)

PSSu E S RS485(-T)



Electronic module with serial interface for standard applications

Approvals

	PSSu E S RS485
	◆

Module features

- ▶ Serial interface: RS 485
- ▶ Communication channels: 2 (Tx/Rx, full duplex)
- ▶ Configurable transmission rates
- ▶ Receive buffer 1023 Byte
- ▶ Send buffer: 127 Byte
- ▶ Max. number per system: 6
- ▶ LEDs for:
 - Operational readiness
 - Module error
 - Data transmission
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S RS485-T**: for increased environmental requirements

Module description

The module provides a serial interface, which is intended for communication in non-safety-related applications. The module may be used for standard applications in system environment A and B.

The module **PSSu E S RS485-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

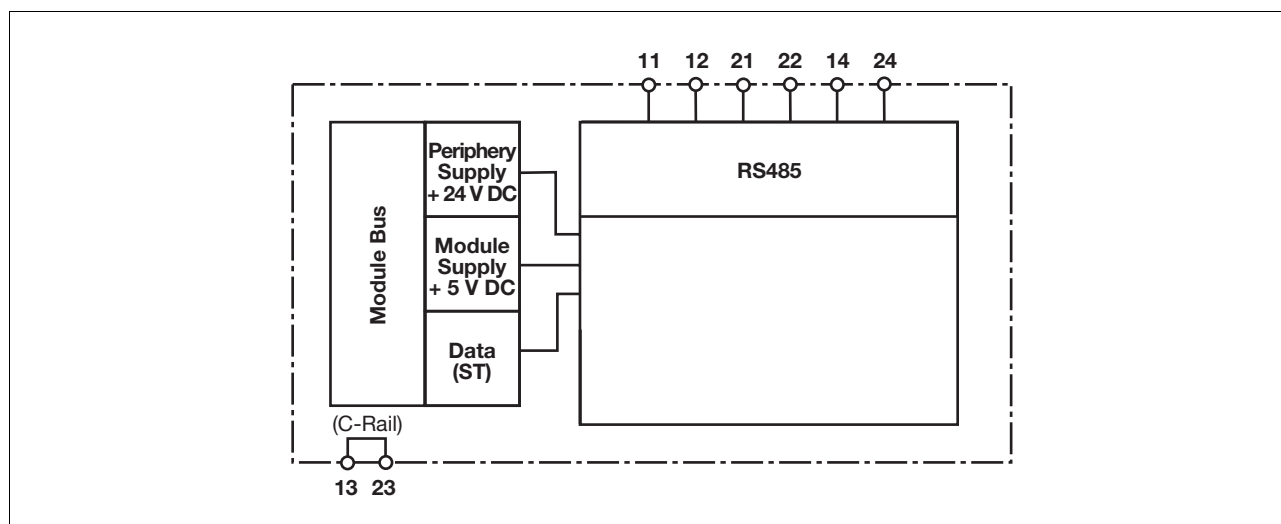
Data exchange

A function block is required for data exchange between the bus subscribers.

INFORMATION

The necessary function block is available from technical support (telephone: +49 711 3409-444).

Block diagram



Serial interfaces (standard)

PSSu E S RS485(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The periphery supply provides the serial interface with voltage.

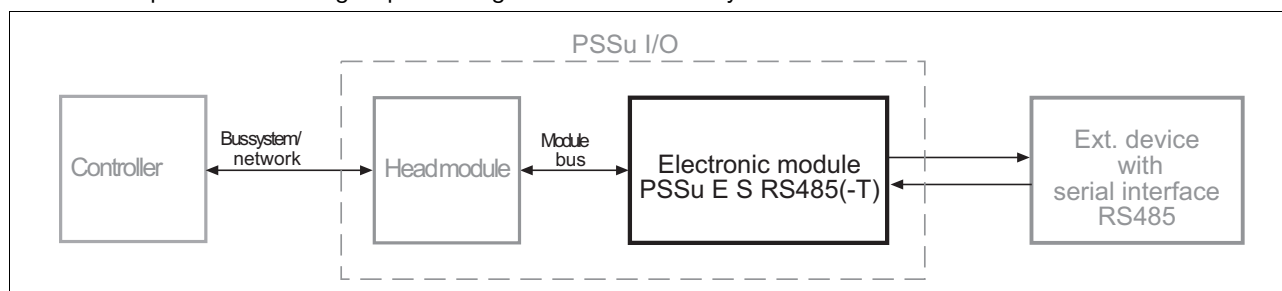
Signal processing

- ▶ In each cycle, a max. of 8 Bytes of data can be transferred in both directions between control system and module. The data to be transferred is stored temporarily in a send and receive buffer.
- ▶ Two additional status bytes and control bytes are available in the

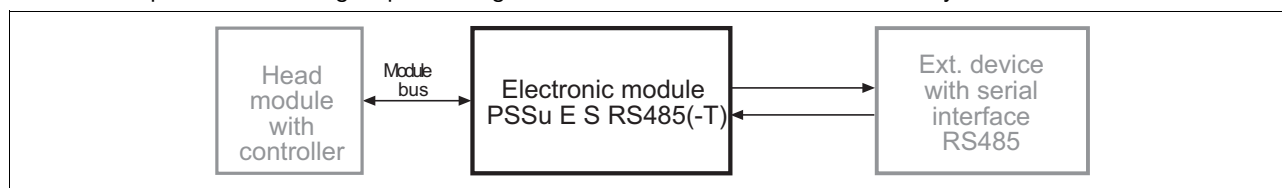
process image for data exchange between control system and module.

- ▶ All the configuration data is stored in the head module and is assigned to the module on restart. This way the configuration data is retained even if you change the module.

Schematic representation of signal processing with decentralised system PSSu I/O:



Schematic representation of signal processing with the PSSu PLC/PSSu multi control system:

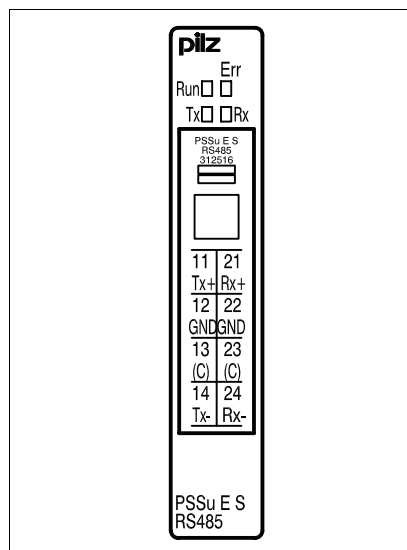


Wiring

- ▶ Safe electrical isolation must be ensured for the voltage supply to the sensors and actuators. Failure to do so could result in electric shock.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the mounting rail.
 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ In environments with strong EMC interference, base modules without a C-rail provide better protection if the shield is connected.
- ▶ Use copper wiring.

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

Front view



Serial interfaces (standard)

PSSu E S RS485(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11: Output Tx+ (send data) 21: Input Rx+ (receive data) 12-22: GND (12-22 linked within the base module) 13-23: Shield connection (13-23 linked within the base module) 14: Output Tx- (send data) 24: Input Rx- (receive data)	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Output Tx+ (send data) 21: Input Rx+ (receive data) 12-22: GND (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Output Tx- (send data) 24: Input Rx- (receive data)	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11: Output Tx+ (send data) 21: Input Rx+ (receive data) 12-22: GND (12-22-15-25 linked within the base module) 13-23: Cable shield (13-23-16-26 linked within the base module) 14: Output Tx- (send data) 24: Input Rx- (receive data) 15-25: GND (12-22-15-25 linked within the base module) 16-26: Cable shield (13-23-16-26 linked within the base module)	

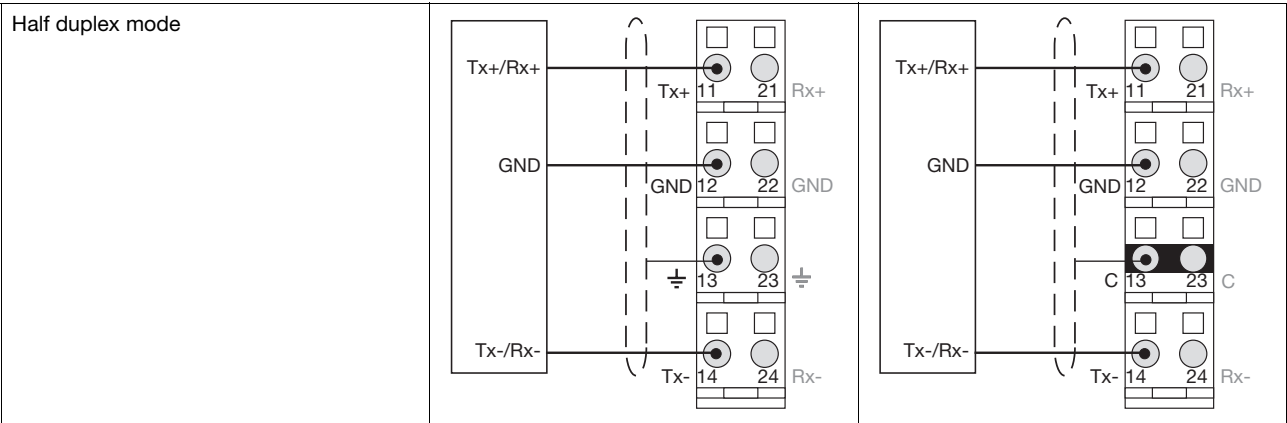
Serial interfaces (standard)
PSSu E S RS485(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C 1/12S PSSu BP-C 1/12S-T	With C-rail: 11: Output Tx+ (send data) 21: Input Rx+ (receive data) 12-22: GND (12-22 linked within the base module) 13-23: C-rail supply, shield connection (13-23 linked within the base module) 14: Output Tx- (send data) 24: Input Rx- (receive data) 15-25: GND (12-22-15-25 linked within the base module) 16-26: C-rail supply, cable shield (13-23-16-26 linked within the base module)	

Connection

Input and output circuit	Without C-rail	With C-rail
Full duplex mode		

Serial interfaces (standard)
PSSu E S RS485(-T)



INFORMATION

The signal lines are equipped with internal terminating resistors. As a result, the module should be used as the first or last device when several devices are networked via the serial interface.

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0721h
Number of ST input bits	64
Number of ST output bits	64
Number of ST status bits	16
Number of ST control bits	16
Support in system environment A	
from ST firmware version for other head modules	17
from ST firmware version PSSu H S PN	1
Support in system environment B	
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	95 mA
Module's power consumption	0.48 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption	11 mA
Module's power consumption	0.26 W
Max. power dissipation of the module	0.80 W

Serial interfaces (standard)

PSSu E S RS485(-T)

Serial interface	
Number of RS485 interfaces	1
Transmission rate (configurable)	1.2 kBit/s, 19.2 kBit/s, 2.4 kBit/s, 300 Bit/s, 4.8 kBit/s, 600 Bit/s, 9.6 kBit/s
Max. cable run	1,000 m
Size of receive buffer	1,023 Byte
Size of send buffer	127 Byte
Potential isolation between interface and Module Supply	yes
Potential isolation between interface and Periphery Supply	yes
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T) -25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-40 - 70 °C coated version (-T) 93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	36 g 37 g coated version (-T)
Mechanical coding	
Type	L
Colour	dark grey

The standards current on **2009-03** apply.

Serial interfaces (standard)

PSSu E S RS485(-T)

Order reference	
Description	Order no.
PSSu E S RS485 (Electronic module)	312 516
PSSu E S RS485-T (Electronic module, coated version)	314 516
Base modules	
Description	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621

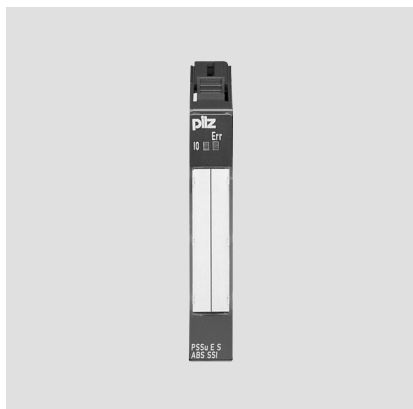
Counter modules (standard)

Counter modules (standard)

Contents	Page
Counter modules (standard)	
PSSu E S ABS SSI(-T)	3.9-2
PSSu E S INC(-T)	3.9-9
PSSu E S INC 24V se(-T)	3.9-17

Counter modules (standard)

PSSu E S ABS SSI(-T)



Electronic module for direct connection of an SSI absolute encoder

Approvals

	PSSu E S ABS SSI
	◆

Module features

- ▶ Counter input (data)
 - Input data length up to max. **32 Bit**
 - Differential input
- ▶ Test pulse output (clock) for re-requesting data
 - Differential output
- ▶ Transmission rate up to max. **1.5 MHz**
- ▶ LED-Anzeigen für:
 - Data transfer
 - Module error
- ▶ For standard applications in system environment A and B
- ▶ Coated version of the module: **PSSu E S ABS SSI-T**: for increased environmental requirements

Module description

This module can be used to connect SSI absolute encoders (synchronous serial interface) for standard functions.

The module may be used for standard applications in system environment A and B.

The module **PSSu E S ABS SSI-T** is suitable for use where there are increased environmental requirements (see Technical Details).

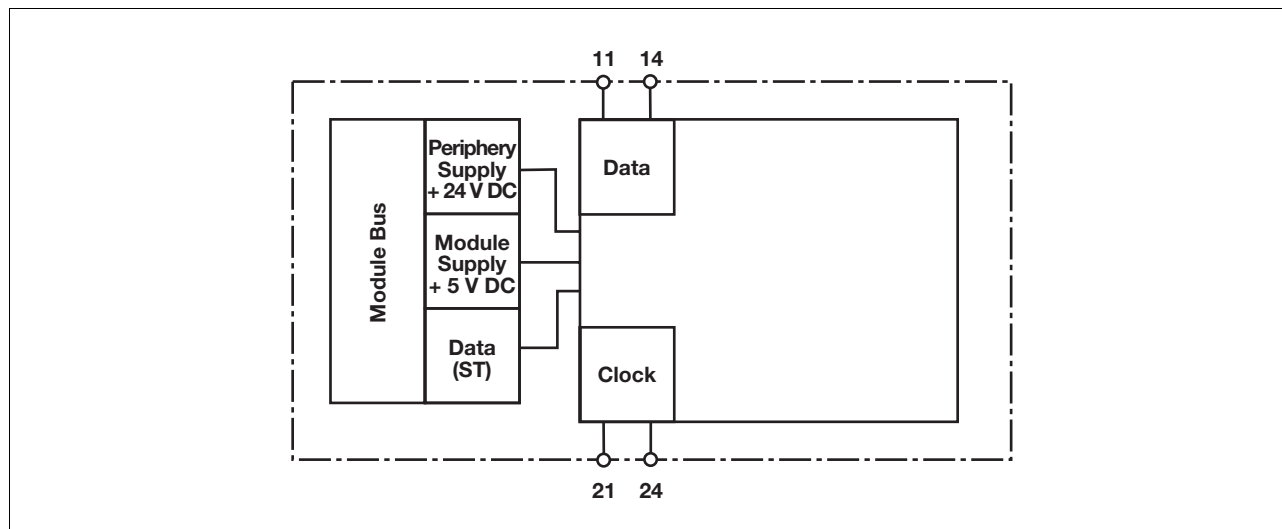
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Counter modules (standard)

PSSu E S ABS SSI(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The supply for the test pulse output is generated from the periphery supply. It is galvanically isolated from the periphery supply.

As part of each cycle the module sends a pulse sequence at the test pulse output (CI) to the SSI absolute encoder. In turn the encoder transmits its position data. The position data is

read in at the module's input (D) (see timing diagram: SSI data transfer).

With the system software the user can set the following values to adapt the module to the encoder or higher level control system:

- ▶ **Transmission rate**
The frequency of the pulses at the test pulse output (CI) determines the transmission rate. The user can adapt the frequency to the encoder in a range from 62.5 kHz up to 1.5 MHz (see Technical Details).
- ▶ **Input data length:**
The module's input data length must be adjusted to the data length

of the absolute encoder.

The module can process up to 32 Bits. The default is 24 Bits.

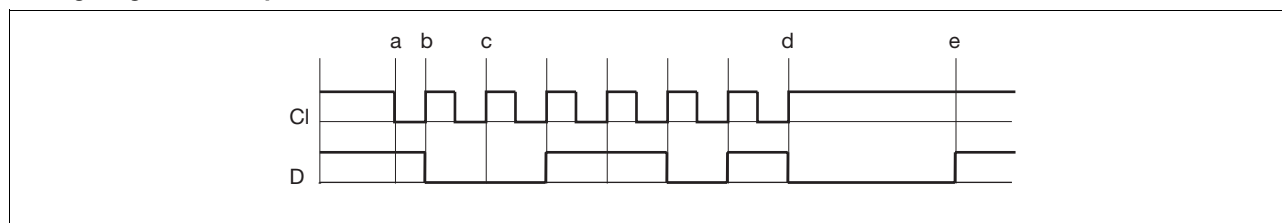
▶ Data format:

The data format in which the module transmits the position data of the connected absolute encoder to the head module.

- Gray code (default)
- Binary code

The position data is transmitted to the head module via the ST module bus with 4 Bytes, irrespective of the configured input data length. The module sends additional status information.

Timing diagram: Example of SSI data transfer:



Key:

The bit width in the example is 6. The position of the encoder is 001101 in gray code, i.e. 9_D .

- ▶ a: Data transfer begins with a falling edge at the CI signal.
- ▶ b: The first bit is transmitted with the first rising edge from the CI signal.
- ▶ c: The time up to the second rising edge is the period length T . $1/T$ is the signal frequency.
- ▶ d: The last rising edge from the CI signal ends the transfer. The encoder acknowledges the end of the transfer with a 0 signal.
- ▶ e: The encoder can transfer data again as soon as there is a 1 signal at input D.

Counter modules (standard)
PSSu E S ABS SSI(-T)

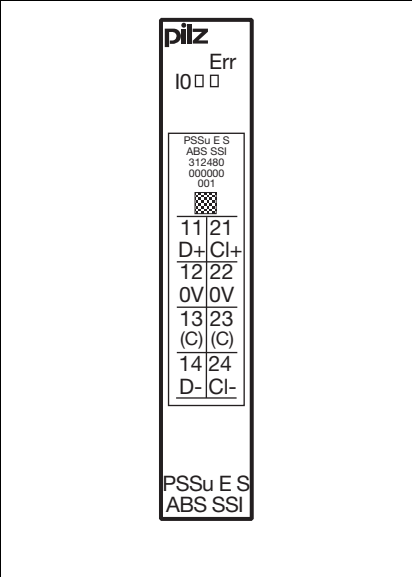
Wiring

- ▶ Use twisted pair cables to carry the differential signals (D+/D- and Cl+/Cl-). This will increase the noise immunity.
 - ▶ Use shielded signal cables with metallic plugs.
 - ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
 - ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

The module connects the shield to the mounting rail.

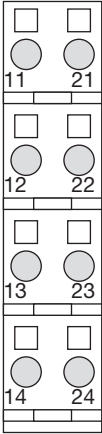
 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ The supply voltages must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410.
 - ▶ Use copper wiring.
 - ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Terminal configuration

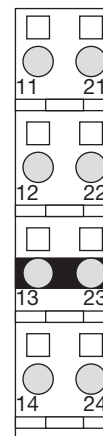
Base module	Terminal configuration
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail:
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	11: Input D+ (Data +)
	21: Output Cl+ (Clock +)
	12-22: 0 V counter (12-22 linked within the base module)
	13-23: Cable shield (13-23 linked within the base module)
	14: Input D- (Data -)
	24: Output Cl- (Clock -)



Counter modules (standard)

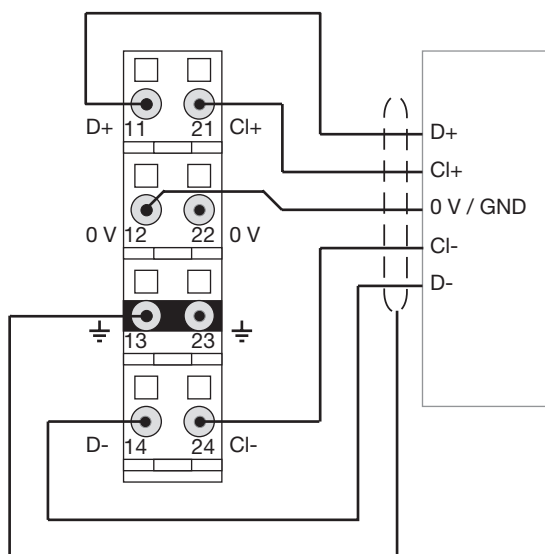
PSSu E S ABS SSI(-T)

Base module	Terminal configuration
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T	With C-rail: 11: Input D+ (Data +) 21: Output Cl+ (Clock +) 12-22: 0 V counter (12-22 linked within the base module) 13-23: C-rail supply, cable screening (13-23 linked within the base module) 14: Input D- (Data -) 24: Output Cl- (Clock -)
Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	



Connection

Input and output circuit	
Connecting an SSI encoder (master mode)	
With C-rail	
Encoder supply via the PSSu E PD module	
0 V connection is not absolutely essential.	



Counter modules (standard)

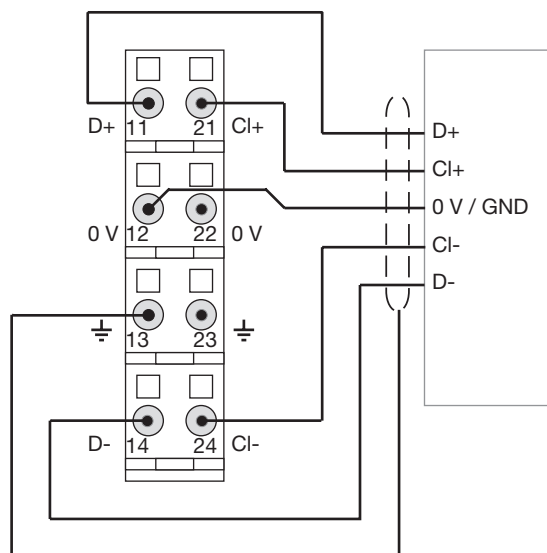
PSSu E S ABS SSI(-T)

Connecting an SSI encoder
(master mode)

Without C-rail

Encoder supply via the PSSu
E PD module

0 V connection is not absolutely
essential.



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Standard
Module's device code	0320h
Number of ST input bits	32
Number of ST status bits	8
Support in system environment A	yes
from ST firmware version for other head modules	11
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	4
Support in system environment B	yes
from head module ST firmware version	1.0.0

Electrical data

Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	101 mA
Module's power consumption	0.51 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	0.75 W

Counter interface

Number of counter inputs	1
Type of counter inputs	SSI encoder
Max. number of bits on the counter input	32 Bit
Selectable transmission rates	62.5 kHz, 100.0 kHz, 125.0 kHz, 250.0 kHz, 500.0 kHz, 1,000.0 kHz, 1,500.0 kHz
Coding of the input signal	Binary, Grey

Counter modules (standard)

PSSu E S ABS SSI(-T)

Counter interface	
Output signal (clock)	Differential signal (RS 422)
Signal at the data input	Differential signal (RS 422)
Potential isolation between input/output and periphery supply	yes
Potential isolation between input/output and voltage for the internal module bus	yes
Typ. processing time	0.1 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	-25 - 70 °C
Condensation	-40 - 70 °C coated version (-T)
	93 % r. h. at 40 °C
	no
	yes coated version (-T)
Max. operating height above sea level	2000 m
	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
	10 - 1,000 Hz coated version (-T)
Max. acceleration	1g
	5g coated version (-T)
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	25g coated version (-T)
	16 ms
	6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	35 g
	37 g coated version (-T)
Mechanical coding	
Type	F
Colour	dark grey

The standards current on **2005-04** apply.

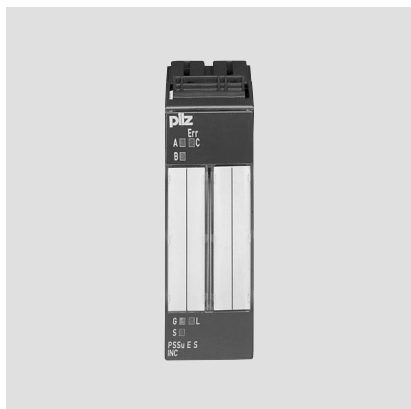
Counter modules (standard)

PSSu E S ABS SSI(-T)

Order reference	
Description	Order no.
PSSu E S ABS SSI (Electronic module)	312 480
PSSu E S ABS SSI(-T) (Electronic module, coated version)	314 480
Base modules	
Description	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Counter modules (standard)

PSSu E S INC(-T)



Electronic module for direct connection of an incremental encoder

Approvals

	PSSu E S INC
	◆

Module features

- ▶ Inputs for
 - Counter pulses (inputs A, B)
 - Zero pulse (Input C)
 - Stopping the counter (Input G, Gate)
 - Memory function (Input L, Latch)
 - Rotary encoder status (Input S, Status)
- ▶ Resolution of the counter and latch memory: **32 Bit**
- ▶ Operating modes:
 - Incremental encoders
 - Counters
- ▶ Inputs A, B, C are operated as differential inputs with inverted signals (A-, B-, C-).
- ▶ Pulse multiplication (up to four times)
- ▶ LEDs for:
 - Data transfer per input A, B, C
 - Status per functional input (Gate, Latch, Status)
 - Module error
- ▶ For standard applications in system environment A and B

- ▶ Coated version of the module: **PSSu E S INC-T**: for increased environmental requirements

Module description

This module may be used to connect incremental encoders with push-pull outputs to RS 422 interfaces (+/- 5 V) for standard functions.

The module may be used for standard applications in system environment A and B.

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

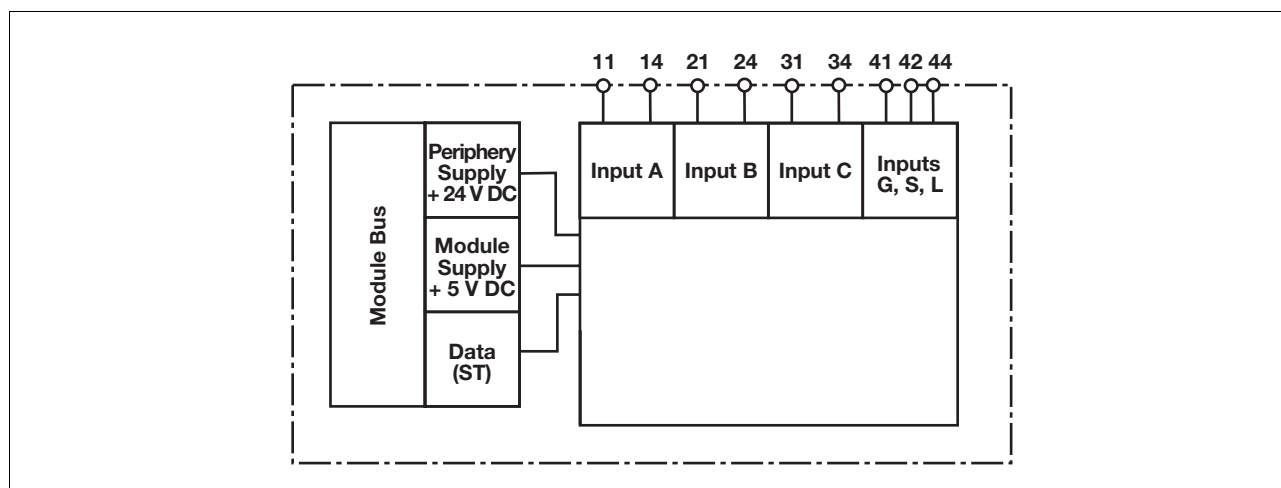
Integrated protection mechanisms

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

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Block diagram



Counter modules (standard)

PSSu E S INC(-T)

Function description

Module supply

- ▶ The module supply provides the module with voltage.

The module has two operating modes:

- ▶ Incremental encoder (default)
- ▶ Counter

In incremental encoder mode the module evaluates inputs A and B. In counter mode, only the rising edges at input A are counted. The user can define the operating modes and any additional options using the system software

In both operating modes, the counter status and the status of the latch memory are each transmitted to the head module via the module bus with a 32 bit data word. The module sends additional status information.

The module has three dual-pole, differential inputs (A, B, C) and three single-pole inputs referenced to earth (G, L, S). Signals with +/- 5 V are connected to the dual-pole inputs in accordance with RS 422.

The single-pole inputs are used for special functions. Inputs G and L may be connected to external signal sources, e.g. to a higher order control system.

- ▶ Input G (gate input)
The counter is stopped with a 1 signal.
- ▶ Input L (input for external latch pulse)
At a rising edge, the module stores the current counter value in the latch memory upon request.
- ▶ Input S (input for external status)
The encoder's fault signal output can be connected to the status input. The module transmits the input status to the head module with the status information.

Additional module functions:

- ▶ Counter overflow
- ▶ Period length measurement
The resolution is 200 ns.
- ▶ Set counter status

Incremental encoder operating mode

The counter outputs and the output for the incremental encoder's zero pulse are connected to the dual-pole inputs.

- ▶ Inputs A, B
The first channel of the encoder is connected to input A, the second to input B.
- ▶ Input C
The output for the incremental encoder's zero pulse is connected to input C. Upon request, the module stores the counter value at the time of the zero pulse in the latch memory.

Counter operating mode

In counter mode the module's dual-pole differential inputs A, B, C have different functions to those of incremental encoder mode.

- ▶ Input A (Count)
Input A is used to connect the counter pulses.
- ▶ Input B (Up/down)
At a 0 signal the module counts forwards. At a 1 signal the module counts backwards.
- ▶ Input C (Gate/Latch)
The counter is stopped with a 1 signal. Upon request, the module stores the current counter value in the latch memory.

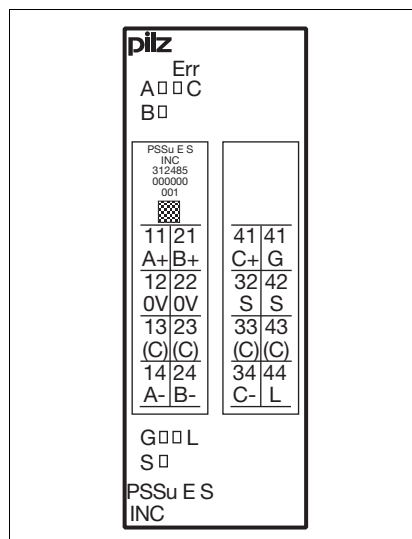
The single-pole inputs have the same function in both operating modes.

Wiring

- ▶ The module's connections are galvanically isolated from the module supply and periphery supply.
- ▶ For EMC reasons we recommend that you operate inputs A, B, C exclusively as differential inputs with inverted signals (A+/A-, B+/B-, C+/C-).
- ▶ The module evaluates open differential inputs (A+/A-, B+/B-, C+/C-) as a 1 signal.
- ▶ The module evaluates open function inputs (G, L, S) as a 0 signal.
- ▶ Use twisted pair cables to carry the inverted signals. This will increase the noise immunity.
- ▶ Use shielded signal cables with metallic plugs.

- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the functional earth via the mounting rail.
- ▶ The channel for the incremental encoder's zero pulse has a different designation depending on the manufacturer (N, C, Z, 0,...)
- ▶ The supply voltages must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Counter modules (standard)

PSSu E S INC(-T)

Terminal configuration

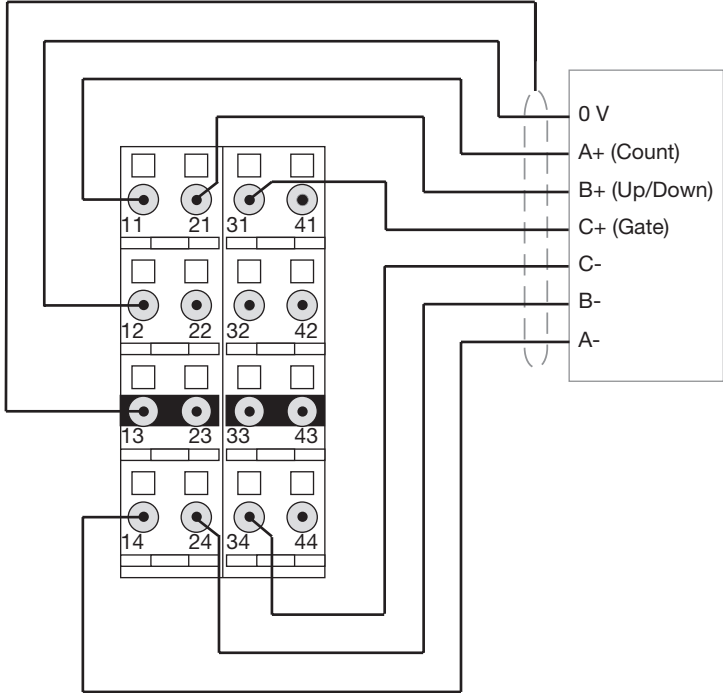
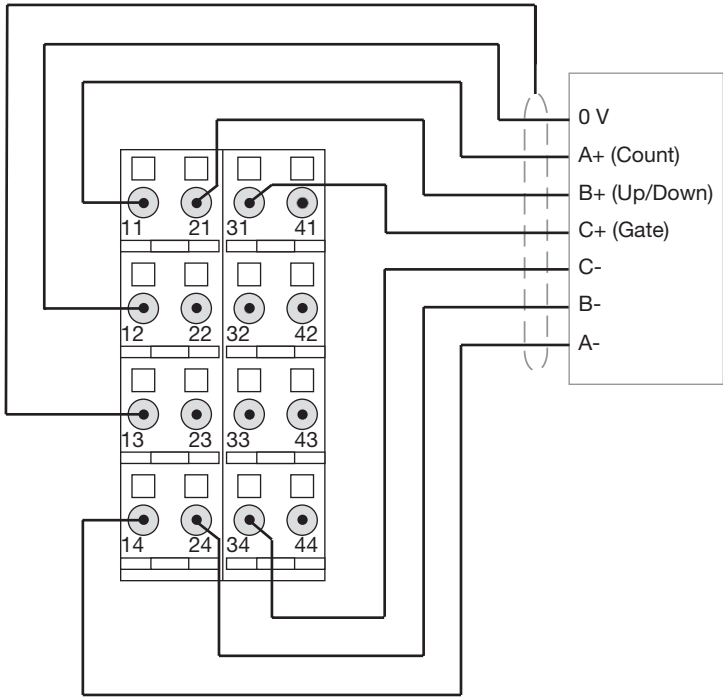
Base module	Terminal configuration	
Screw terminals: PSSu BP 2/16S PSSu BP 2/16S-T	Without C-rail: 11: Input A+ 21: Input B+ 31: Input C+ 41: Input G (Gate)	
Cage clamp terminals: PSSu BP 2/16C PSSu BP 2/16C-T	12-22: 0 V counter (12-22 linked within the base module)	
	32-42: Input S (Status) (32-42 linked within the base module)	
	13-23-33-43: Shield connection (13-23, 33-43 linked within the base module)	
	14: Input A- 24: Input B- 34: Input C- 44: Input L (Latch)	
Screw terminals: PSSu BP-C 2/16S PSSu BP-C 2/16S-T	With C-rail: 11: Input A+ 21: Input B+ 31: Input C+ 41: Input G (Gate)	
Cage clamp terminals: PSSu BP-C 2/16C PSSu BP-C 2/16C-T	12-22: 0 V counter (12-22 linked within the base module)	
	32-42: Input S (Status) (32-42 linked within the base module)	
	13-23-33-43: C-rail supply Shield connection (13-23, 33-43 linked within the base module)	
	14: Input A- 24: Input B- 34: Input C- 44: Input L (Latch)	

Counter modules (standard)
PSSu E S INC(-T)

Connection

Incremental encoder operating mode	With C-rail
Encoder supply via the PSSu E PD module	
Incremental encoder operating mode	Without C-rail
Encoder supply via the PSSu E PD module	

Counter modules (standard)
PSSu E S INC(-T)

Counter operating mode	With C-rail
Encoder supply via the PSSu E PD module Functional inputs (G, L, S) not connected.	
Counter operating mode	Without C-rail
Encoder supply via the PSSu E PD module Functional inputs (G, L, S) not connected.	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Counter modules (standard)

PSSu E S INC(-T)

Technical details	
Application range	Standard
Module's device code	0321h
Number of ST input bits	64
Number of ST output bits	32
Number of ST status bits	8
Number of ST control bits	8
Support in system environment A	yes
from ST firmware version for other head modules	11
from ST firmware version PSSu H S PN	2
from ST firmware version PSSu WR S IDN	4
Support in system environment B	yes
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	157 mA
Module's power consumption	0.79 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	15 mA
Module's power consumption with no load	0.37 W
Max. power dissipation of the module	1.20 W
Counter interface	
Number of counter inputs	1
Type of counter inputs	Incremental encoder
Max. number of bits on the counter input	32 Bit
Evaluation of counter pulses	1x, 2x, 4x
Maximum threshold frequency	5.0 MHz
Phase offset between differential signals A and B	90 deg
Phase offset tolerance	30 deg
Signal at counter inputs A and B and/or C	Differential signal (RS 422)
Time constant of input filter on LATCH signal	50 µs
Time constant of input filter on GATE signal	50 µs
Time constant of input filter on STATUS signal	50 µs
Permitted low signal range on LATCH/GATE/STATUS signals	-3 - 5 V
Permitted high signal range on LATCH/GATE/STATUS signals	11 - 30 V
Typ. input current of the LATCH and/or GATE and/or STATUS signals at low level	0 mA
Typ. input current of the LATCH and/or GATE and/or STATUS signals at high level	4.0 mA
Potential isolation between input/output and periphery supply	yes
Potential isolation between input/output and voltage for the internal module bus	yes
Typ. processing time	0.1 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
	-40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)

Counter modules (standard)

PSSu E S INC(-T)

Environmental data	
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	50 g 52 g coated version (-T)
Mechanical coding	
Type	F
Colour	dark grey

The standards current on **2005-04** apply.

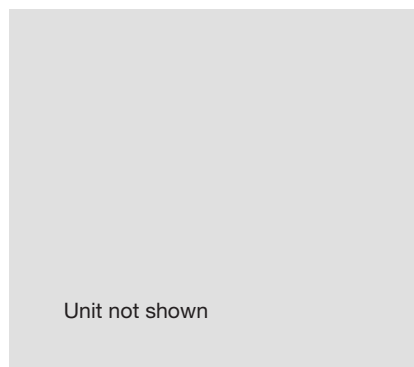
Order reference	
Description	Order no.
PSSu E S INC (Electronic module)	312 485
PSSu E S INC-T (Electronic module, coated version)	314 485

Counter modules (standard)**PSSu E S INC(-T)**

Base modules	Order no.
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16S-T (Base module without C-rail with screw terminals, coated version)	314 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP 2/16C-T (Base module without C-rail with cage clamp terminals, coated version)	314 629
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16S-T (Base module with C-rail and screw terminals, coated version)	314 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631
PSSu BP-C 2/16C-T (Base module with C-rail and cage clamp terminals, coated version)	314 631

Counter modules (standard)

PSSu E S INC 24V se(-T)



Electronic module for direct connection of an incremental encoder

Approvals

	PSSu E S INC 24V se
	◆

Module features

- ▶ Connection of a rotary encoder with HTL output signal
- ▶ Inputs for
 - Counter pulses (inputs A, B), single-pole, referenced to earth (single-ended)
 - Zero pulse (inputs C), single-pole, referenced to earth (single-ended)
 - Stopping the counter (Input G, Gate)
 - Memory function (Input L, Latch)
 - Rotary encoder status (Input S, Status)
- ▶ Outputs:
 - 24 VDC supply voltage for encoder
 - 1 semiconductor output (switches depending on the counter status)
- ▶ Resolution of the counter and latch memory: 32 Bit
- ▶ Operating modes:
 - Incremental encoder
 - Counter
- ▶ Pulse multiplication (up to four times)
- ▶ No potential isolation between periphery supply and inputs/outputs
- ▶ LEDs for:
 - Data transfer per input A, B, C
 - Status per functional input (Gate, Latch, Status)
 - Module error
- ▶ For standard applications in system environment A and B

In preparation

Application of the product in system environment B is in preparation.

- ▶ Coated version of the module:
PSSu E S INC 24V se-T: for increased environmental requirements

Module description

The module can be used to connect an incremental encoder with HTL output signal for standard functions.

The module may be used for standard applications in system environment A. The module **PSSu E S INC 24V se-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

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

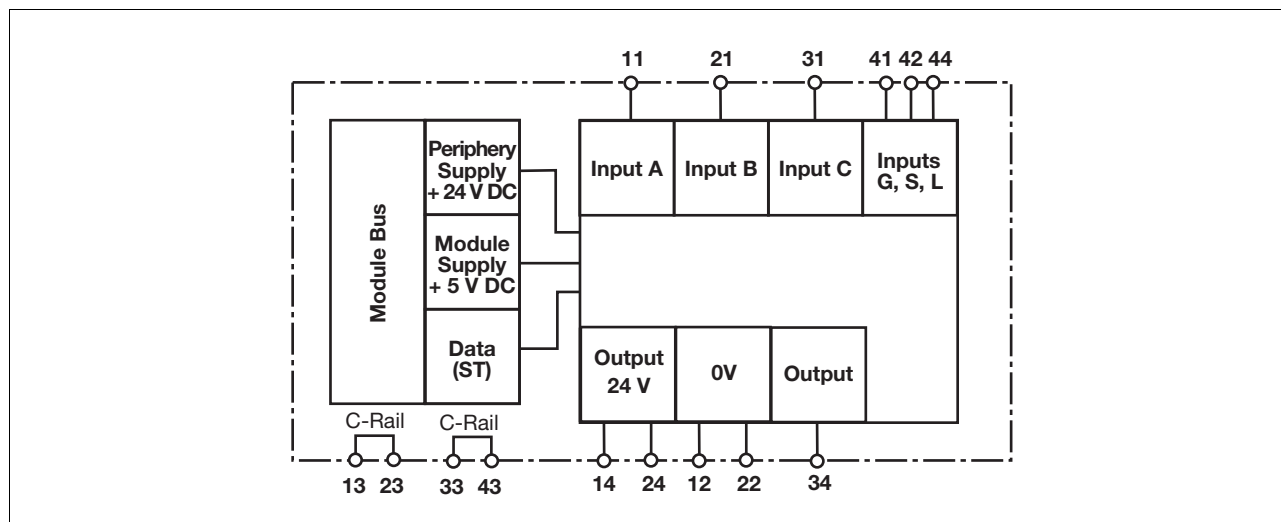
The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error
- ▶ Supply voltage overload for the encoder

Counter modules (standard)

PSSu E S INC 24V se(-T)

Block diagram



Function description

Module supply

- ▶ The module supply provides the module with voltage.

Inputs

- ▶ 3 single-pole inputs referenced to earth: A, B, C, for connecting an incremental encoder or an encoder that provides rising edges as counter pulses.
- ▶ 3 single-pole inputs referenced to earth: G, L, S, for special functions

Outputs:

- ▶ Supply voltage for encoder, 24 VDC, 100 mA
- ▶ Semiconductor output (switches depending on the counter status)
 - “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

Operating modes

- ▶ Incremental encoder
- ▶ Counter

Functions

- ▶ Period length measurement or
- ▶ Storing the counter status in latch memory after a latch pulse or zero pulse
- ▶ Setting the counter status

The electronic module transfers the data and status information to the head module via the module bus. The

choice of function and the function's configuration are defined via the system software.

The single-pole inputs (G, L, S) are used for special functions. Inputs G and L may be connected to external signal sources, e.g. to a higher order control system.

- ▶ Input G (gate input)

The counter is stopped with a 1 signal. The module ignores the counter pulses at the inputs until a 0 signal returns.

- ▶ Input L (input for latch pulse)

At a rising edge, the module stores the current counter value in the latch memory. The counter continues counting; it is not stopped by the latch pulse. The module transmits the stored value to the head module. The period length measurement may be configured as an alternative to the latch function.

- ▶ Input S (status input)

The encoder's fault signal output can be connected to the status input. The module transmits the input status to the head module with the status information.

The module provides a supply voltage of 24 VDC / 100 mA to supply the rotary encoder.

The output is short circuit-proof. In the event of an overload, the supply voltage is switched off and a warning is is-

sued on the bus. The supply voltage is re-established when the cause of the overload has been rectified.

Counter modules (standard)

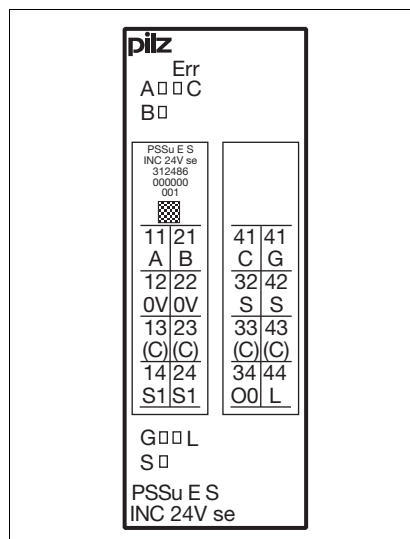
PSSu E S INC 24V se(-T)

Wiring

- ▶ The module's connections are galvanically isolated from the module supply.
- ▶ The module evaluates open inputs (A, B, C) as a 0 signal.
- ▶ The module evaluates open function inputs (G, L, S) as a 0 signal.
- ▶ We recommend that you use shielded signal lines.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

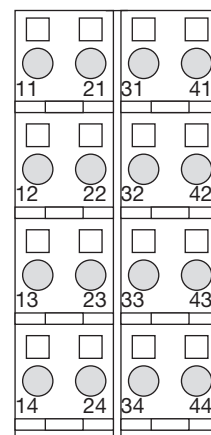
- The module connects the shield to the functional earth via the mounting rail.
- ▶ The channel for the incremental encoder's zero pulse has a different designation depending on the manufacturer (N, C, Z, 0,...)
- ▶ The supply voltages must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



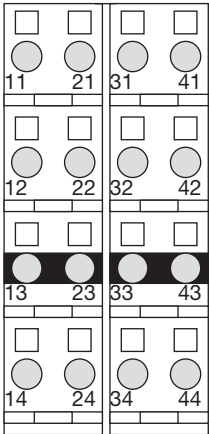
Terminal configuration

Base module	Terminal configuration
Screw terminals: PSSu BP 2/16S PSSu BP 2/16S-T	Without C-rail: 11: Input A 21: Input B 31: Input C 41: Input G (Gate) 12-22: 0 V encoder (12-22 linked within the base module) 32-42: Input S (Status) (32-42 linked within the base module) 13-23-33-43: Cable shield (13-23-33-43 linked within the base module) 14-24: Supply voltage output for encoder 34: Output for limit value monitoring 44: Input L (Latch)



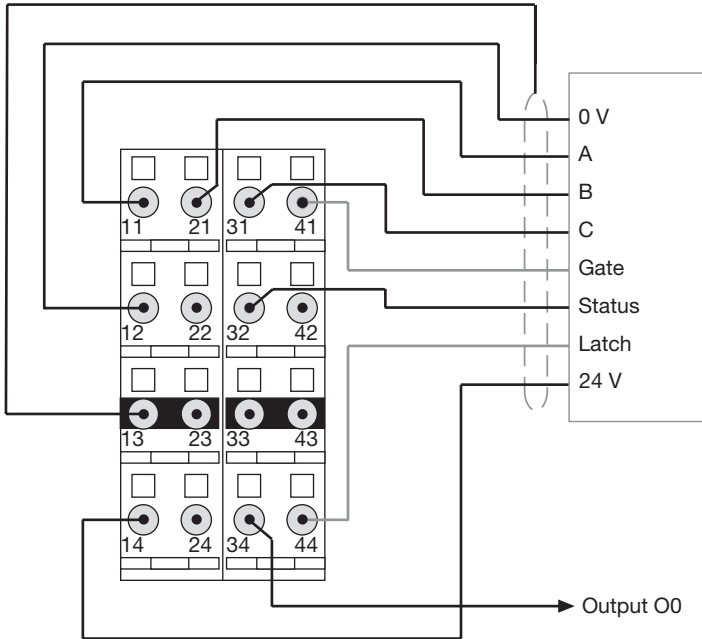
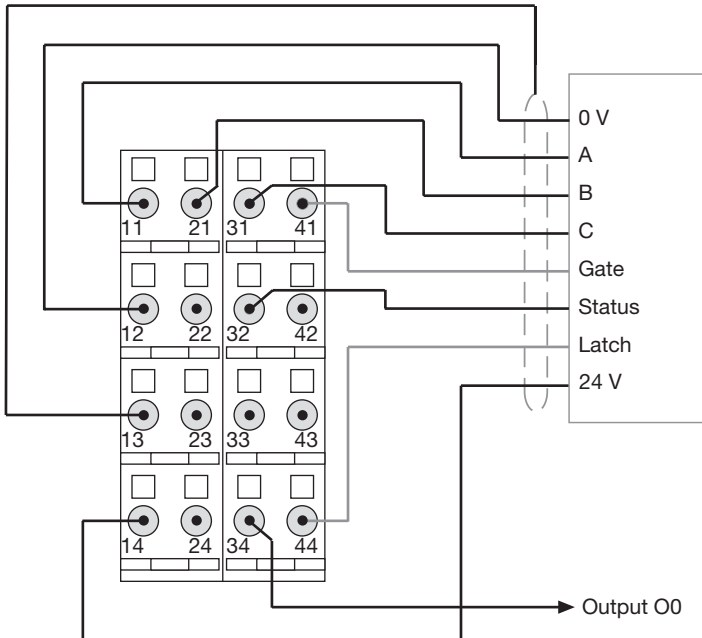
Counter modules (standard)
PSSu E S INC 24V se(-T)

Base module	Terminal configuration
Screw terminals: PSSu BP-C 2/16S PSSu BP-C 2/16S-T	With C-rail: 11: Input A
Cage clamp terminals: PSSu BP-C 2/16C PSSu BP-C 2/16C-T	21: Input B 31: Input C 41: Input G (Gate)
	12-22: 0 V encoder (12-22 linked within the base module)
	32-42: Input S (Status) (32-42 linked within the base module)
	13-23-33-43: C-rail supply Cable screening (13-23-33-43 linked within the base module)
	14-24: Supply voltage output for encoder
	34: Output for limit value monitoring
	44: Input L (Latch)



Counter modules (standard)
PSSu E S INC 24V se(-T)

Connection

Incremental encoder mode Encoder is supplied via output 14 (S1) Output O0: Output for limit value monitoring	With C-rail 
Incremental encoder mode Encoder is supplied via output 14 (S1) Output O0: Output for limit value monitoring	Without C-rail 

PSSu E S INC 24V se(-T)

3.9

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Counter modules (standard)

PSSu E S INC 24V se(-T)

Technical details	
Application range	Standard
Module's device code	0322h
Number of ST input bits	64
Number of ST output bits	64
Number of ST status bits	8
Number of ST control bits	8
Support in system environment A	
from ST firmware version for other head modules	18
from ST firmware version PSSu H S PN	3
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	170 mA
Module's power consumption	0.85 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	1.40 W
Counter interface	
Number of counter inputs	1
Type of counter inputs	Incremental encoder
Max. number of bits on the counter input	32 Bit
Evaluation of counter pulses	1x, 2x, 4x
Maximum threshold frequency	0.2 MHz
Phase offset between differential signals A and B	90 deg
Phase offset tolerance	30 deg
Signal at counter inputs A and B and/or C	
Time constant of input filter on LATCH signal	50 µs
Time constant of input filter on GATE signal	50 µs
Time constant of input filter on STATUS signal	50 µs
Permitted low signal range on LATCH/GATE/STATUS signals	-3 - 5 V
Permitted high signal range on LATCH/GATE/STATUS signals	11 - 30 V
Typ. input current of the LATCH and/or GATE and/or STATUS signals at low level	0 mA
Typ. input current of the LATCH and/or GATE and/or STATUS signals at high level	4.0 mA
Potential isolation between input/output and periphery supply	no
Potential isolation between input/output and voltage for the internal module bus	yes
Typ. processing time	0.1 ms
Outputs	
Supply voltage for incremental encoder	24 V DC
Max. output current at rated voltage	0.10 A
Semiconductor output	24 V DC
Max. output current at rated voltage	0.50 A

Counter modules (standard)

PSSu E S INC 24V se(-T)

Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	2000 m 5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz 10 - 1,000 Hz coated version (-T)
Max. acceleration	1g 5g coated version (-T)
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 25g coated version (-T) 16 ms 6 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	50 g 52 g coated version (-T)
Mechanical coding	
Type	M
Colour	dark grey

The standards current on **2005-04** apply.

Counter modules (standard)

PSSu E S INC 24V se(-T)

Order reference	
Description	Order no.
PSSu E S INC 24V se (Electronic module)	312 486
PSSu E S INC 24V se-T (Electronic module, coated version)	314 486
Base modules	
Order no.	
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16S-T (Base module without C-rail with screw terminals, coated version)	314 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP 2/16C-T (Base module without C-rail with cage clamp terminals, coated version)	314 629
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16S-T (Base module with C-rail and screw terminals, coated version)	314 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631
PSSu BP-C 2/16C-T (Base module with C-rail and cage clamp terminals, coated version)	314 631

Counter modules (failsafe)

Counter modules (failsafe)

Contents	Page
Counter modules (failsafe)	
PSSu E F ABS SSI	3.10-2
PSSu E F INC	3.10-9

Counter modules (failsafe)

PSSu E F ABS SSI



Electronic module for direct connection of an SSI absolute encoder

Approvals

	PSSu E F ABS SSI
	◆
	◆

Module features

- ▶ Counter input (data)
 - Input data length up to max. **32 Bit**
 - Differential input
- ▶ Test pulse output (clock) for requesting data
 - Differential output
- ▶ Transmission rate up to max. **1.5 MHz**
- ▶ LED-Anzeigen für:
 - Data transfer
 - Module error
- ▶ For failsafe applications in system environment B (automation system PSS 4000)

Module description

The module may be used in order to connect SSI absolute encoders (synchronous serial interface) for failsafe functions.

With the counter module you can implement the following safety functions: Monitoring of:

- ▶ Position
- ▶ Speed
- ▶ Standstill

Two counter modules and two sensors have to be used. It is possible to use either two counter modules of the same type or a combination of PSSu E F INC or PSSu K F INC and PSSu E F ABS SSI. Redundant and diverse input values and use of the function blocks FS_IncrementalEncoder, FS_AbsoluteEncoder and FS_CounterDual can achieve **PL e (Cat. 4)** and **SIL CL 3**.

Requirements of the PSSu system:

- ▶ The counter modules must be part of a control system PSSu PLC or PSSu multi (not decentralised I/O system).
- ▶ The function blocks have to be assigned to the FS resource of the PSSu system where the counter modules are inserted. Control via SafetyNet is not permitted.

Demands on the sensors:

- ▶ Absolute encoders with SSI interfaces may be used as sensors.

- ▶ Connect the sensors mechanically independently to the axis. If this is not possible, the connection should be positive-locking without wearing parts as e.g. chains or drive belts. If it is not possible to avoid this, the mechanical connection of the sensors must be monitored. Alternatively, it is possible to use a sensor that internally has 2 independent measured value recording systems.

Please note during configuration and within the user program:

- ▶ The input values must be diverse. This can be achieved through different
 - Scaling
 - Direction of rotation/count direction
 - Offset

To avoid errors during a simultaneous counter overflow, one of the absolute encoders must be equipped with an offset.

- ▶ If more than two counters are used, each individual counter module of a PSSu system must supply diverse input values to the other counter modules of the PSSu system.
- ▶ Safe standstill monitoring must be carried out by feasibility with a safe travel command in the function block.
- ▶ Test the safety functions when commissioning or recommissioning.

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

Integrated protection mechanisms

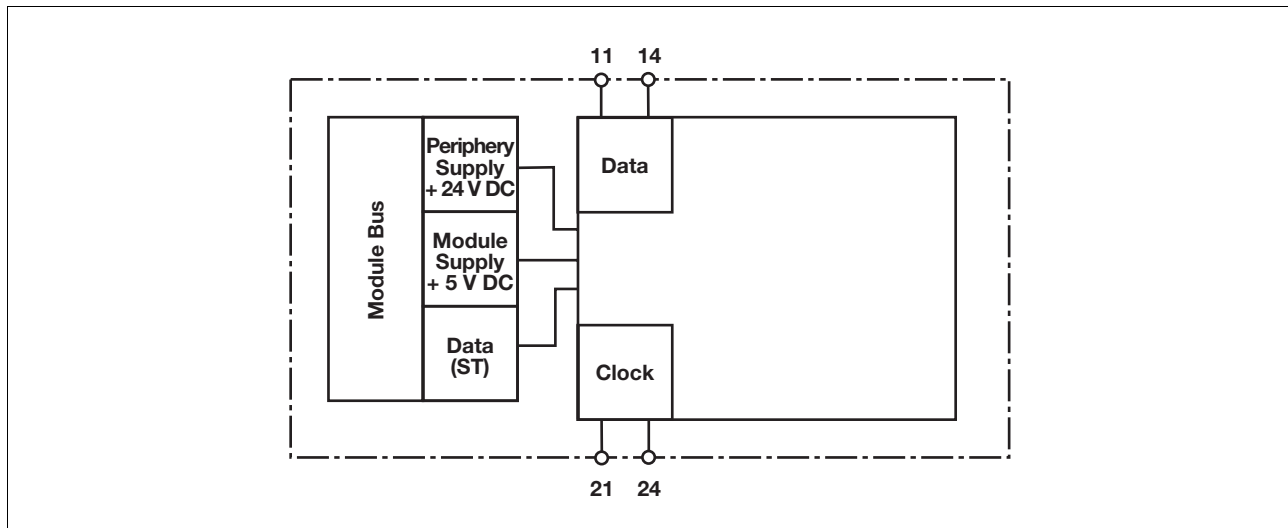
When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Counter modules (failsafe) PSSu E F ABS SSI

Block diagram



Function description

Module supply

- The module supply provides the module with voltage.

Periphery supply

- The supply for the test pulse output is generated from the periphery supply. It is galvanically isolated from the periphery supply.

As part of each cycle the module sends a pulse sequence at the test pulse output (CI) to the SSI absolute encoder. In turn the encoder transmits its position data. The position data is

read in at the module's input (D) (see timing diagram: SSI data transfer). With the system software the user can set the following values to adapt the module to the encoder or higher level control system:

- **Transmission rate**
The frequency of the pulses at the test pulse output (CI) determines the transmission rate. The user can adapt the frequency to the encoder in a range from 62.5 kHz up to 1.5 MHz (see Technical Details).
- **Input data length:**
The module's input data length must be adjusted to the data length

of the absolute encoder.

The module can process up to 32 Bits. The default is 24 Bits.

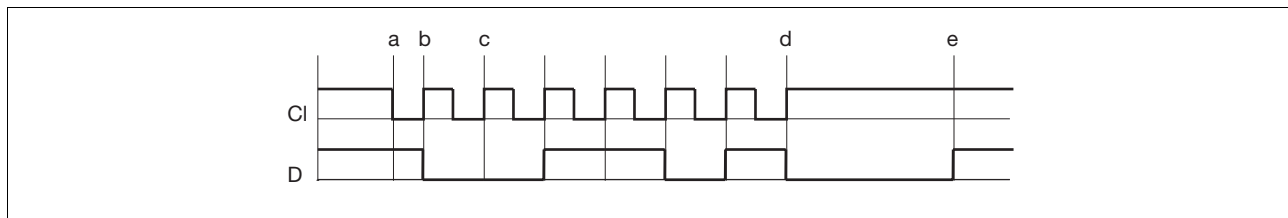
► Data format:

The data format in which the module transmits the position data of the connected absolute encoder to the head module.

- Gray code (default)
- Binary code

The position data is transmitted to the head module via the ST module bus with 4 Bytes, irrespective of the configured input data length. The module sends additional status information.

Timing diagram: Example of SSI data transfer:



Key:

The bit width in the example is 6. The position of the encoder is 001101 in gray code, i.e. 9_D .

- a: Data transfer begins with a falling edge at the CI signal.
- b: The first bit is transmitted with the first rising edge from the CI signal.
- c: The time up to the second rising edge is the period length T . $1/T$ is the signal frequency.
- d: The last rising edge from the CI signal ends the transfer. The encoder acknowledges the end of the transfer with a 0 signal.
- e: The encoder can transfer data again as soon as there is a 1 signal at input D.

Counter modules (failsafe)

PSSu E F ABS SSI

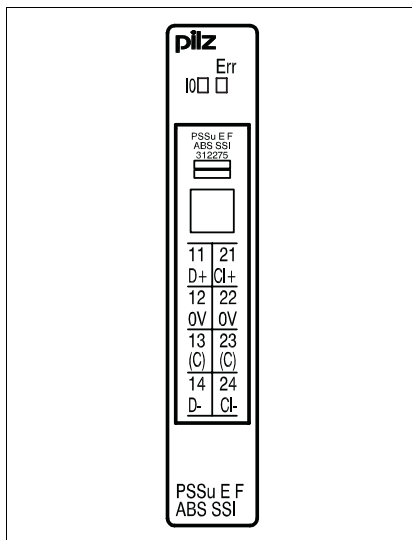
Wiring

Front view

- ▶ Use twisted pair cables to carry the differential signals (D+/D- and Cl+/Cl-). This will increase the noise immunity.
- ▶ Use shielded signal cables with metallic plugs.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.

The module connects the shield to the mounting rail.

 - Connect the mounting rail to the functional earth via an earthing terminal.
- ▶ The supply voltages must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410.
- ▶ Use copper wiring.
- ▶ Connect the two sensors via separate cables. This also applies to compact encoders.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.



Counter modules (failsafe) PSSu E F ABS SSI

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	Without C-rail: 11: Input D+ (Data +) 21: Output Cl+ (Clock +) 12-22: 0 V counter (12-22 linked within the base module) 13-23: Cable shield (13-23 linked within the base module) 14: Input D- (Data -) 24: Output Cl- (Clock -)	
Screw terminals: PSSu BP-C 1/8S PSSu BP-C 1/8S-T Cage clamp terminals: PSSu BP-C 1/8C PSSu BP-C 1/8C-T	With C-rail: 11: Input D+ (Data +) 21: Output Cl+ (Clock +) 12-22: 0 V counter (12-22 linked within the base module) 13-23: C-rail supply, cable screening (13-23 linked within the base module) 14: Input D- (Data -) 24: Output Cl- (Clock -)	

Counter modules (failsafe) PSSu E F ABS SSI

Connection

Input and output circuit Connecting an SSI encoder (master mode) With C-rail Encoder supply via the PSSu E PD module 0 V connection is not absolutely essential.	
Connecting an SSI encoder (master mode) Without C-rail Encoder supply via the PSSu E PD module 0 V connection is not absolutely essential.	

INFORMATION

To achieve the safety values **PL e (Cat. 4)** and **SIL CL 3** two modules must be used.

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Counter modules (failsafe)

PSSu E F ABS SSI

Technical details	
Application range	Failsafe
Module's device code	0323h
Number of ST input bits	32
Number of ST status bits	8
Support in system environment A	no
Support in system environment B	
from head module FS firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	101 mA
Module's power consumption	0.51 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Max. power dissipation of the module	0.75 W
Counter interface	
Number of counter inputs	1
Type of counter inputs	SSI encoder
Max. number of bits on the counter input	32 Bit
Selectable transmission rates	62.5 kHz, 100.0 kHz, 125.0 kHz, 250.0 kHz, 500.0 kHz, 1,000.0 kHz, 1,500.0 kHz
Coding of the input signal	Binary, Grey
Output signal (clock)	Differential signal (RS 422)
Signal at the data input	Differential signal (RS 422)
Potential isolation between input/output and periphery supply	yes
Potential isolation between input/output and voltage for the internal module bus	yes
Typ. processing time	0.1 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2

Counter modules (failsafe)

PSSu E F ABS SSI

Mechanical data

Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	35 g
Mechanical coding	
Type	J
Colour	yellow

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
		PL e (Cat. 4)	Cat. 4	SIL CL 3	2.61E-09	20

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

The standards current on **2005-04** apply.

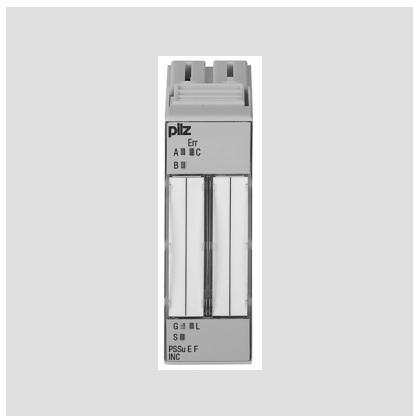
Order reference

Description	Order no.
PSSu E F ABS SSI (Electronic module)	312 275

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

Counter modules (failsafe)

PSSu E F INC



Electronic module for direct connection of an incremental encoder

Approvals

	PSSu E F INC
	◆

Module features

- ▶ Inputs for
 - Counter pulses (inputs A, B)
 - Zero pulse (Input C)
 - Stopping the counter (Input G, Gate)
 - Memory function (Input L, Latch)
 - Rotary encoder status (Input S, Status)
- ▶ Resolution of the counter and latch memory: **32 Bit**
- ▶ Operating modes:
 - Incremental encoder
 - Counter
- ▶ Inputs A, B, C are operated as differential inputs with inverted signals (A-, B-, C-).
- ▶ LEDs for:
 - Data transfer per input A, B, C
 - Status per functional input (Gate, Latch, Status)
 - Module error
- ▶ For failsafe applications in system environment B (automation system PSS 4000)

Module description

With the counter module you can implement the following safety functions: Monitoring of:

- ▶ Position
- ▶ Speed
- ▶ Standstill

To guarantee safety integrity you must use

- ▶ 2 sensors and
- ▶ 2 counter modules: a PSSu E F INC and a PSSu E F ABS SSI and
- ▶ the function blocks
FS_IncrementalEncoder,
FS_AbsoluteEncoder and
FS_CounterDual

With redundant and divers input values **PL e (Cat. 4)** and **SIL CL 3** can be achieved.

Requirements of the PSSu system:

- ▶ The counter modules must be part of a control system PSSu PLC or PSSu multi (not decentralised I/O system).
- ▶ The function blocks have to be assigned to the FS resource of the PSSu system where the counter modules are inserted. Control via SafetyNet is not permitted.

Demands on the sensors:

- ▶ Incremental encoders with RS422 interfaces may be used as sensors.
- ▶ Connect the sensors mechanically independently to the axis. If this is not possible, the connection should be positive-locking without wearing parts as e.g. chains or drive belts. If it is not possible to avoid this, the mechanical connection of the sensors must be monitored. Alternatively, it is possible to use a sensor that internally has 2 independent measured value recording systems.

Please note during configuration and within the user program:

- ▶ The input values must be diverse. This can be achieved through different
 - Scaling
 - Direction of rotation/count direction
 - Offset
- ▶ If more than two counters are used, each individual counter module of a PSSu system must supply diverse input values to the other counter modules of the PSSu system.
- ▶ Safe standstill monitoring must be carried out by feasibility with a safe travel command in the function block.
- ▶ Test the safety functions when commissioning or recommissioning.

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

Integrated protection mechanisms

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

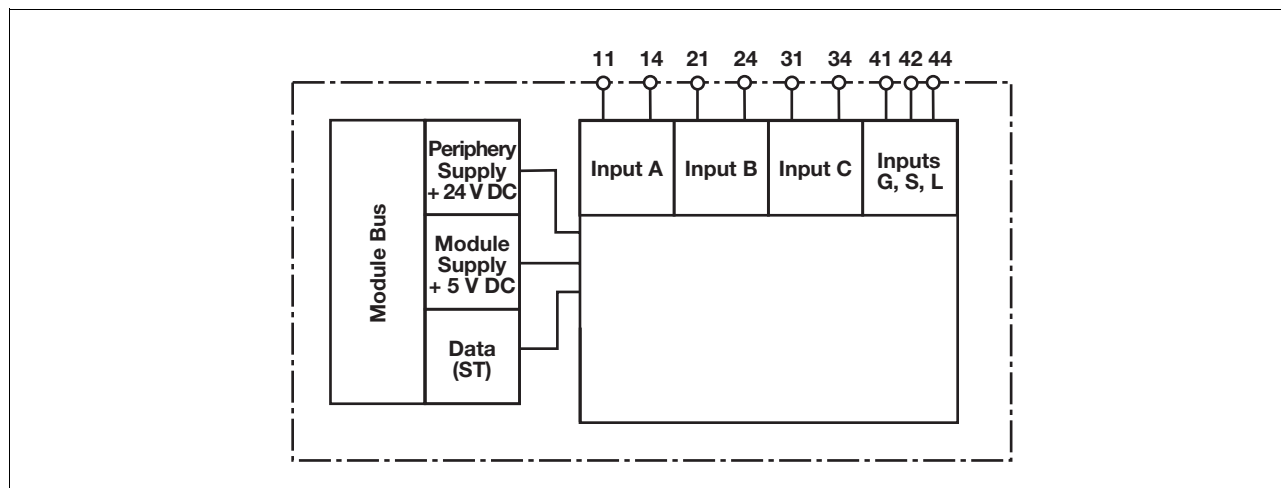
The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Counter modules (failsafe)

PSSu E F INC

Block diagram



Function description

Module supply

- ▶ The module supply provides the module with voltage.

The module has two operating modes:

- ▶ Incremental encoder (default)
- ▶ Counter

In incremental encoder mode the module evaluates inputs A and B. In counter mode, only the rising edges at input A are counted. The user can define the operating modes and any additional options using the system software

In both operating modes, the counter status and the status of the latch memory are each transmitted to the head module via the module bus with a 32 bit data word. The module sends additional status information.

The module has three dual-pole, differential inputs (A, B, C) and three single-pole inputs referenced to earth (G, L, S). Signals with ± 5 V are connected to the dual-pole inputs in accordance with RS 422.

The single-pole inputs are used for special functions. Inputs G and L may be connected to external signal sources, e.g. to a higher order control system.

- ▶ Input G (gate input)
The counter is stopped with a 1 signal.

- ▶ Input L (input for external latch pulse)
At a rising edge, the module stores the current counter value in the latch memory upon request.
- ▶ Input S (input for external status)
The encoder's fault signal output can be connected to the status input. The module transmits the input status to the head module with the status information.

Additional module functions:

- ▶ Counter overflow
- ▶ Period length measurement
The resolution is 200 ns.
- ▶ Set counter status

Incremental encoder operating mode

The counter outputs and the output for the incremental encoder's zero pulse are connected to the dual-pole inputs.

- ▶ Inputs A, B
The first channel of the encoder is connected to input A, the second to input B.
- ▶ Input C
The output for the incremental encoder's zero pulse is connected to input C. Upon request, the module stores the counter value at the time of the zero pulse in the latch memory.

Counter operating mode

In counter mode the module's dual-pole differential inputs A, B, C have different functions to those of incremental encoder mode.

- ▶ Input A (Count)
Input A is used to connect the counter pulses.
- ▶ Input B (Up/down)
At a 0 signal the module counts forwards. At a 1 signal the module counts backwards.
- ▶ Input C (Gate/Latch)
The counter is stopped with a 1 signal. Upon request, the module stores the current counter value in the latch memory.

The single-pole inputs have the same function in both operating modes.

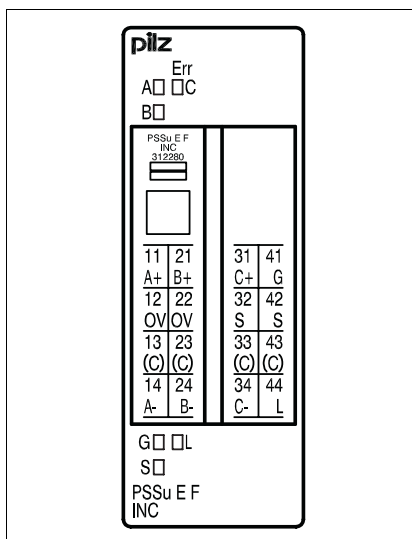
Counter modules (failsafe)

PSSu E F INC

Wiring

- ▶ The module's connections are galvanically isolated from the module supply and periphery supply.
- ▶ For EMC reasons we recommend that you operate inputs A, B, C exclusively as differential inputs with inverted signals (A+/A-, B+/B-, C+/C-).
- ▶ The module evaluates open differential inputs (A+/A-, B+/B-, C+/C-) as a 1 signal.
- ▶ The module evaluates open function inputs (G, L, S) as a 0 signal.
- ▶ Use twisted pair cables to carry the inverted signals. This will increase the noise immunity.
- ▶ Use shielded signal cables with metallic plugs.
- ▶ On base modules with C-rail:
 - Connect the shield to the terminals on the C-rail.
 - Connect the C-rail with low impedance to the functional earth.
- ▶ On base modules without C-rail:
 - Connect the shield as shown in the terminal configuration section.
 - The module connects the shield to the functional earth via the mounting rail.
- ▶ The channel for the incremental encoder's zero pulse has a different designation depending on the manufacturer (N, C, Z, 0,...)
- ▶ The supply voltages must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410.
- ▶ Use copper wiring.
- ▶ Connect the two sensors via separate cables. This also applies to compact encoders.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view

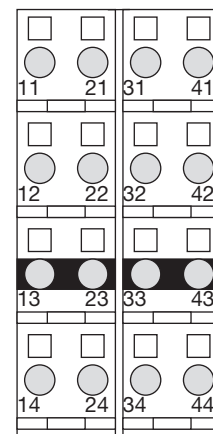
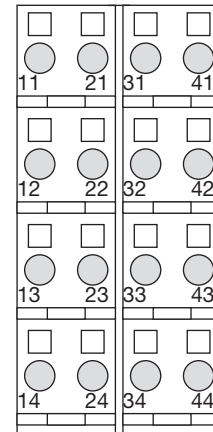


Counter modules (failsafe)

PSSu E F INC

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 2/16S PSSu BP 2/16S-T	Without C-rail:	
	11: Input A+	
	21: Input B+	
	31: Input C+	
	41: Input G (Gate)	
	12-22: 0 V counter (12-22 linked within the base module)	
	32-42: Input S (Status) (32-42 linked within the base module)	
	13-23-33-43: Shield connection (13-23, 33-43 linked within the base module)	
	14: Input A-	
	24: Input B-	
	34: Input C-	
	44: Input L (Latch)	
Screw terminals: PSSu BP-C 2/16S PSSu BP-C 2/16S-T	With C-rail:	
	11: Input A+	
	21: Input B+	
	31: Input C+	
	41: Input G (Gate)	
	12-22: 0 V counter (12-22 linked within the base module)	
	32-42: Input S (Status) (32-42 linked within the base module)	
	13-23-33-43: C-rail supply Shield connection (13-23, 33-43 linked within the base module)	
	14: Input A-	
	24: Input B-	
	34: Input C-	
	44: Input L (Latch)	



Counter modules (failsafe)
PSSu E F INC

Connection

Incremental encoder operating mode	With C-rail
Encoder supply via the PSSu E PD module	
Incremental encoder operating mode	Without C-rail
Encoder supply via the PSSu E PD module	

Counter modules (failsafe)

PSSu E F INC

Counter operating mode	With C-rail
Encoder supply via the PSSu E PD module Functional inputs (G, L, S) not connected.	
Counter operating mode	Without C-rail
Encoder supply via the PSSu E PD module Functional inputs (G, L, S) not connected.	

INFORMATION

To achieve the safety values **PL e (Cat. 4)** and **SIL CL 3** two modules must be used. a PSSu E F INC and a PSSu E F ABS SSI.

Counter modules (failsafe)

PSSu E F INC

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Failsafe
Module's device code	0324h
Number of ST input bits	64
Number of ST output bits	32
Number of ST status bits	8
Number of ST control bits	8
Support in system environment A	no
Support in system environment B	
from head module FS firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	157 mA
Module's power consumption	0.79 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	15 mA
Module's power consumption with no load	0.37 W
Max. power dissipation of the module	1.20 W
Counter interface	
Number of counter inputs	1
Type of counter inputs	Incremental encoder
Max. number of bits on the counter input	32 Bit
Evaluation of counter pulses	1x, 2x, 4x
Maximum threshold frequency	5.0 MHz
Phase offset between differential signals A and B	90 deg
Phase offset tolerance	30 deg
Signal at counter inputs A and B and/or C	Differential signal (RS 422)
Time constant of input filter on LATCH signal	50 µs
Time constant of input filter on GATE signal	50 µs
Time constant of input filter on STATUS signal	50 µs
Permitted low signal range on LATCH/GATE/STATUS signals	-3 - 5 V
Permitted high signal range on LATCH/GATE/STATUS signals	11 - 30 V
Typ. input current of the LATCH and/or GATE and/or STATUS signals at low level	0 mA
Typ. input current of the LATCH and/or GATE and/or STATUS signals at high level	4.0 mA
Potential isolation between input/output and periphery supply	yes
Potential isolation between input/output and voltage for the internal module bus	yes
Typ. processing time	0.1 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m

Counter modules (failsafe)

PSSu E F INC

Environmental data	
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	50 g
Mechanical coding	
Type	J
Colour	yellow

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
		PL e (Cat. 4)	Cat. 4	SIL CL 3	3.34E-09	20

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

The standards current on **2005-04** apply.

Counter modules (failsafe)**PSSu E F INC****Order reference**

Description	Order no.
PSSu E F INC (Electronic module)	312 280

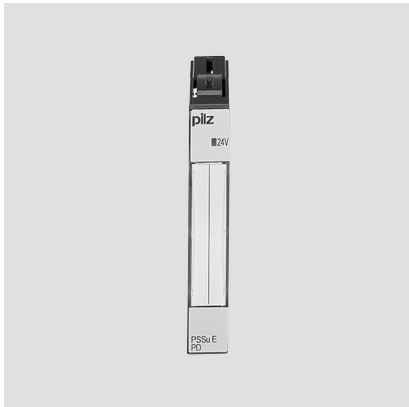
Base modules	Order no.
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631

Voltage distribution

Voltage distribution

Contents	Page
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PSSu E PD(-T)	3.11-2
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PSSu E PS-P +/- 10V	3.11-22
PSSu E PS-P +/- 15V	3.11-28

Voltage distribution PSSu E PD(-T)



Electronic module operates as distributor for the periphery supply

Approvals

	PSSu E PD
	◆

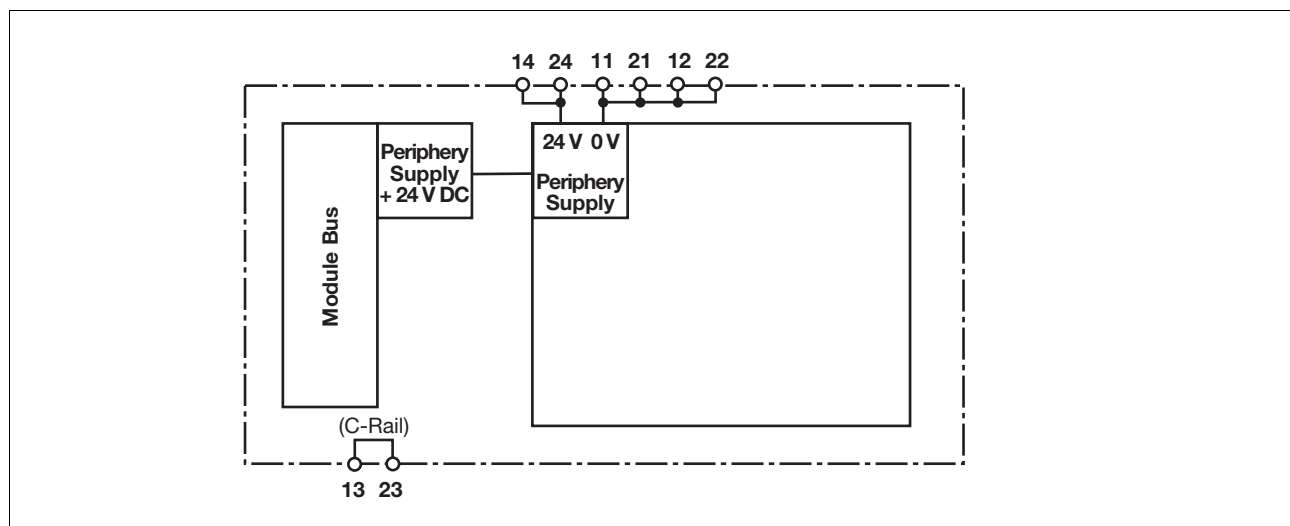
Module features

- ▶ The module routes the periphery supply from the module bus to the base module terminals.
- ▶ LED for:
 - Periphery supply
- ▶ Coated version of the module:
PSSu E PD-T: for increased environmental requirements

Module description

The module may be used for additional connections to the periphery supply. The periphery supply can be drawn from the connections, but may not be fed through that route. The module **PSSu E PD-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Block diagram



Voltage distribution PSSu E PD(-T)

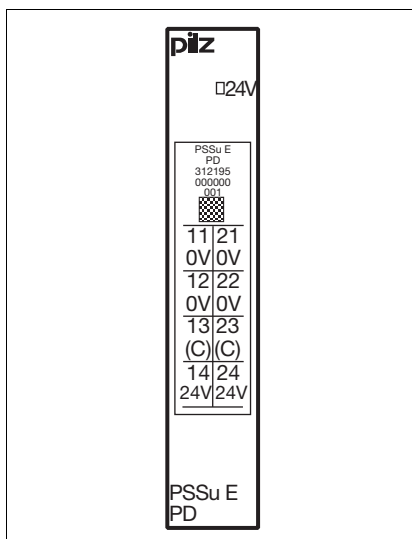
Function description

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

Wiring

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

Front view

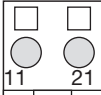
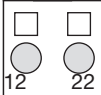
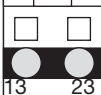
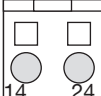
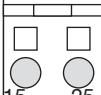
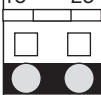


Terminal configuration

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

Voltage distribution

PSSu E PD(-T)

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11-21: 0 V periphery supply (11-21 linked internally)	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	12-22: 0 V periphery supply (12-22 linked within the base module)	
	13-23: C-rail supply (13-23 linked within the base module)	
	14-24: +24 V periphery supply (14-24 linked internally)	
	15-25: 0 V periphery supply (15-25 linked within the base module)	
	16-26: C-rail supply (16-26 linked within the base module)	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Environmental data	
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
	-40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
	-40 - 70 °C coated version (-T)
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
	yes coated version (-T)

Voltage distribution

PSSu E PD(-T)

Environmental data	
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27 coated version (-T)	15g coated version (-T) 11 ms coated version (-T)
EN 60068-2-29 coated version (-T)	10g coated version (-T) 16 ms coated version (-T)
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1 coated version (-T)	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PC
	PA coated version (-T)
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	28 g
Mechanical coding	
Type	A
Colour	light grey

The standards current on **2005-04** apply.

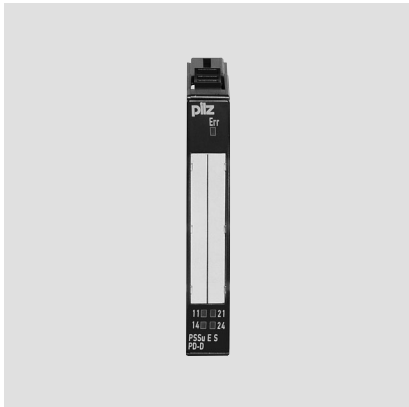
Order reference	
Description	Order no.
PSSu E PD (Electronic module)	312 195
PSSu E PD-T (Electronic module, coated version)	314 195
Base modules	
Order no.	
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601

Voltage distribution

PSSu E PD(-T)

Base modules	Order no.
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8S-T (Base module with C-rail and screw terminals, coated version)	314 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP-C 1/8C-T (Base module with C-rail and cage clamp terminals, coated version)	314 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12S-T (Base module with C-rail and screw terminals, coated version)	314 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623
PSSu BP-C1 1/12C-T (Base module with C-rail and cage clamp terminals, coated version)	314 623

Voltage distribution PSSu E S PD-D



Module features

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

The module provides the following diagnostic data:

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

Module description

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

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

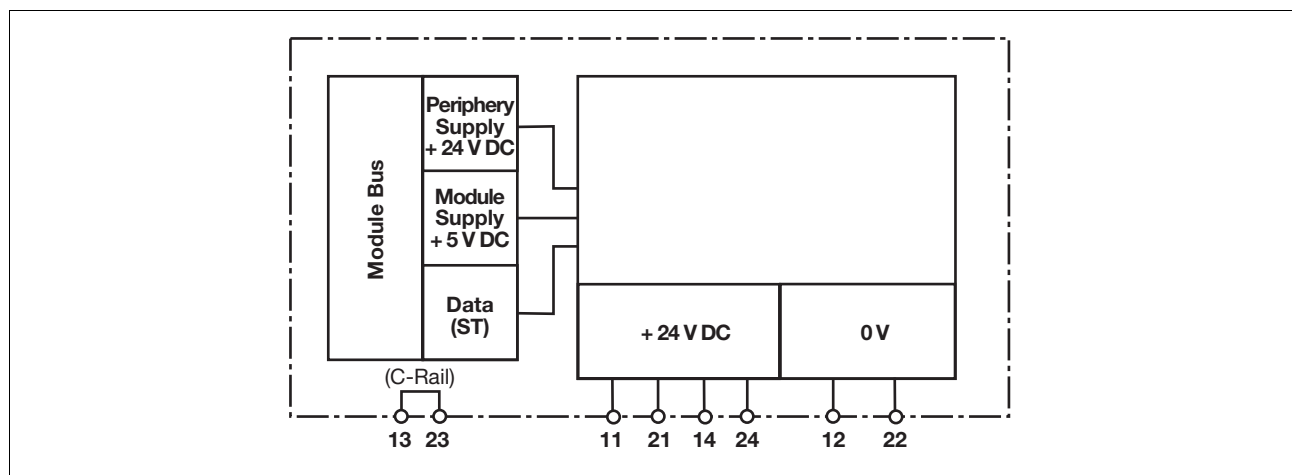
Approvals

	PSSu E S PD-D
	◆

Integrated protection mechanisms

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

Block diagram



Voltage distribution PSSu E S PD-D

Function description

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

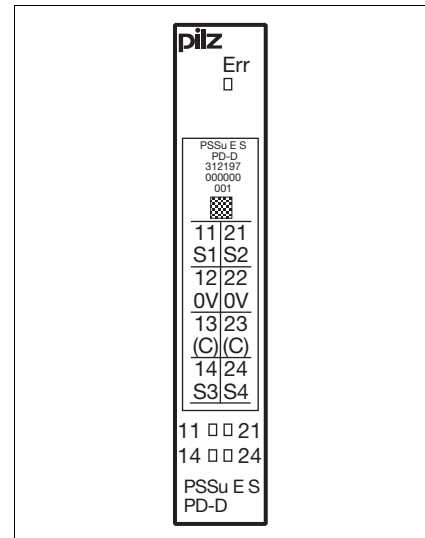
The module provides advanced diagnostic data, which is also available in a status byte in the ST-PIL:

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

Wiring

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

Front view

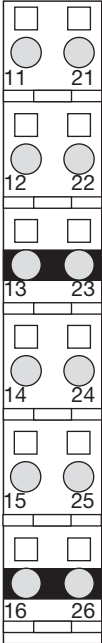


Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S	Without C-rail:	
	11: Output S1	11 21
	21: Output S2	21 22
	12-22: 0 V periphery supply (12-22 linked within the base module)	12 22
	13-23: 0 V periphery supply (13-23 linked within the base module)	13 23
	14: Output S3	14 24
	24: Output S4	24 25
Screw terminals: PSSu BP-C 1/8S	With C-rail:	
	11: Output S1	11 21
	21: Output S2	21 22
	12-22: 0 V periphery supply (12-22 linked within the base module)	12 22
	13-23: C-rail supply (13-23 linked within the base module)	13 23
	14: Output S3	14 24
	24: Output S4	24 25

Voltage distribution

PSSu E S PD-D

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S	With C-rail:	
Cage clamp terminals: PSSu BP-C1 1/12C	11: Output S1	
	21: Output S2	
	12-22: 0 V periphery supply (12-22 linked within the base module)	
	13-23: C-rail supply (13-23-16-26 linked within the base module)	
	14: Output S3	
	24: Output S4	
	15-25: 0 V periphery supply (15-25 linked within the base module)	
	16-26: C-rail supply (13-23-16-26 linked within the base module)	

NOTICE

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	000Ah
Support in system environment A	
from ST firmware version for other head modules	16
from ST firmware version PSSu H S PN	1
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	60 mA
Module's power consumption	0.30 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	30 mA
Module's power consumption with no load	0.72 W
Max. power dissipation of the module	1.50 W
Outputs	
Number of outputs for periphery supply	4
Short-circuit proof	yes
Potential isolation between output and voltage for the internal module bus	yes
Max. output current at rated voltage	1.50 A
Typ. threshold value for overload	8 A
Permitted loads	inductive, capacitive, resistive

Voltage distribution

PSSu E S PD-D

Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	34 g
Mechanical coding	
Type	J
Colour	dark grey

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

Voltage distribution

PSSu E S PD-D

Order reference

Designation	Order No.
PSSu E S PD-D (electronic module)	312 197

Base modules

PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP-C 1/8S (Base module with C-rail and screw terminals)	312 610
PSSu BP-C 1/8C (Base module with C-rail and cage clamp terminals)	312 611
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623

Voltage distribution PSSu E PD1(-T)



Electronic module for duplicating supplies

Approvals

	PSSu E PD1
	◆

Module features

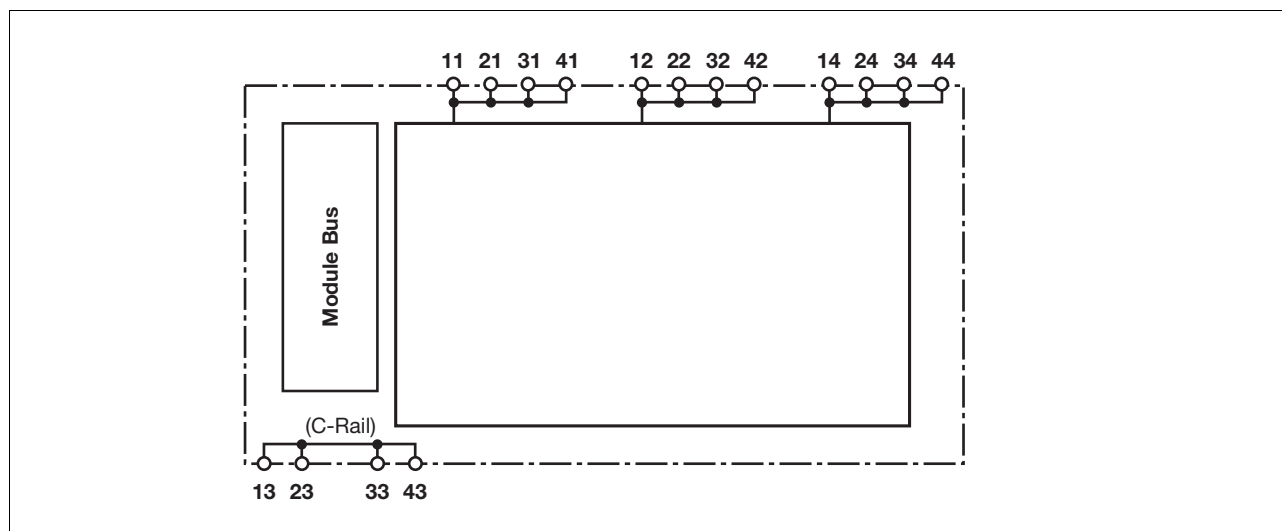
- ▶ The module provides connections for external supplies.
- ▶ The external supplies are galvanically isolated from the module bus supplies.
- ▶ Coated version of the module:
PSSu E PD1-T: for increased environmental requirements

Module description

The module may be used to feed and extract external supplies to and from the connection terminals.

The module **PSSu E PD1-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Block diagram



Voltage distribution PSSu E PD1(-T)

Function description

Module supply

- ▶ The module needs no supply from the module supply.

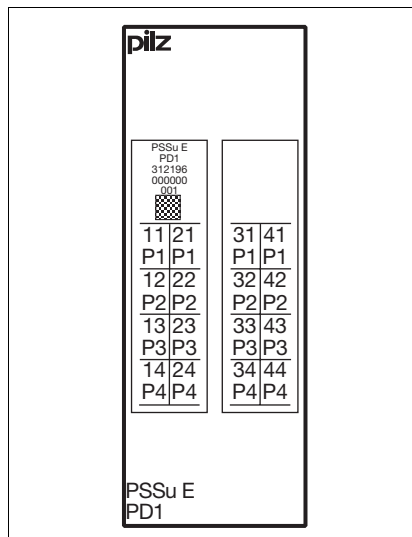
Periphery supply

- ▶ The module distributes the periphery supply on the module bus.
- ▶ The periphery supply is not available on the module's connection terminals.

External supplies

- ▶ The module provides connections for external supplies.
- ▶ The module does not switch the external supplies.
- ▶ The external supplies are galvanically isolated from the module bus supplies and from each other.
- ▶ The module has no current limitation on the external supplies.

Front view



Wiring

- ▶ Safe electrical isolation must be ensured for the external supplies. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load on the connection terminals is 4 A per supply.
- ▶ Permitted infeed at the module's connection terminals:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... + 30 VDC
 - - 48 VAC ... + 48 VAC
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules without C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Voltage distribution PSSu E PD1(-T)

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 2/16S PSSu BP 2/16S-T	11-21-31-41: Supply P1 (11-21-31-41 linked internally)	
Cage clamp terminals: PSSu BP 2/16C PSSu BP 2/16C-T	12-22-32-42: Supply P2 (12-22-32-42 linked within the base module)	
	13-23-33-43: Supply P3 (13-23-33-43 linked within the base module)	
	14-24-34-44: Supply P4 (14-24-34-44 linked internally)	
Screw terminals: PSSu BP-C 2/16S PSSu BP-C 2/16S-T	11-21-31-41: Supply P1 (11-21-31-41 linked internally)	
Cage clamp terminals: PSSu BP-C 2/16C PSSu BP-C 2/16C-T	12-22-32-42: Supply P2 (12-22-32-42 linked within the base module)	
	13-23-33-43: C-rail supply (13-23-33-43 linked within the base module)	
	14-24-34-44: Supply P4 (14-24-34-44 linked internally)	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Voltage distribution

PSSu E PD1(-T)

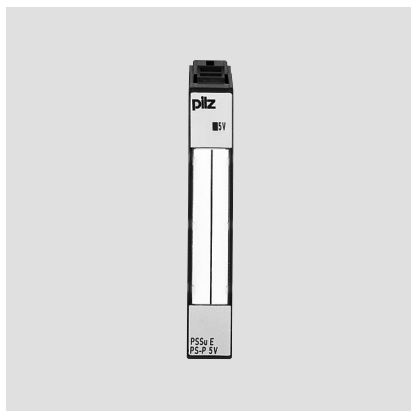
Technical details	
Application range	Standard
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Max. power dissipation of the module	0.60 W
Environmental data	
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	49 g
Mechanical coding	
Type	A
Colour	light grey

The standards current on **2005-04** apply.

Voltage distribution PSSu E PD1(-T)

Order reference	
Description	Order no.
PSSu E PD1 (Electronic module)	312 196
PSSu E PD1-T (Electronic module, coated version)	314 196
Base modules	
Description	Order no.
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16S-T (Base module without C-rail with screw terminals, coated version)	314 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP 2/16C-T (Base module without C-rail with cage clamp terminals, coated version)	314 629
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16S-T (Base module with C-rail and screw terminals, coated version)	314 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631
PSSu BP-C 2/16C-T (Base module with C-rail and cage clamp terminals, coated version)	314 631

Voltage distribution PSSu E PS-P 5V



Electronic module with DC power supply for external voltages

Approvals

	PSSu E PS-P 5V
	◆

Module features

- ▶ Primary side of power supply
 - The external supply is fed to the base module terminals.
 - Voltage: 24 V
- ▶ Secondary side of power supply
 - The module supplies the output voltage to the base module terminals.
 - No buffer when the supply voltage is interrupted
 - Voltage: **5 V**
 - Max. continuous output: **10.0 W**
 - Max. current at **5 V**: **2.0 A**
- ▶ LED for:
 - External voltage

Module description

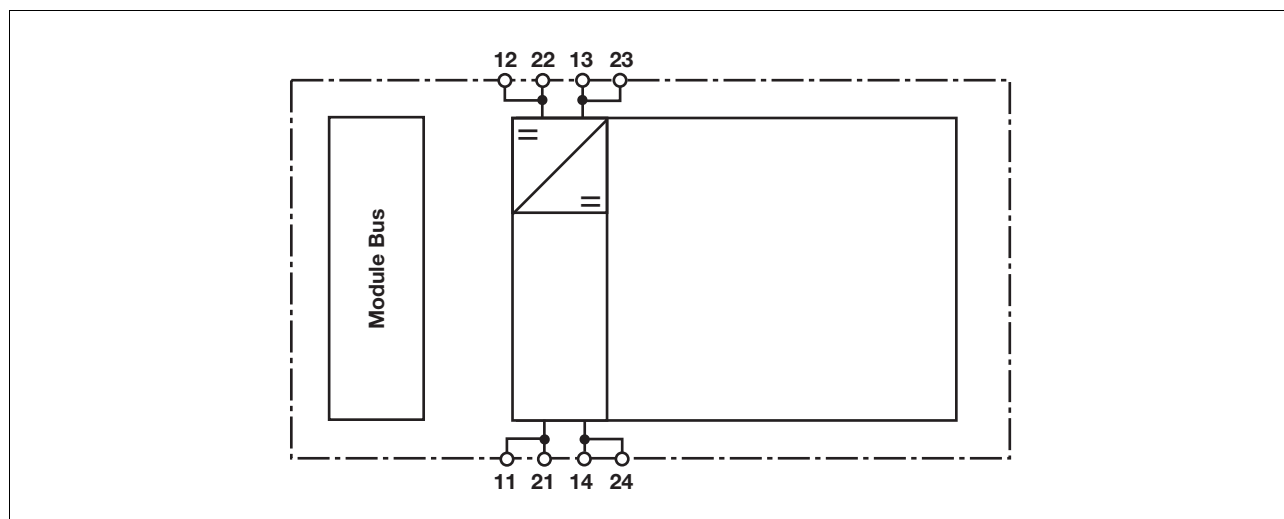
The module may be used to convert a 24 V protective extra low voltage, in order to supply sensors and actuators connected to the PSSuniversal system.

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Short circuit-proof
- ▶ Temperature monitoring
 - Shutdown in the case of overload
 - Restart when the module has cooled down.
- ▶ The external supply and the module bus supplies are galvanically isolated.

Block diagram



Voltage distribution PSSu E PS-P 5V

Function description

The modules are typically used to supply periphery devices, such as:

- ▶ Rotary encoders
- ▶ Pressure gauges
- ▶ Transducers
- ▶ Potentiometers

Module supply

- ▶ The module needs no supply from the module supply.
- ▶ The module distributes the module supply on the module bus.

Periphery supply

- ▶ The module needs no supply from the periphery supply.
- ▶ The periphery supply is not available on the module's connection terminals.
- ▶ The module distributes the periphery supply on the module bus.

External supplies

- ▶ The module provides connections for external supplies. The external supplies are fed to the base module terminals.
- ▶ Please refer to the derating diagram.

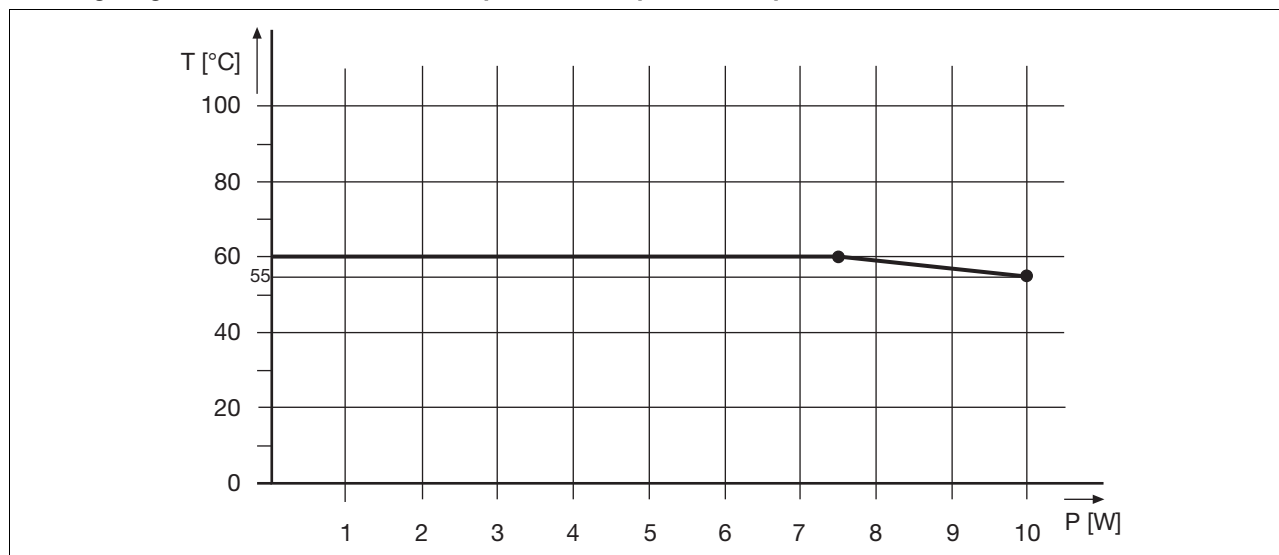
Primary side of power supply

- Voltage: **24 V**
- Max. power consumption: **12.0 W**

Secondary side of power supply

- The module supplies the output voltage to the base module terminals.
- No buffer when the supply voltage is interrupted
- Voltage: **5 V**
- Max. continuous output: **10.0 W**
- Max. current at **5 V**: **2.0 A**

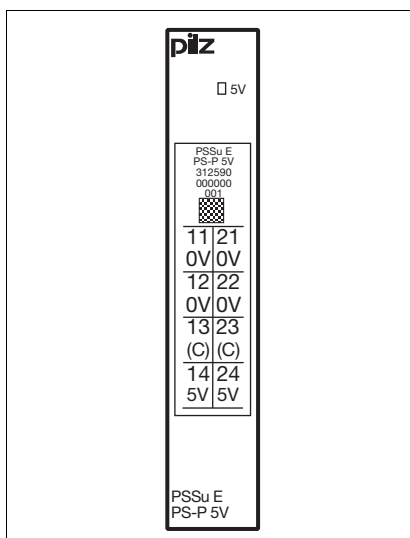
Derating diagram: Permitted ambient temperature T dependent on power P



Wiring

- ▶ Safe electrical isolation must be ensured for the external supplies. Failure to do so could result in electric shock.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



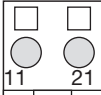
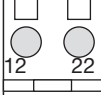
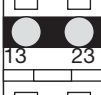
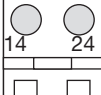
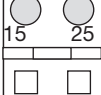
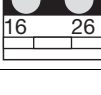
Voltage distribution PSSu E PS-P 5V

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	Without C-rail: 11-21: 0 V extraction (11-21 linked internally) 12-22: 0 V infeed (12-22 linked within the base module) 13-23: +24 V infeed (13-23 linked within the base module) 14-24: +5 V extraction (14-24 linked internally)	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	Without C-rail: 11-21: 0 V extraction (11-21 linked internally) 12-22: 0 V infeed (12-22-15-25 linked within the base module) 13-23: +24 V infeed (13-23-16-26 linked within the base module) 14-24: +5 V extraction (14-24 linked internally) 15-25: 0 V infeed (12-22-15-25 linked within the base module) 16-26: +24 V infeed (13-23-16-26 linked within the base module)	

Voltage distribution

PSSu E PS-P 5V

Base module	Terminal configuration	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11-21: 0 V extraction (11-21 linked internally)	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	12-22: 0 V infeed (12-22 linked within the base module)	
	13-23: C-rail supply (13-23-16-26 linked within the base module)	
	14-24: +5 V extraction (14-24 linked internally)	
	15-25: +24 V infeed (15-25 linked within the base module)	
	16-26: C-rail supply (13-23-16-26 linked within the base module)	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Primary side (external supply voltage)	
Supply voltage U_B DC	24 V
Voltage tolerance	-30 %/+25 %
Power consumption at U_B DC	12.0 W
Secondary side (output voltage)	
Output power	10.0 W
Voltage tolerance	-2 %/+2 %
Voltage output	5 V
Max. current	2.0 A
Max. power dissipation of the module	1.50 W

Voltage distribution

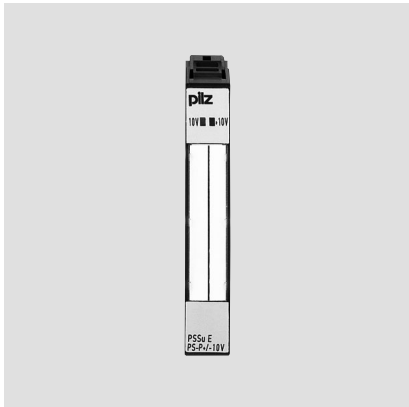
PSSu E PS-P 5V

Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	35 g
Mechanical coding	
Type	B
Colour	light grey

Order reference	
Description	Order no.
PSSu E PS-P 5V (Electronic module)	312 590

Base modules	Order no.
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623

Voltage distribution PSSu E PS-P +/- 10V



Electronic module with DC power supply for external voltages

Approvals

	PSSu E PS-P + - 10V
	◆

Module features

- ▶ Primary side of power supply
 - The external supply is fed to the base module terminals.
 - Voltage: 24 V
- ▶ Secondary side of power supply
 - The module supplies the output voltage to the base module terminals.
 - No buffer when the supply voltage is interrupted
 - Voltage: **10 V/-10 V**
 - Max. continuous output: **10.0 W**
 - Max. current at **10 V**: **1.0 A**
 - Max. current at **-10 V**: **0.5 A**
- ▶ LED for:
 - External voltage

Module description

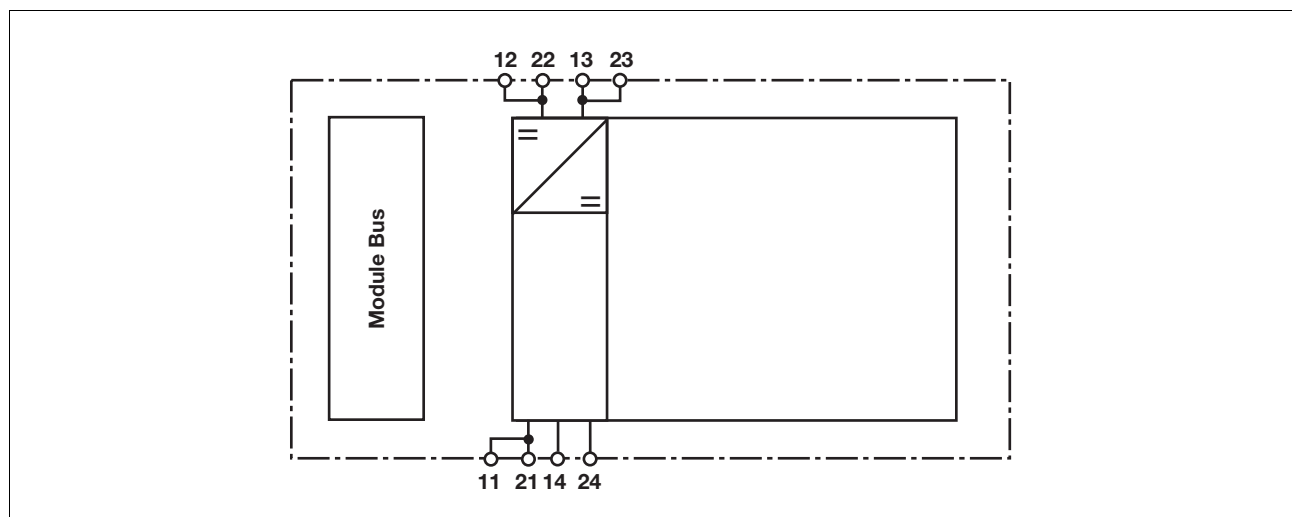
The module may be used to convert a 24 V protective extra low voltage, in order to supply sensors and actuators connected to the PSSuniversal system.

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Short circuit-proof
- ▶ Temperature monitoring
 - Shutdown in the case of overload
 - Restart when the module has cooled down.
- ▶ The external supply and the module bus supplies are galvanically isolated.

Block diagram



Voltage distribution PSSu E PS-P +/- 10V

Function description

The modules are typically used to supply periphery devices, such as:

- ▶ Rotary encoders
- ▶ Pressure gauges
- ▶ Transducers
- ▶ Potentiometers

Module supply

- ▶ The module needs no supply from the module supply.
- ▶ The module distributes the module supply on the module bus.

Periphery supply

- ▶ The module needs no supply from the periphery supply.
- ▶ The periphery supply is not available on the module's connection terminals.
- ▶ The module distributes the periphery supply on the module bus.

External supplies

- ▶ The module provides connections for external supplies. The external supplies are fed to the base module terminals.
- ▶ Please refer to the derating diagram.

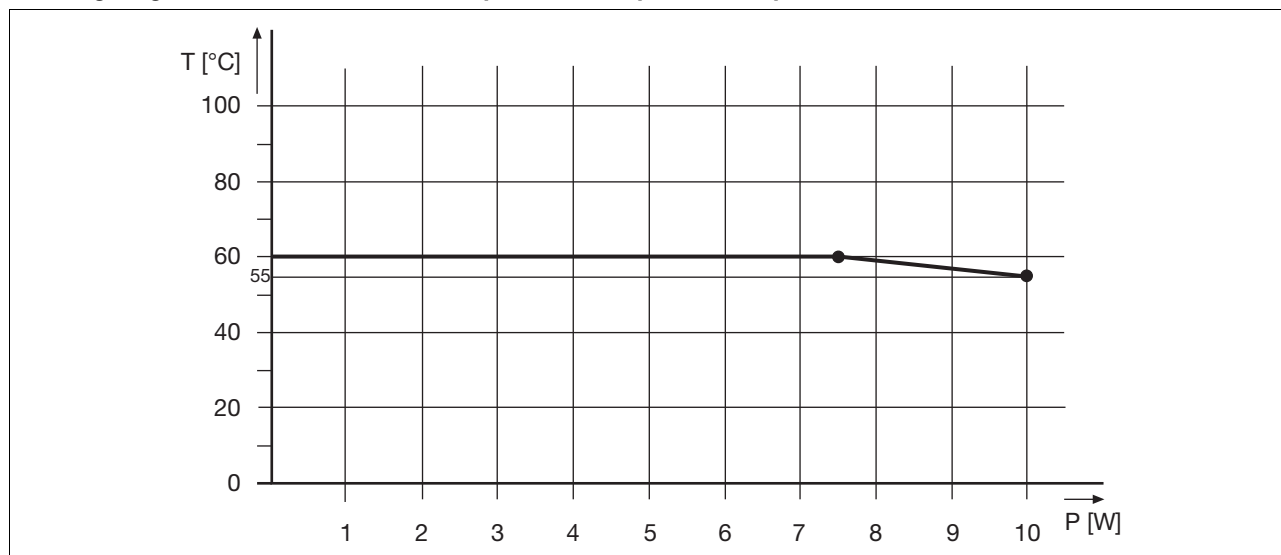
Primary side of power supply

- Voltage: **24 V**
- Max. power consumption: **12.0 W**

Secondary side of power supply

- The module supplies the output voltage to the base module terminals.
- No buffer when the supply voltage is interrupted
- Voltage: **10 V/-10 V**
- Max. continuous output: **10.0 W**
- Max. current at **10 V: 1.0 A**
- Max. current at **-10 V: 0.5 A**

Derating diagram: Permitted ambient temperature T dependent on power P

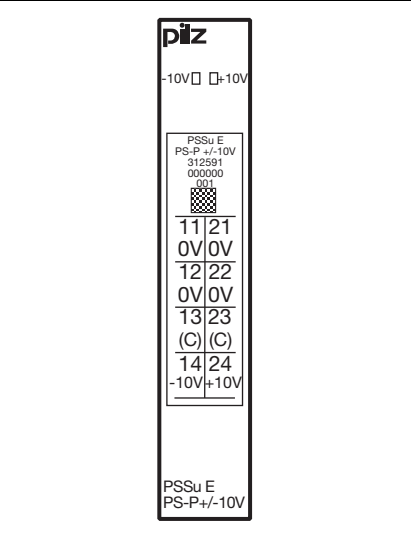


Voltage distribution
PSSu E PS-P +/- 10V

Wiring

- ▶ Safe electrical isolation must be ensured for the external supplies. Failure to do so could result in electric shock.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11-21: 0 V extraction (11-21 linked internally)	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	12-22: 0 V infeed (12-22 linked within the base module) 13-23: +24 V infeed (13-23 linked within the base module) 14: -10 V extraction 24: +10 V extraction	

Voltage distribution PSSu E PS-P +/- 10V

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11-21: 0 V extraction (11-21 linked internally)	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	12-22: 0 V infeed (12-22-15-25 linked within the base module)	
	13-23: +24 V infeed (13-23-16-26 linked within the base module)	
	14: -10 V extraction	
	24: +10 V extraction	
	15-25: 0 V infeed (12-22-15-25 linked within the base module)	
	16-26: +24 V infeed (13-23-16-26 linked within the base module)	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11-21: 0 V extraction (11-21 linked internally)	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	12-22: 0 V infeed (12-22 linked within the base module)	
	13-23: C-rail supply (13-23-16-26 linked within the base module)	
	14: -10 V extraction	
	24: +10 V extraction	
	15-25: +24 V infeed (15-25 linked within the base module)	
	16-26: C-rail supply (13-23-16-26 linked within the base module)	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Voltage distribution

PSSu E PS-P +/- 10V

Technical details

Application range	Standard
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Primary side (external supply voltage)	
Supply voltage U_B DC	24 V
Voltage tolerance	-30 %/+25 %
Power consumption at U_B DC	12.0 W
Secondary side (output voltage)	
Output power	10.0 W
Voltage tolerance	-2 %/+2 %
Voltage output	10 V
Max. current	1.0 A
Negative output voltage	-10 V
Max. current of negative voltage	0.5 A
Max. power dissipation of the module	1.50 W
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP 20
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	40 g
Mechanical coding	
Type	C
Colour	light grey

Voltage distribution

PSSu E PS-P +/- 10V

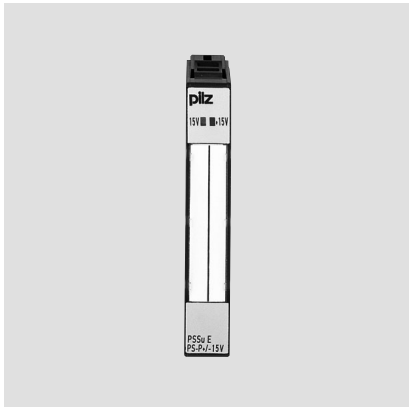
Order reference	

Description	Order no.
PSSu E PS-P +/-10V (Electronic module)	312 591

Base modules	Order no.

PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623

Voltage distribution PSSu E PS-P +/- 15V



Electronic module with DC power supply for external voltages

Approvals

	PSSu E PS-P + - 15V
	◆

Module features

- ▶ Primary side of power supply
 - The external supply is fed to the base module terminals.
 - Voltage: 24 V
- ▶ Secondary side of power supply
 - The module supplies the output voltage to the base module terminals.
 - No buffer when the supply voltage is interrupted
 - Voltage: **15 V/-15 V**
 - Max. continuous output: **10.0 W**
 - Max. current at **15 V: 0.6 A**
 - Max. current at **-15 V: 0.3 A**
- ▶ LED for:
 - External voltage

Module description

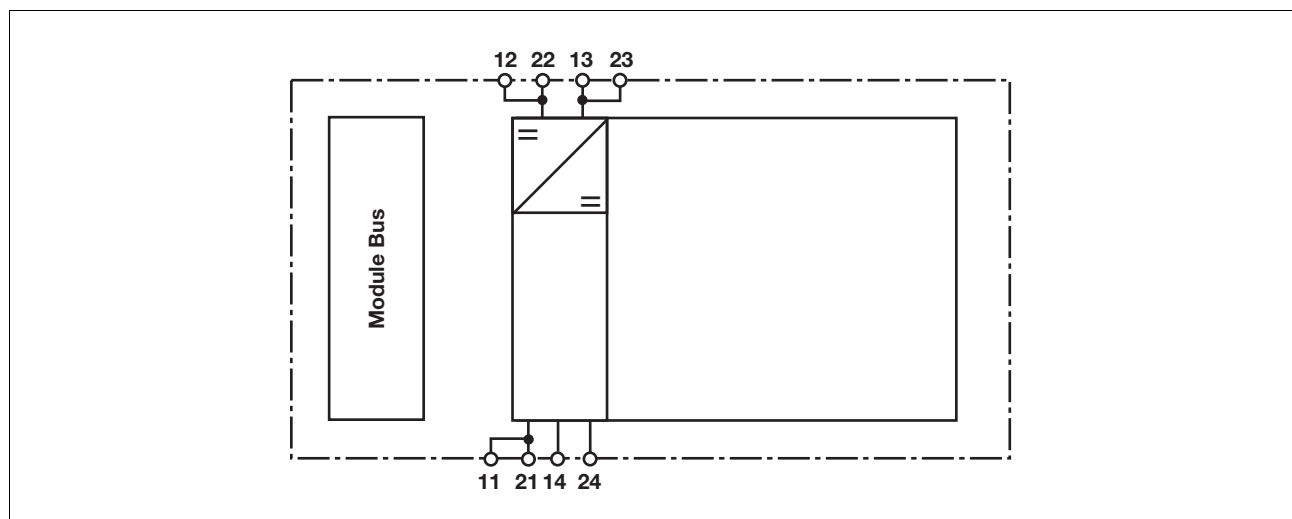
The module may be used to convert a 24 V protective extra low voltage, in order to supply sensors and actuators connected to the PSSuniversal system.

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Short circuit-proof
- ▶ Temperature monitoring
 - Shutdown in the case of overload
 - Restart when the module has cooled down.
- ▶ The external supply and the module bus supplies are galvanically isolated.

Block diagram



Voltage distribution PSSu E PS-P +/- 15V

Function description

The modules are typically used to supply periphery devices, such as:

- ▶ Rotary encoders
- ▶ Pressure gauges
- ▶ Transducers
- ▶ Potentiometers

Module supply

- ▶ The module needs no supply from the module supply.
- ▶ The module distributes the module supply on the module bus.

Periphery supply

- ▶ The module needs no supply from the periphery supply.
- ▶ The periphery supply is not available on the module's connection terminals.
- ▶ The module distributes the periphery supply on the module bus.

External supplies

- ▶ The module provides connections for external supplies. The external supplies are fed to the base module terminals.
- ▶ Please refer to the derating diagram.

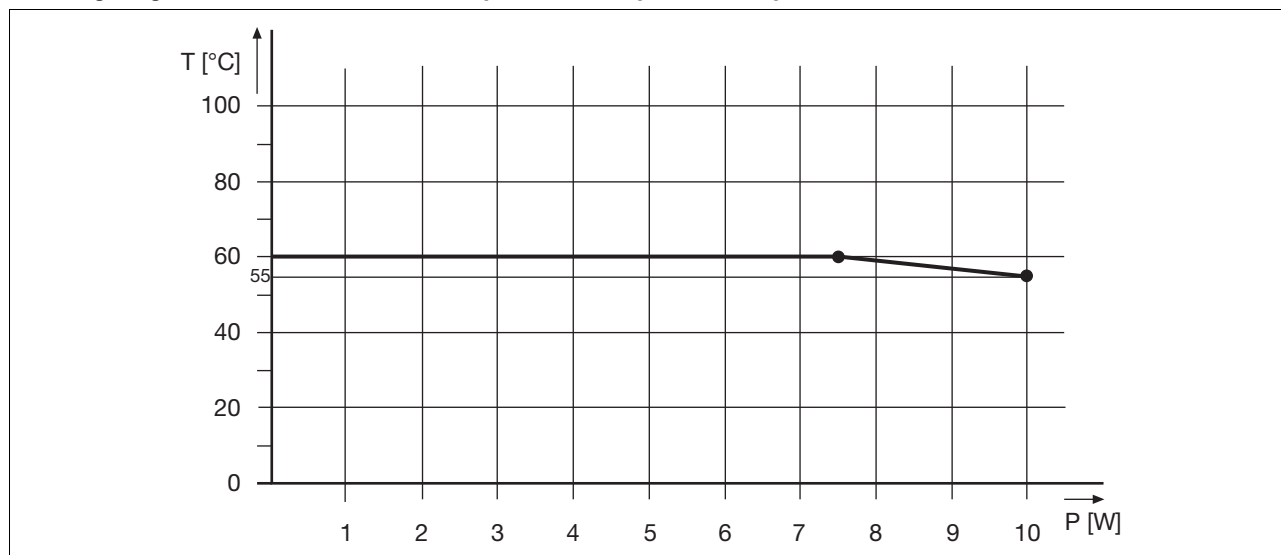
Primary side of power supply

- Voltage: **24 V**
- Max. power consumption: **12.0 W**

Secondary side of power supply

- The module supplies the output voltage to the base module terminals.
- No buffer when the supply voltage is interrupted
- Voltage: **15 V/-15 V**
- Max. continuous output: **10.0 W**
- Max. current at **15 V: 0.6 A**
- Max. current at **-15 V: 0.3 A**

Derating diagram: Permitted ambient temperature T dependent on power P

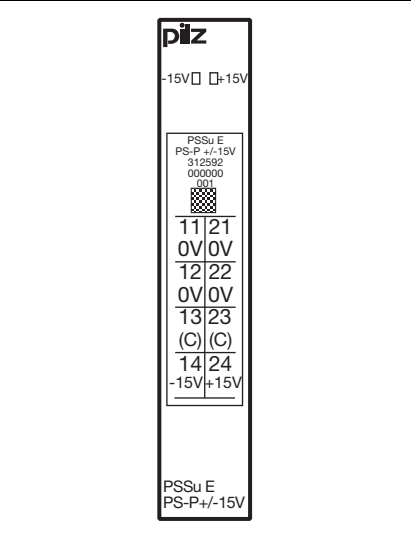


Voltage distribution
PSSu E PS-P +/- 15V

Wiring

- ▶ Safe electrical isolation must be ensured for the external supplies. Failure to do so could result in electric shock.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/8S PSSu BP 1/8S-T	Without C-rail: 11-21: 0 V extraction (11-21 linked internally)	
Cage clamp terminals: PSSu BP 1/8C PSSu BP 1/8C-T	12-22: 0 V infeed (12-22 linked within the base module) 13-23: +24 V infeed (13-23 linked within the base module) 14: -15 V extraction 24: +15 V extraction	

Voltage distribution PSSu E PS-P +/- 15V

Base module	Terminal configuration	
Screw terminals: PSSu BP 1/12S PSSu BP 1/12S-T	Without C-rail: 11-21: 0 V extraction (11-21 linked internally)	
Cage clamp terminals: PSSu BP 1/12C PSSu BP 1/12C-T	12-22: 0 V infeed (12-22-15-25 linked within the base module)	
	13-23: +24 V infeed (13-23-16-26 linked within the base module)	
	14: -15 V extraction	
	24: +15 V extraction	
	15-25: 0 V infeed (12-22-15-25 linked within the base module)	
	16-26: +24 V infeed (13-23-16-26 linked within the base module)	
Screw terminals: PSSu BP-C1 1/12S PSSu BP-C1 1/12S-T	With C-rail: 11-21: 0 V extraction (11-21 linked internally)	
Cage clamp terminals: PSSu BP-C1 1/12C PSSu BP-C1 1/12C-T	12-22: 0 V infeed (12-22 linked within the base module)	
	13-23: C-rail supply (13-23-16-26 linked within the base module)	
	14: -15 V extraction	
	24: +15 V extraction	
	15-25: +24 V infeed (15-25 linked within the base module)	
	16-26: C-rail supply (13-23-16-26 linked within the base module)	

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Voltage distribution

PSSu E PS-P +/- 15V

Technical details

Application range	Standard
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	
from head module FS firmware version	1.0.0
from head module ST firmware version	1.0.0
Electrical data	
Primary side (external supply voltage)	
Supply voltage U_B DC	24 V
Voltage tolerance	-30 %/+25 %
Power consumption at U_B DC	12.0 W
Secondary side (output voltage)	
Output power	10.0 W
Voltage tolerance	-2 %/+2 %
Voltage output	15 V
Max. current	0.6 A
Negative output voltage	-15 V
Max. current of negative voltage	0.3 A
Max. power dissipation of the module	1.50 W
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	12.6 mm
Depth	60.2 mm
Weight	40 g
Mechanical coding	
Type	D
Colour	light grey

Voltage distribution

PSSu E PS-P +/- 15V

Order reference	

Description	Order no.
PSSu E PS-P +/-15V (Electronic module)	312 592

Base modules	Order no.

PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619
PSSu BP-C1 1/12S (Base module with C-rail and screw terminals)	312 622
PSSu BP-C1 1/12C (Base module with C-rail and cage clamp terminals)	312 623

Link modules

Link modules

Contents	Page
Link modules	
PSSu WB S IDN	3.12-2
PSSu WR S IDN	3.12-9
PSSu XB F-T	3.12-16
PSSu XR F-T	3.12-21

Link modules PSSu WB S IDN



Base station to connect the PSSuniversal system to **InduraNET p** for standard data

Approvals

	PSSu WB S IDN
	◆

Module features

- ▶ The module terminates a PSSu system and extends the ST data bus across an **InduraNET p** radio link.
- ▶ As a base station the module supports up to four remote stations PSSu WR S IDN
- ▶ Antenna connection for **InduraNET p**
- ▶ The module provides connections for external supplies. The external supplies are galvanically isolated from the module bus supplies.
- ▶ LEDs for:
 - **InduraNET p** status per remote station
 - Module error
- ▶ For standard applications in system environment A

Module description

The module may be used as a base station in **InduraNET p**, for the wireless communication of ST data. It can be operated with up to four remote stations of type PSSu WR S IDN.

The module may be used to feed and extract external supplies to and from the connection terminals.

InduraNET p devices meet the requirements and specifications of the EU directive 1999/5/EU and may be operated in the following European Union countries:

- ▶ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

InduraNET p devices may also be operated in the following countries:

- ▶ Andorra, British Virgin Islands, Gibraltar, Greenland, Jersey, Monaco, Montserrat, Netherlands Antilles, Pitcairn, San Marino, Svalbard and Jan Mayen, Vatican City
- ▶ Iceland, Liechtenstein, Norway, Switzerland
- ▶ Australia, Canada, Japan, New Zealand, United States of America

Other countries: On request

The module may be used for standard applications in system environment A.

Integrated protection mechanisms

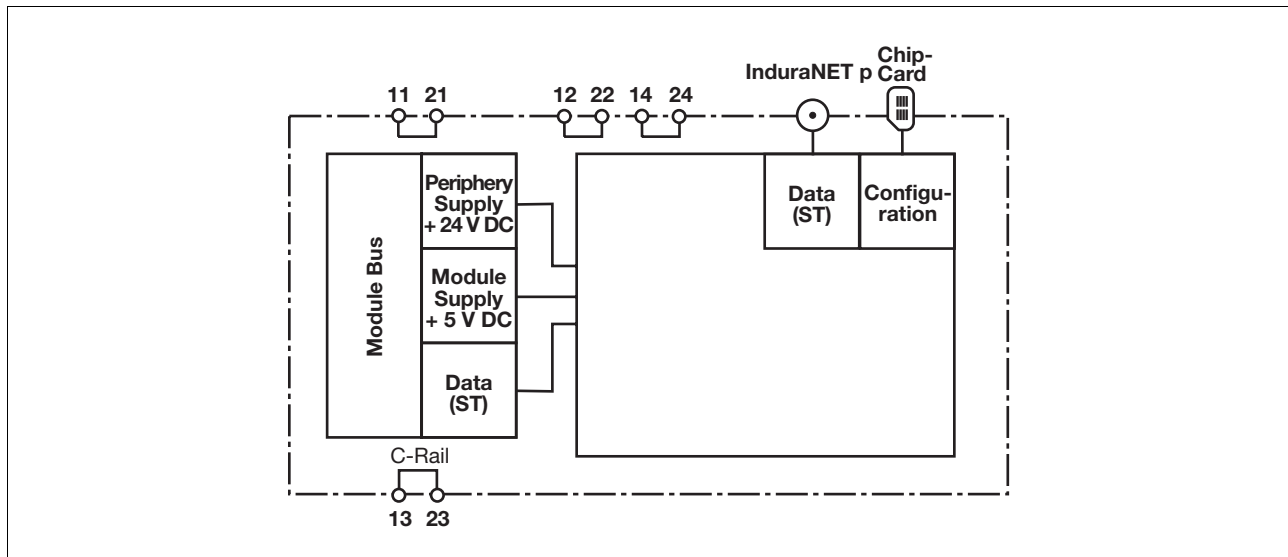
When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

The module provides the following diagnostic data:

- ▶ Module status
- ▶ Module error

Link modules PSSu WB S IDN

Block diagram



Function description

The module is a base station in **InduraNET p** and extends the PSSu module bus across a radio link. The base station is always the termination module in a base system. The base station can communicate with up to four remote stations.

The module provides connections for external supplies.

- ▶ The module does not switch the external supplies.
- ▶ The external supplies are galvanically isolated from the module bus supplies and from each other.
- ▶ The module has no current limitation on the external supplies.

InduraNET p enables wireless communication on the PSSuniversal. Data from the standard section is transmitted via radio instead of the module bus. Wireless communication via InduraNET p does not need to be considered in the user program.

The module bus cycle is recreated in the remote system. This will increase the input/output reaction times of a remote system.

Each InduraNET p device is given an ID, which ensures that all subscribers are uniquely identified. Up to ten InduraNET p networks can coexist within one environment. All the settings for wireless communication are stored within the module on a chip

card, which is written via a chip card reader.

Properties of wireless communication

- ▶ Frequency range 2.4 GHz ISM band
- ▶ Strong immunity to signals from other wireless services
- ▶ CFM (Coexistence Frequency Management) guarantees that InduraNET p devices coexist without problem with other radio-based systems.
 - InduraNET p devices do not use non-overlapping WLAN channels.
 - InduraNET p devices do not transmit until they have scanned their frequency range (Listen before Talk).
 - InduraNET p devices switch to free channels in order to avoid collisions.

Properties of the antenna

- ▶ The antenna is designed to IP54. It can be installed on a flat surface using one hole mounting.
- ▶ The SMA antenna cable is 2 m long and has an impedance level of 50 Ohm.

- ▶ The max. operating range depends heavily on surface reflection and on the transmissivity of surrounding materials. Approximate guidelines are:

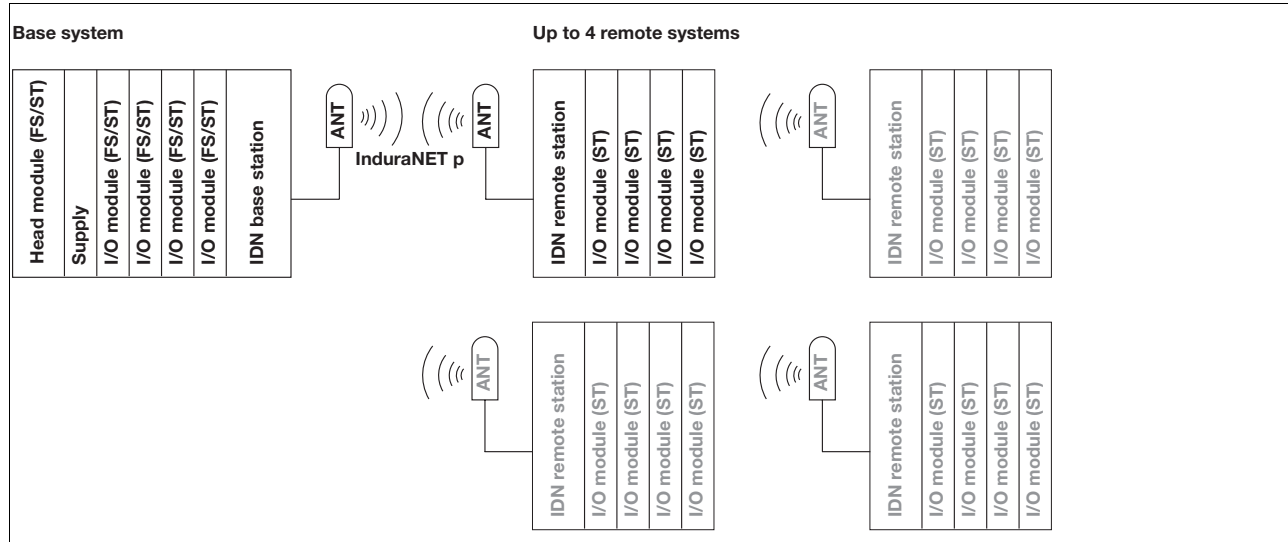
- 10 m ... 100 m indoors
- 100 m ... 1000 m outdoors

- ▶ Two antenna types are available:

- For remote and base station: PSS ANT 1 IDN is optimised for typical indoor applications.
- For base station only: PSS ANT 2 IDN with two redundant antennas in one housing is optimised for high availability in difficult environmental conditions, e.g. for mobile applications.

Link modules PSSu WB S IDN

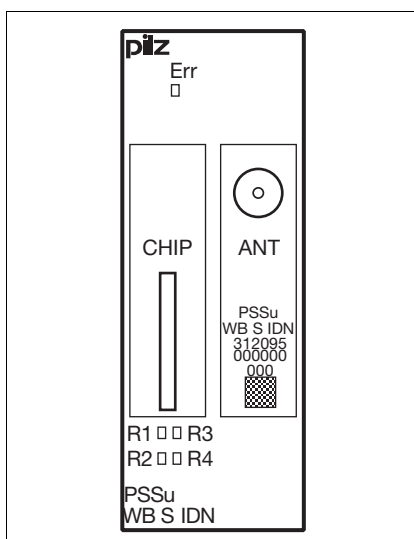
Schematic representation of **InduraNET p**



Wiring

- ▶ The maximum current load for the periphery supply on the module bus is 10 A.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ Use copper wiring.

Front view



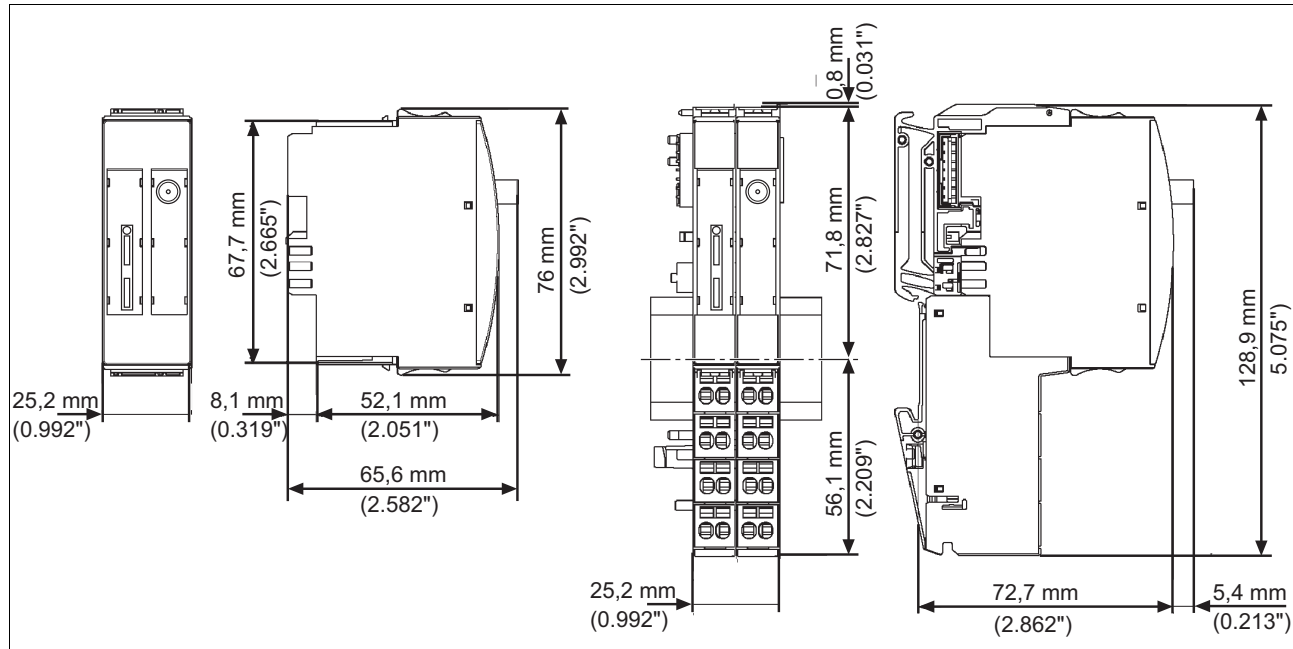
Link modules
PSSu WB S IDN

Terminal configuration

Base module	Terminal configuration	
Screw terminals: PSSu BP 2/16S	Without C-rail:	
Cage clamp terminals: PSSu BP 2/16C	11- 21: Potential P1 (11-21 linked internally)	
	12-22: Potential P2 (12-22 linked within the base module)	
	13-23: Potential P3 (13-23 linked within the base module)	
	14-24: Potential P4 (14-24 linked internally)	
	31-44: Not connected 32-42: Not connected 33-43: Not connected 34-44: Not connected	
Screw terminals: PSSu BP-C 2/16S	With C-rail:	
Cage clamp terminals: PSSu BP-C 2/16C	11- 21: Potential P1 (11-21 linked internally)	
	12-22: Potential P2 (12-22 linked within the base module)	
	13-23-33-43: C-rail supply (13-23-33-43 linked within the base module)	
	14-24: Potential P4 (14-24 linked internally)	
	31-44: Not connected 32-42: Not connected 34-44: Not connected	

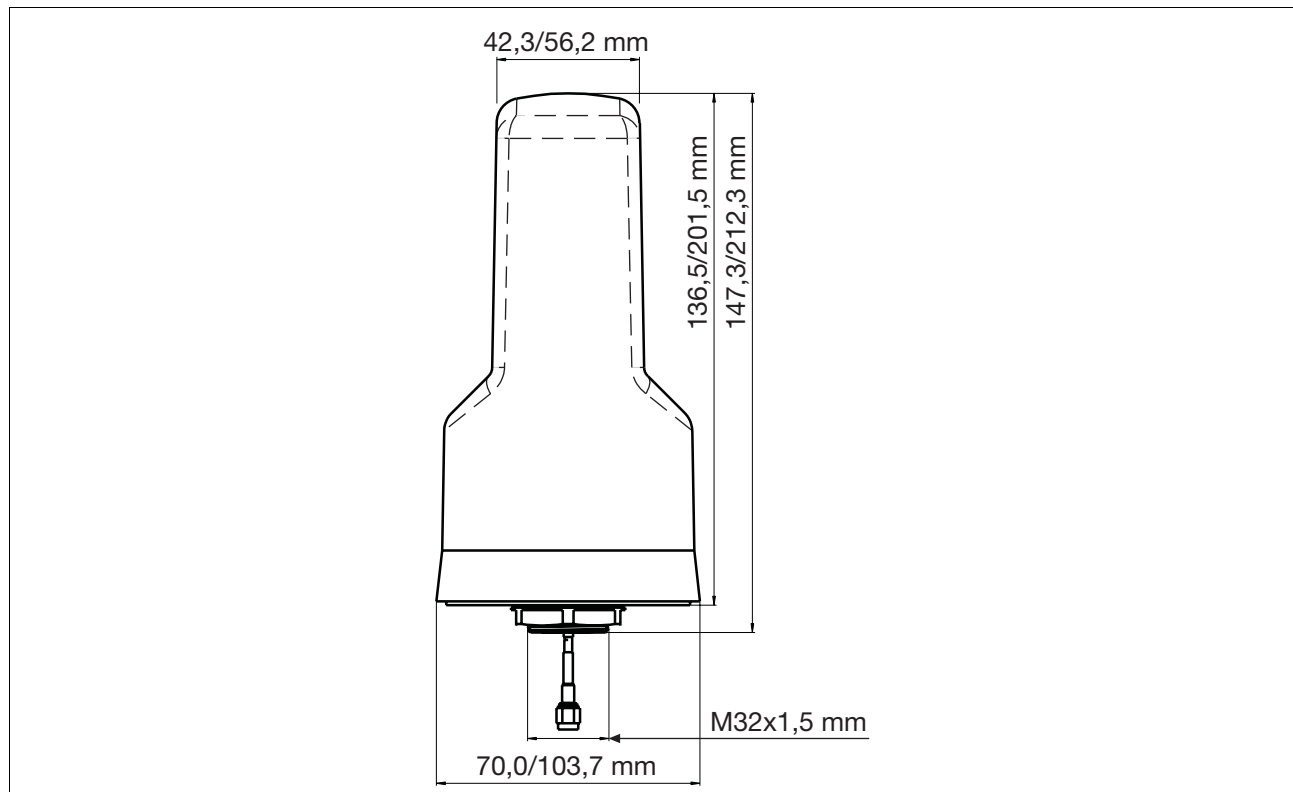
Link modules PSSu WB S IDN

Dimensions



A min. 15 cm clearance is required above the mounting rail in the control cabinet to connect the antenna cable on the module.

Dimensions of the antenna ANT1/ANT2 (ANT 2 for base station only):



Link modules

PSSu WB S IDN

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0005h
Support in system environment A	
from ST firmware version for other head modules	12
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	2
Support in system environment B	no
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.8 - 5.4 V
Current and power consumption from module supply	
Module's current consumption	132 mA
Module's power consumption	0.63 W
Max. power dissipation of the module	0.75 W
InduraNET p interface	
Application range	Standard applications
Application in accordance with	ARIB STO-T 66 (19.2), EN 300328 V1.7.1, EN 301489-1 V1.6.1, EN 301489-3 V1.4.1, FCC Part 15-249, IEC 60950
Working frequency range	2,405 - 2,479 MHz
Channel spacing	1 MHz
Number of channels	75
Modulation	GFSK
Frequency deviation	-160 - 160 kHz
Typ. transmitter output EIRP	18 dBm/64 mW
Max. transmitter output EIRP	20 dBm/100 mW
Receiver type	Superhet
Max. receiver sensitivity when PER=0.1%	-90 dBm
Frequency stability	-2.5 - 2.5 ppm
Intermediate frequency	$f_{ZF}=f_{LO}-f_{RX}=(8/7 \cdot f_{RX}+2\text{MHz})-f_{RX}$
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
EMC	EN 300328 V1.7.1, EN 301489-3 V1.4.1, EN 55011: class A, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 60 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms

Link modules

PSSu WB S IDN

Environmental data	
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP20
Airgap creepage in accordance with EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	58 g
Mechanical coding	
Type	G
Colour	dark grey

The standards current on **2007-11** apply.

Order reference	
Description	Order no.
PSSu WB S IDN (Base station with InduraNET p interface for ST data, including chip card)	312 095
PSS ANT 1 IDN (System antenna, including antenna cable)	312 995
PSS ANT 2 IDN (Diverse system antenna, including antenna cable)	312 996
PSS CAB IDN 2 (System extension cable, 2 m)	312 999

Base modules	Order no.
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631

Link modules PSSu WR S IDN



Remote station to connect the PSSuniversal system to **InduraNET p** for standard data

Approvals

	PSSu WR S IDN
	◆

Module features

- ▶ This module forms the head module of a remote system in **InduraNET p**.
- ▶ Antenna connection for **InduraNET p**
- ▶ Power supply for max. **2.0 A**
 - When the supply voltage is interrupted, the module supply is buffered for 20 ms.
 - Separate infeed for periphery supply
 - Separate infeed for module supply
- ▶ LEDs for:
 - System status
 - **InduraNET p** status
 - USB status
- ▶ Electronic modules that can be used for input/output:
 - All digital standard modules (PSSu E S xD...)
- ▶ For standard applications in system environment A

Module description

The module may be used as a remote station in **InduraNET p**, for the wireless communication of ST data. It can be operated with a base station of type PSSu WB S IDN.

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

InduraNET p devices meet the requirements and specifications of the EU directive 1999/5/EU and may be operated in the following European Union countries:

- ▶ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

InduraNET p devices may also be operated in the following countries:

- ▶ Andorra, British Virgin Islands, Gibraltar, Greenland, Jersey, Monaco, Montserrat, Netherlands Antilles, Pitcairn, San Marino, Svalbard and Jan Mayen, Vatican City
- ▶ Iceland, Liechtenstein, Norway, Switzerland

- ▶ Australia, Canada, Japan, New Zealand, United States of America
- Other countries: On request
The module may be used for standard applications in system environment A.

Integrated protection mechanisms

The module has the following protection mechanisms:

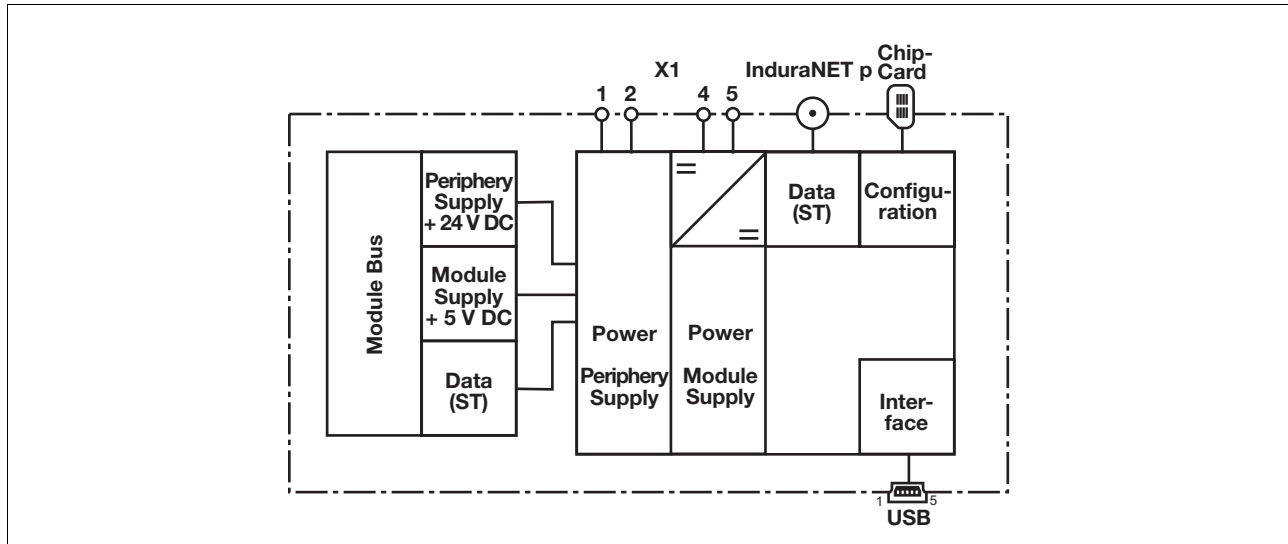
- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
- ▶ Module supply
 - Short circuit-proof

The module provides the following diagnostic data:

- ▶ Module status
- ▶ Module error

Link modules PSSu WR S IDN

Block diagram



Function description

The module is a remote station in **InduraNET p** and enables the PSSuniversal to be used as a remote system. The remote station is always the first module in a remote systems. The remote station co-ordinates the PSSu module bus on the remote system and exchanges data between the connected I/O modules and an assigned base station in **InduraNET p**. The module supplies voltage to the modules on the remote system:

- ▶ Supply to the module bus:
 - Module supply supplies itself and subsequent modules (right-hand side)
 - Periphery supply
- ▶ When the voltages are fed separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

InduraNET p enables wireless communication on the PSSuniversal. Data from the standard section is transmitted via radio instead of the module bus. Wireless communication via InduraNET p does not need to be considered in the user program. The module bus cycle is recreated in the remote system. This will increase

the input/output reaction times of a remote system.

Each InduraNET p device is given an ID, which ensures that all subscribers are uniquely identified. Up to ten InduraNET p networks can coexist within one environment. All the settings for wireless communication are stored within the module on a chip card, which is written via a chip card reader.

Properties of wireless communication

- ▶ Frequency range 2.4 GHz ISM band
- ▶ Strong immunity to signals from other wireless services
- ▶ CFM (Coexistence Frequency Management) guarantees that InduraNET p devices coexist without problem with other radio-based systems.
 - InduraNET p devices do not use non-overlapping WLAN channels.
 - InduraNET p devices do not transmit until they have scanned their frequency range (Listen before Talk).
 - InduraNET p devices switch to free channels in order to avoid collisions.

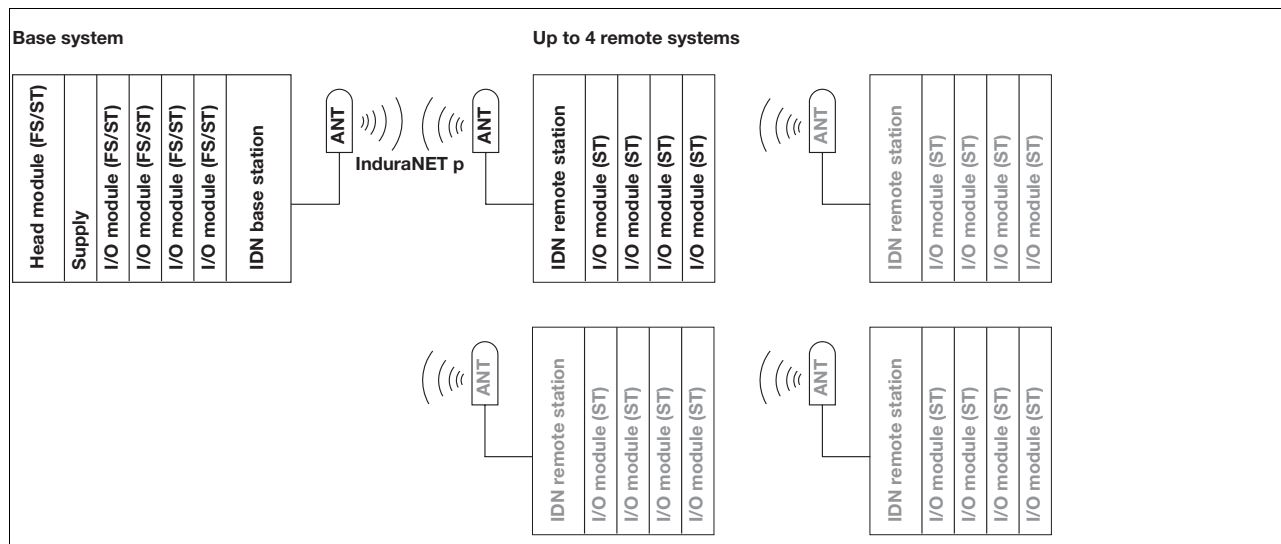
Properties of the antenna

- ▶ The antenna is designed to IP54. It can be installed on a flat surface using one hole mounting.

- ▶ The SMA antenna cable is 2 m long and has an impedance level of 50 Ohm.
- ▶ The max. operating range depends heavily on surface reflection and on the transmissivity of surrounding materials. Approximate guidelines are:
 - 10 m ... 100 m indoors
 - 100 m ... 1000 m outdoors
- ▶ Two antenna types are available:
 - For remote and base station: PSS ANT 1 IDN is optimised for typical indoor applications.
 - For base station only: PSS ANT 2 IDN with two redundant antennas in one housing is optimised for high availability in difficult environmental conditions, e.g. for mobile applications.

Link modules PSSu WR S IDN

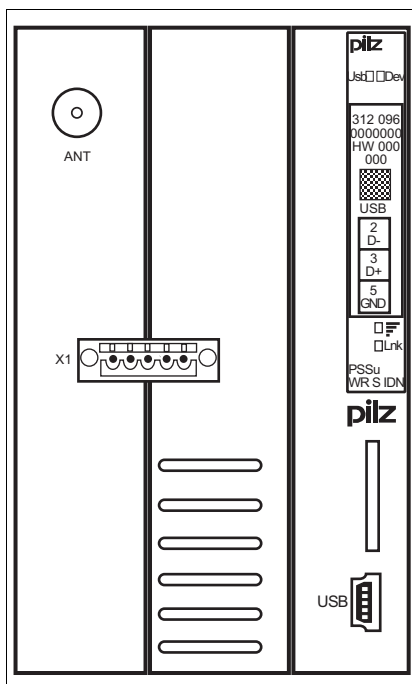
Schematic representation of **InduraNET p**



Wiring

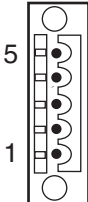
- ▶ Please refer to the technical details regarding the requirements of the supply voltages.
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the periphery supply on the module bus is 10 A.
- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm²:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

Front view



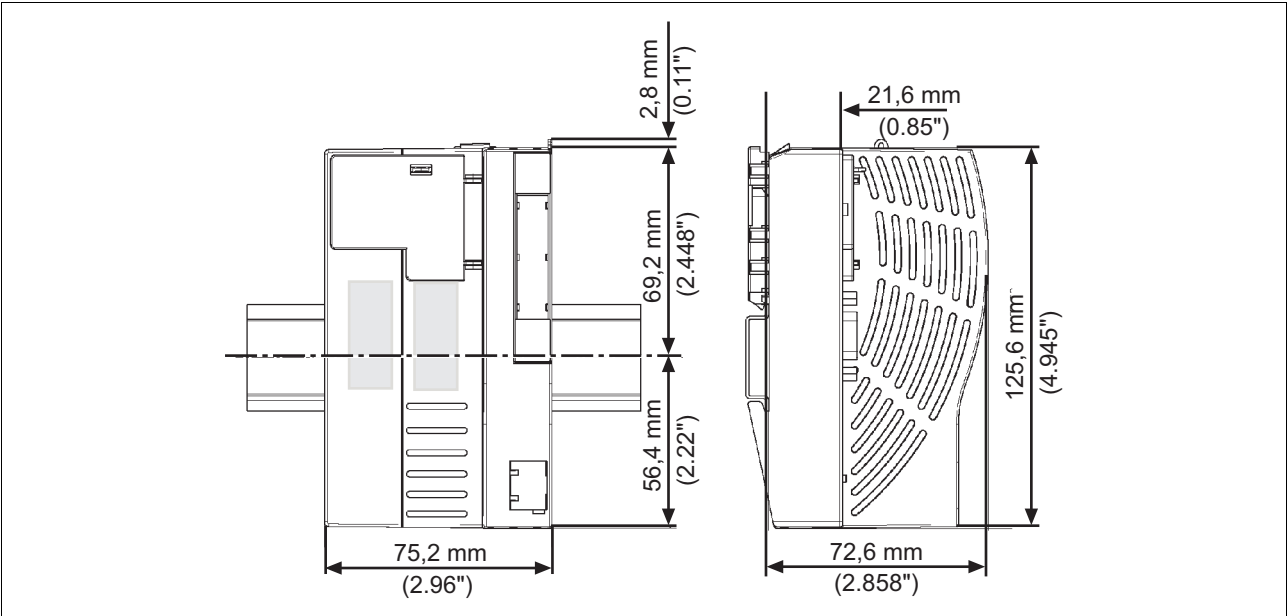
Link modules
PSSu WR S IDN

Terminal configuration

Connector description	Terminal configuration	
5-pin Combicon plug-in connector X1	1: +24 V infeed for periphery supply 2: 0 V infeed for periphery supply 3: n.c. 4: +24 V infeed for module supply 5: 0 V infeed for module supply	
USB	Assignment	
Mini-B USB connector	1: n.c. 2: D- USB Data - 3: D+ USB Data + 4: n.c. 5: GND Ground	

► n.c. = not connected

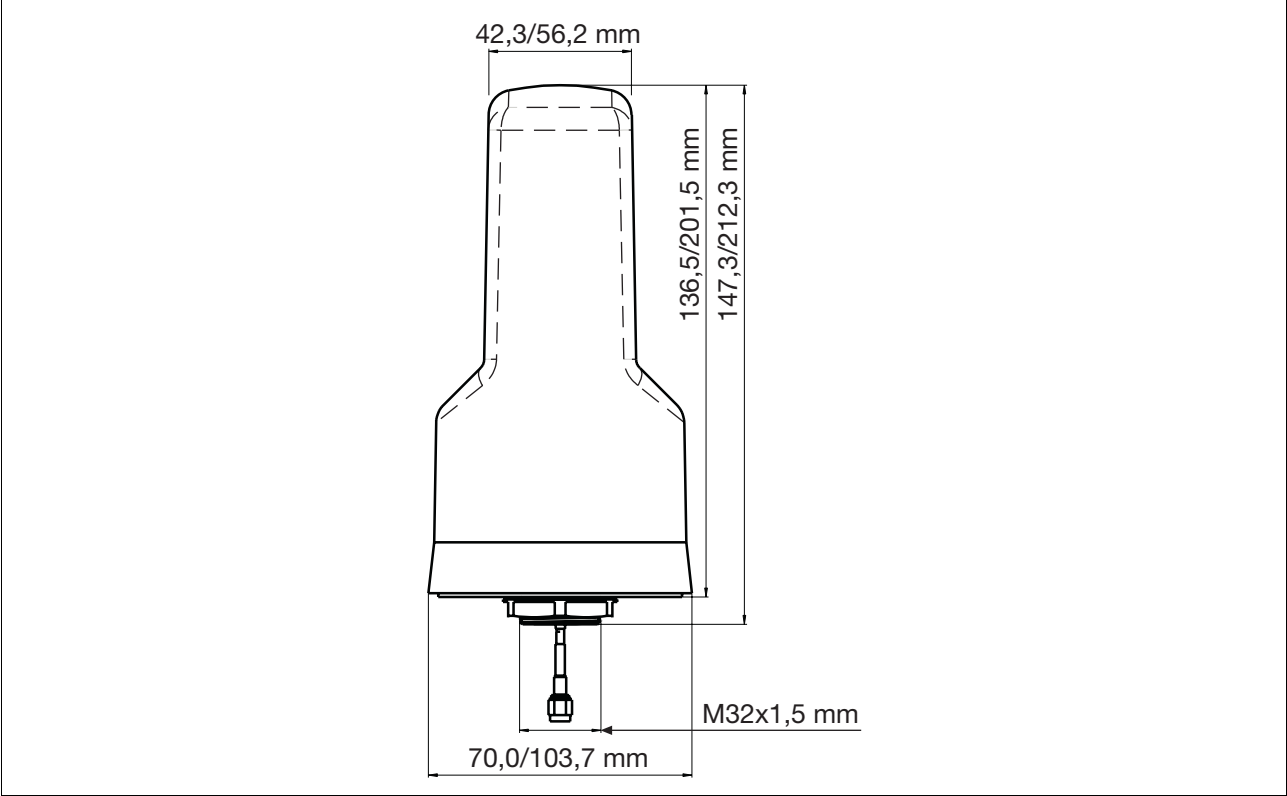
Dimensions



A min. 15 cm clearance is required above the mounting rail in the control cabinet to connect the antenna cable on the module.

Link modules
PSSu WR S IDN

Dimensions of the antenna ANT1/ANT2 (ANT 2 for base station only):



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0006h
Electrical data	
Internal supply voltage	
Supply voltage range of module supply	4.8 - 5.4 V
Current and power consumption from module supply	
Module's current consumption	215 mA
Module's power consumption	1.10 W
Max. power dissipation of the module	4.20 W
Infeed for	Module Supply
Voltage	24 VDC
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	12.0 W
Max. continuous current that the external power supply must provide	0.8 A
Inrush current that the external power supply must provide	4.0 A
Infeed for	Periphery Supply
Voltage	24 VDC
Max. continuous current that the external power supply must provide	10.0 A

Link modules

PSSu WR S IDN

Electrical data	
Voltage output	Module Supply
Voltage	5 V DC
Voltage tolerance	-2 %/+2 %
Current load capacity	2.0 A
Buffer in the case of supply interruptions in accordance with	EN61131-2, EN61496-1
Short circuit-proof	yes
InduraNET p interface	
Application range	Standard applications
Application in accordance with	ARIB STO-T 66 (19,2), EN 300328 V1.7.1, EN 301489-1 V1.6.1, EN 301489-3 V1.4.1, FCC Part 15-249
Working frequency range	2,405 - 2,479 MHz
Channel spacing	1 MHz
Number of channels	75
Modulation	GFSK
Frequency deviation	-160 - 160 kHz
Typ. transmitter output EIRP	18 dBm/64 mW
Max. transmitter output EIRP	20 dBm/100 mW
Receiver type	Superhet
Max. receiver sensitivity when PER=0.1%	-90 dBm
Frequency stability	-2.5 - 2.5 ppm
Intermediate frequency	$f_{ZF}=f_{LO}-f_{RX}=(8/7 \cdot f_{RX}+2\text{MHz})-f_{RX}$
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C
Condensation	no
EMC	EN 300328 V1.7.1, EN 301489-3 V1.4.1, EN 55011: class A, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz, 10 - 60 Hz, 60 - 1,000 Hz
Shock stress	11 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 61131-2	
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.4 mm
Width	75.2 mm
Depth	79.4 mm
Weight	169 g

The standards current on **2007-11** apply.

Link modules

PSSu WR S IDN

Order reference

Description	Order no.
PSSu WR S IDN (Remote station with InduraNET p interface for ST data, including chip card)	312 096
PSS ANT 1 IDN (System antenna, including antenna cable)	312 995
PSS CAB IDN 2 (System extension cable, 2 m)	312 999

Link modules PSSu XB F-T



Base station for attaching a connection cable for PSSuniversal

Approvals

	PSSu XB F-T
	◆
	◆
	◆

Module features

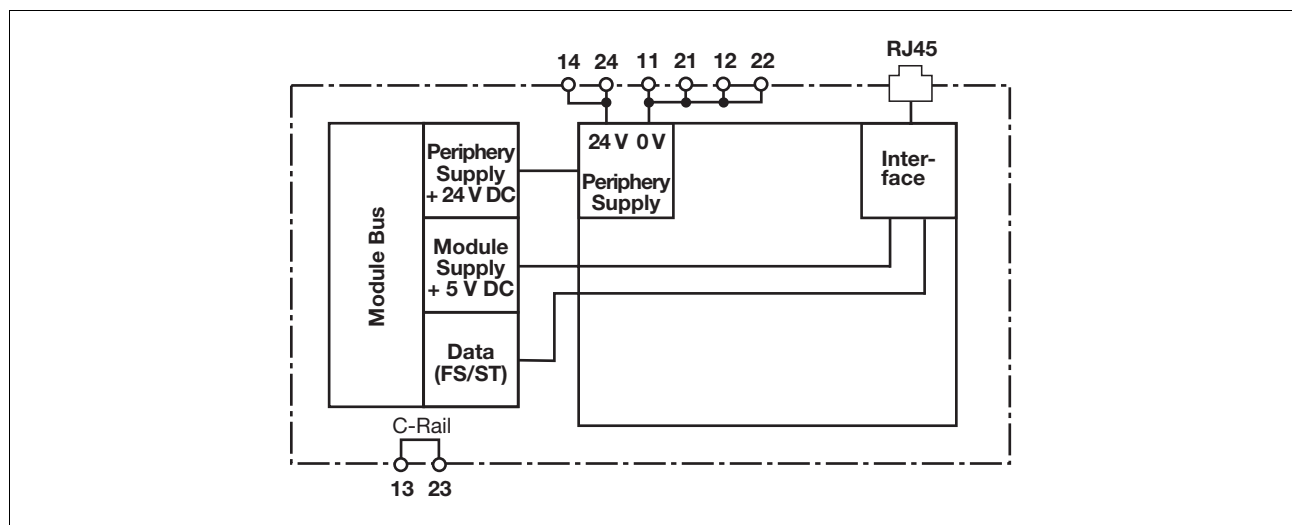
- ▶ The module terminates a PSSu system and extends the module bus via a cable connection.
- ▶ The module supports a remote station PSSu XR F-T.
- ▶ Plug for the module bus connection cable
- ▶ The cable connection transfers:
 - FS data
 - ST data
 - Module supply
- ▶ The module routes the periphery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

from the connections, but may not be fed through that route.
The module may be used for standard and failsafe applications in system environment A.

Module description

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

Block diagram



Link modules PSSu XB F-T

Function description

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

- ▶ The module routes the periphery supply from the module bus to the base module terminals.
- ▶ The module does not switch the periphery supply.

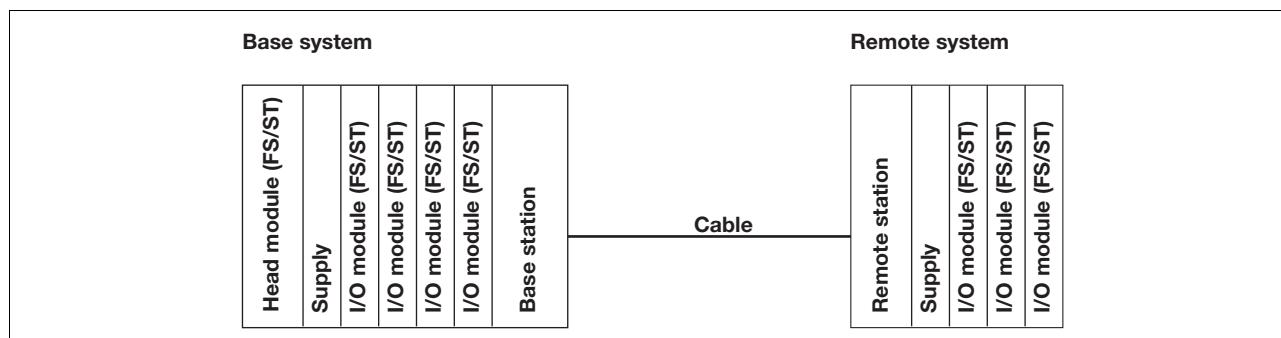
- ▶ The periphery supply has no current limitation.

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

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

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

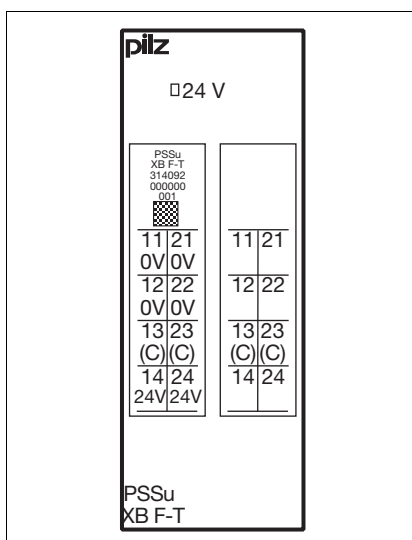
Cable connection PSSu XB F-T – PSSu XR F-T



Wiring

- ▶ The connection cable PSSu A RJ45-CAB 1.5M is available as an accessory.
- ▶ The base station and remote station must be in the same control cabinet.
- ▶ Use copper wiring.
- ▶ The terminal configuration as stated on the front plate applies for base modules with C-rail. The terminal configuration as stated in the technical documentation applies for all other base modules.

Front view



Link modules PSSu XB F-T

Terminal configuration

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

Connection

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

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Link modules

PSSu XB F-T

Technical details	
Application range	Standard/Failsafe
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	no
Electrical data	
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	10 mA
Module's power consumption with no load	0.24 W
Environmental data	
Ambient temperature in accordance with EN 60068-2-14	-40 - 70 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	yes
Max. operating height above sea level	5000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	33 g
Mechanical coding	
Type	L
Colour	yellow

Link modules PSSu XB F-T

Order reference	
Description	Order no.
PSSu XB F-T (Base station)	314 092
Connection cable PSSu A RJ45-CAB 1.5M	314 094
Base modules	Order no.
PSSu BP 2/16S (Base module without C-rail with screw terminals)	312 628
PSSu BP 2/16S-T (Base module without C-rail with screw terminals, coated version)	314 628
PSSu BP 2/16C (Base module without C-rail with cage clamp terminals)	312 629
PSSu BP 2/16C-T (Base module without C-rail with cage clamp terminals, coated version)	314 629
PSSu BP-C 2/16S (Base module with C-rail and screw terminals)	312 630
PSSu BP-C 2/16S-T (Base module with C-rail and screw terminals, coated version)	314 630
PSSu BP-C 2/16C (Base module with C-rail and cage clamp terminals)	312 631
PSSu BP-C 2/16C-T (Base module with C-rail and cage clamp terminals, coated version)	314 631

Link modules
PSSu XR F-T



Remote station for attaching a connection cable for PSSuniversal

Approvals

	PSSu XR F-T
	◆
	◆
	◆

Module features

- ▶ This module represents the first module in a PSSu remote system.
- ▶ The module communicates with a base station PSSu XB F-T.
- ▶ Plug for the module bus connection cable
- ▶ The cable connection transfers:
 - FS data
 - ST data
 - Module supply
- ▶ LED indicators on the RJ45 socket for:
 - Status of ST bus
 - Status of FS bus
- ▶ Electronic modules that can be used for input/output:
 - All failsafe modules (PSSu E F...)
 - All standard modules (PSSu E S...)
- ▶ For standard and failsafe applications in system environment A

Module description

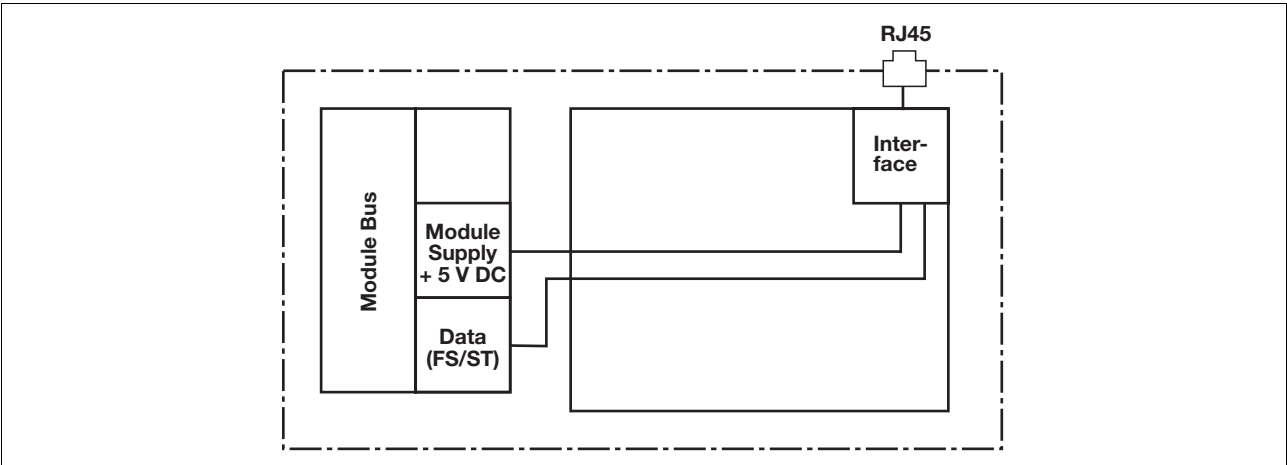
The module may be used as a remote station to extend the PSSuniversal module bus inside a control cabinet via a cable connection. It can be operated with a base station of type

PSSu XB F-T plus the connection cable PSSu A RJ45-CAB 1.5M.

The module may be used for standard and failsafe applications in system environment A.

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

Block diagram



Link modules PSSu XR F-T

Function description

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

The periphery supply and the C-rail supply within the remote system must be refreshed.

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

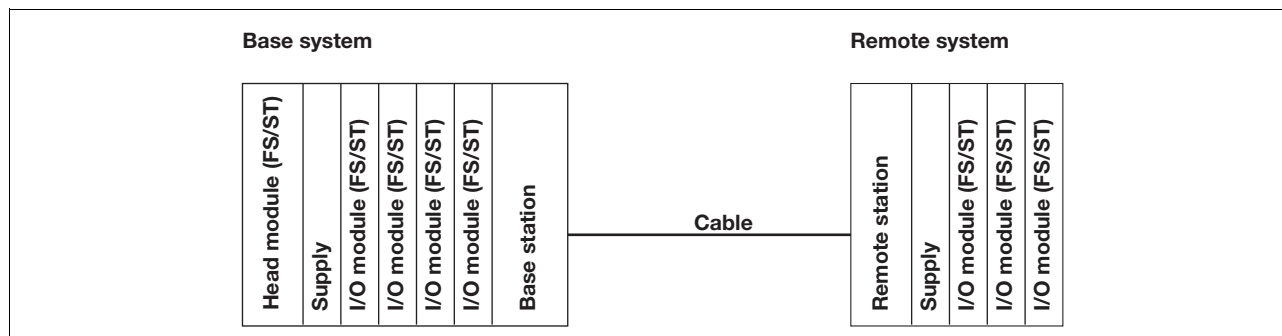
The cable connection does not appear in the process image. The cable con-

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

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

Function diagram

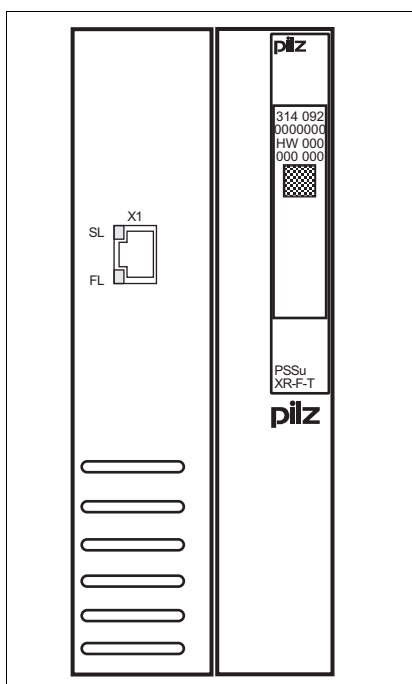
Cable connection PSSu XB F-T – PSSu XR F-T



Wiring

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

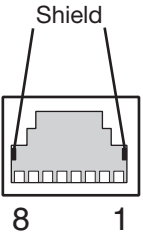
Front view



Link modules

PSSu XR F-T

Connection

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

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Support in system environment A	
from FS firmware version for other head modules	1
from ST firmware version for other head modules	1
from FS firmware version PSSu H F PN	1
from ST firmware version PSSu H S PN	1
from ST firmware version PSSu WR S IDN	1
Support in system environment B	no
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	20 mA
Module's power consumption	0.10 W
Environmental data	
Ambient temperature in accordance with EN 60068-2-14	-40 - 70 °C
Storage temperature in accordance with EN 60068-2-1/-2	-40 - 70 °C
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	yes
Max. operating height above sea level	5000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1, EN 61131-2	
Overvoltage category	II
Pollution degree	2

Link modules PSSu XR F-T

Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	125.6 mm
Width	50.2 mm
Depth	72.6 mm
Weight	90 g

Order reference	
Description	Order no.
PSSu XR F-T	314 093
(Remote station, including terminating plate PSSu A EC XB)	
Connection cable PSSu A RJ45-CAB 1.5M	314 094

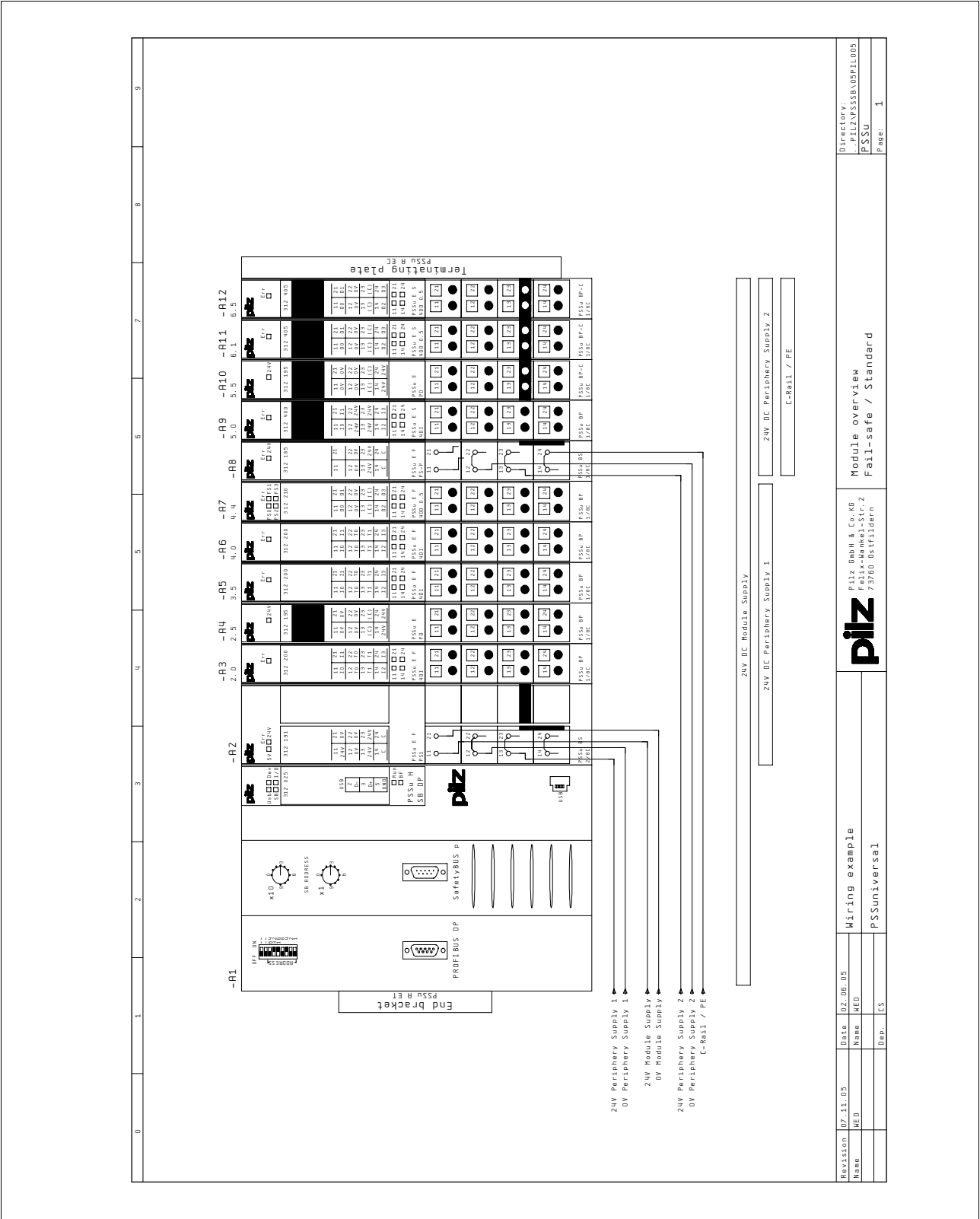
Contents	Page
Applications	
Manufacturing cell with access protection	4.1-2

Manufacturing cell with access protection

Manufacturing cell with access protection

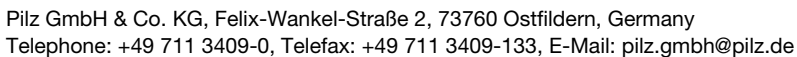
- ▶ The feed area in a manufacturing cell is monitored via a light curtain.
- ▶ The maintenance area is protected by a safety gate with guard locking.
- ▶ The plant can only be started under the following conditions:
 - E-STOP released
 - Safety gate closed
 - Light curtain's protected area clear
- ▶ When the E-STOP has been operated or the safety gate opened, a reset on the plant is required in order to restart it.
- ▶ The safety-related functions are connected to failsafe input/output modules.
- ▶ The non-safety-related plant functions are connected to standard input/output modules.

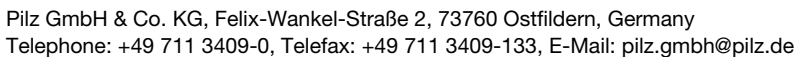
Manufacturing cell with access protection



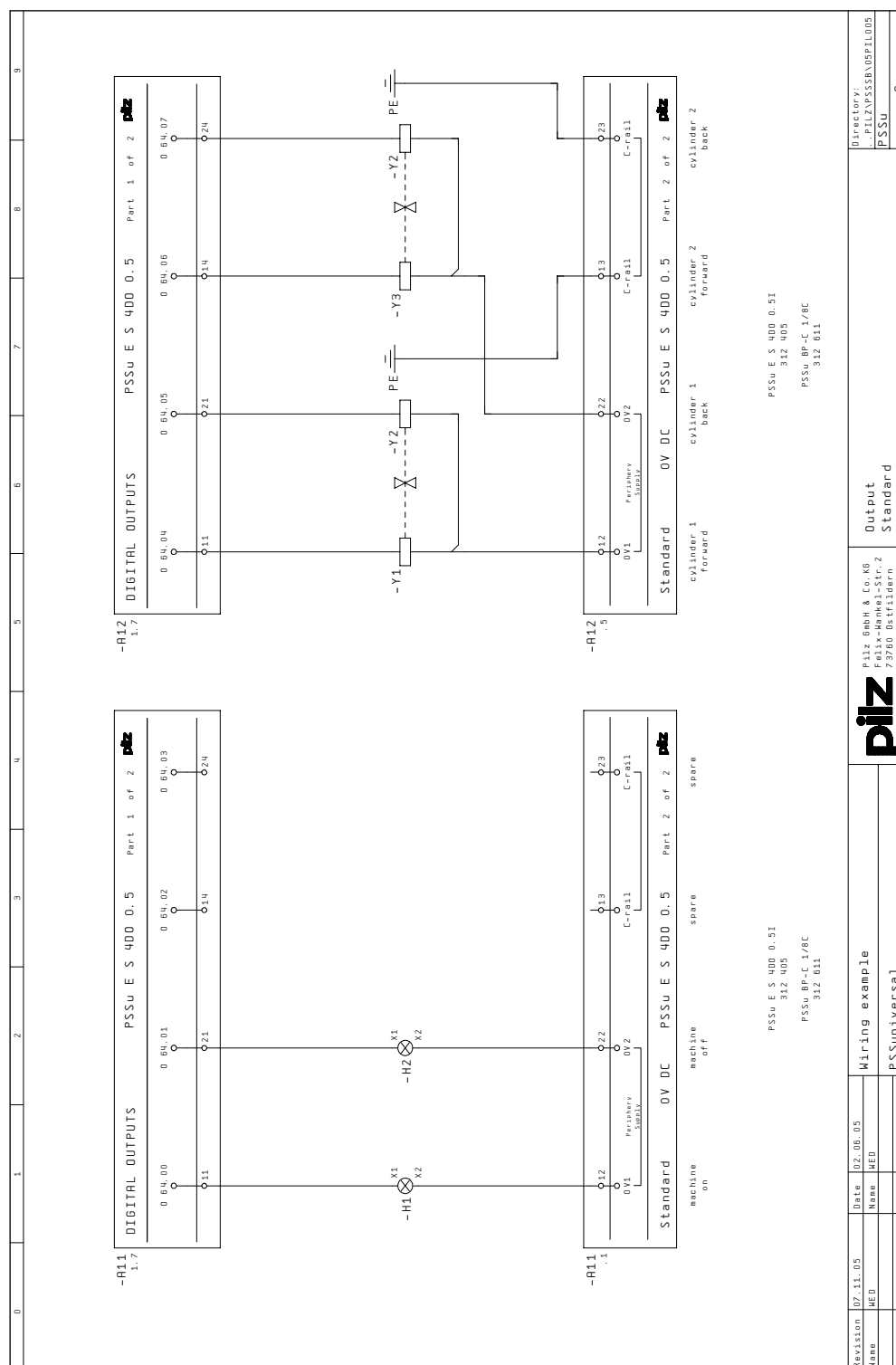
4.1







4.1



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Installation accessories	5.1-2
Markers and labelling	5.1-3
Coding elements	5.1-4
Other accessories	5.1-5

Installation accessories

Order reference		
Description		Order no.
PSSu A ET PE	Earthing terminal for top hat rail, PE connection, Gr/Y. Scope of supply: 10 pieces	312 949
PSSu A ET	End bracket for top-hat rail, standard, plastic version, black. Scope of supply: 10 pieces	312 900
PSSu A ETM	End bracket for top-hat rail, metal version, for high mech. stress. Scope of supply: 2 pieces	312 901
PSSu A EC	Terminating plate with integral terminating resistor	312 902
PSSu A EC-T	Terminating plate with integral terminating resistor, coated version	314 902
PSSu A EC XB	Terminating plate with integral terminating resistor for PSSu XB F-T	312 969
PSSu A SH S	Shielded terminal for base modules with screw connection. Scope of supply: 10 pieces	312 963
PSSu A SH T	Shielded terminal for base modules with cage clamp connection. Scope of supply: 10 pieces	312 964
PSSu A RJ45-CAB 1.5M	Connection cable for PSSu XB F-T	314 094
PSSu A Con 1/4 S	Connector with spring-loaded terminals 1-row/4-pin	313 110
PSSu A Con 2/8 C	Connector with spring-loaded terminals 2-row/8-pin	313 111
PSSu A Con 1/10 C	Connector with spring-loaded terminals 1-row/10-pin	313 115
PSSu A Con 3/30 C	Connector with spring-loaded terminals 3-row/30-pin	313 116

Brackets PSSu A ET and PSSu A EC are supplied with a head module.

Markers and labelling

Order reference		
Description		Order no.
PSSu A ME0	Markers for base module supplies, 10 x 6 marking strips, blue	312 950
PSSu A ME1	Markers for base module supplies, 10 x 6 marking strips, red	312 951
PSSu A ME2	Markers for base module supplies, 10 x 6 marking strips, green	312 952
PSSu A ME3	Markers for base module supplies, 10 x 6 marking strips, black	312 953
PSSu A ME4	Markers for base module supplies, 10 x 6 marking strips, brown	312 954
PSSu A ME5	Markers for base module supplies, 10 x 6 marking strips, red / blue	312 955
PSSu A ME6	Markers for base module supplies, 10 x 6 marking strips, green / yellow	312 956
PSSu A ME7	Markers for base module supplies, 10 x 6 marking strips, white	312 957
PSSu A LA0	Labelling strips with separator, for laser printer, for labelling the terminals on the base modules (10 A4 sheets, each with 108 tags ⁽¹⁾)	312 958
PSSu A LA1	Tags for labelling the terminals on the base modules (Dekafix, labelled 1..50, 10 x 50 tags)	312 959
PSSu A LA2	Tags for labelling the terminals on the base modules (Dekafix, labelled 51.0.100, 10 x 50 tags)	312 960
PSSu A LA3	Tags for labelling the terminals on the base modules (Dekafix, labelled 101.0.150, 10 x 50 tags)	312 961
PSSu A LA4	Tags for labelling the terminals on the base modules (Dekafix, labelled 151.0.200, 10 x 50 tags)	312 962
PSSu A LA0.1	Labelling strips without separator, for laser printer, for labelling the terminals on the base modules (10 A4 sheets, each with 108 tags ⁽¹⁾)	312 967

⁽¹⁾ The size of the tags is 5 x 40 mm.

Coding elements

Order reference		
Description		Order no.
PSSu A CE "A"	Yellow coding elements, A	312 903
PSSu A CE "B"	Yellow coding elements, B	312 904
PSSu A CE "C"	Yellow coding elements, C	312 905
PSSu A CE "D"	Yellow coding elements, D	312 906
PSSu A CE "E"	Yellow coding elements, E	312 907
PSSu A CE "F"	Yellow coding elements, F	312 908
PSSu A CE "G"	Yellow coding elements, G	312 909
PSSu A CE "H"	Yellow coding elements, H	312 910
PSSu A CE "I"	Yellow coding elements, I	312 911
PSSu A CE "J"	Yellow coding elements, J	312 912
PSSu A CE "K"	Yellow coding elements, K	312 913
PSSu A CE "L"	Yellow coding elements, L	312 914
PSSu A CE "M"	Yellow coding elements, M	312 915
PSSu A CE "N"	Yellow coding elements, N	312 916
PSSu A CE "O"	Yellow coding elements, O	312 917
PSSu A CE "P"	Yellow coding elements, P	312 918
PSSu A CE "Q"	Yellow coding elements, Q	312 919
PSSu A CE "R"	Yellow coding elements, R	312 920
PSSu A CE "A"	White coding elements, A	312 921
PSSu A CE "A"	Grey coding elements, A	312 923
PSSu A CE "B"	Grey coding elements, B	312 924
PSSu A CE "C"	Grey coding elements, C	312 925
PSSu A CE "D"	Grey coding elements, D	312 926
PSSu A CE "E"	Grey coding elements, E	312 927
PSSu A CE "F"	Grey coding elements, F	312 928
PSSu A CE "G"	Grey coding elements, G	312 929
PSSu A CE "H"	Grey coding elements, H	312 930
PSSu A CE "I"	Grey coding elements, I	312 931
PSSu A CE "J"	Grey coding elements, J	312 932
PSSu A CE "K"	Grey coding elements, K	312 933
PSSu A CE "L"	Grey coding elements, L	312 934
PSSu A CE "M"	Grey coding elements, M	312 935
PSSu A CE "N"	Grey coding elements, N	312 936
PSSu A CE "O"	Grey coding elements, O	312 937
PSSu A CE "P"	Grey coding elements, P	312 938
PSSu A CE "Q"	Grey coding elements, Q	312 939
PSSu A CE "R"	Grey coding elements, R	312 940

Scope of supply: 10 coding elements each.

Other accessories

Order reference		
Description		Order no.
PSSu A T1	Actuation tool for cage clamp	312 965
PSSu A GSD	Profibus GSD data, floppy disk	312 980
PSSu A EDS	DeviceNet EDS data, floppy disk	312 985
PSSu A USB-CAB03	USB cable, 3 m length	312 992
PSSu A USB-CAB05	USB cable, 5 m length	312 993
PMImicro diag	Graphic diagnostic terminal	260 000

Order reference



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Modules

Alphabetically by type

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Connection cable PSSu A RJ45-CAB 1.5M	314 094	3.12-16
PSS ANT 1 IDN (System antenna, including antenna cable)	312 995	3.12-2
PSS ANT 2 IDN (Diverse system antenna, including antenna cable)	312 996	3.12-2
PSS CAB IDN 2 (System extension cable, 2 m)	312 999	3.12-2
PSSu A Con 1/4 S (2 x screw terminals)	313 110	(see electronic module)
PSSu A Con 2/8 C (2 x spring-loaded terminals)	313 111	(see electronic module)
PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	312 619	(see electronic module)
PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	314 619	(see electronic module)
PSSu BP 1/12S (Base module without C-rail with screw terminals)	312 618	(see electronic module)
PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	314 618	(see electronic module)
PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	312 601	(see electronic module)
PSSu BP 1/8C-J (Base module without C-rail with cage clamp terminals, integrated cold junction compensation)	312 603	(see electronic module)
PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	314 601	(see electronic module)
PSSu BP 1/8C-TJ (Base module without C-rail with cage clamp terminals, integrated cold junction compensation, coated version)	314 603	(see electronic module)
PSSu BP 1/8S (Base module without C-rail with screw terminals)	312 600	(see electronic module)
PSSu BP 1/8S-J (Base module without C-rail with screw terminals, integrated cold junction compensation)	312 602	(see electronic module)
PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	314 600	(see electronic module)
PSSu BP 1/8S-TJ (Base module without C-rail with screw terminals, integrated cold junction compensation, coated version)	314 602	(see electronic module)
PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	312 621	(see electronic module)
PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	314 621	(see electronic module)
PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	312 620	(see electronic module)
PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	314 620	(see electronic module)
PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	312 611	(see electronic module)
PSSu BP-C 1/8C-J (Base module with C-rail and cage clamp terminals, integrated cold junction compensation)	312 613	(see electronic module)
PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	314 611	(see electronic module)
PSSu BP-C 1/8C-TJ (Base module with C-rail and cage clamp terminals, integrated cold junction compensation, coated version)	314 613	(see electronic module)
PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	312 610	(see electronic module)
PSSu BP-C 1/8S-J (Base module with C-rail and screw terminals, integrated cold junction compensation)	312 612	(see electronic module)

Modules

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PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	314 610	(see electronic module)
PSSu BP-C 1/8S-TJ (Base module with C-rail and screw terminals, integrated cold junction compensation, coated version)	314 612	(see electronic module)
PSSu E AI SHT1 (Electronic module)	312 261	3.6-56
PSSu E F 2DO 2 (Electronic module)	312 215	3.5-19
PSSu E F 2DO 2-T (Electronic module, coated version)	314 215	3.5-19
PSSu E F 2DOR 8 (Electronic module)	312 225	3.5-28
PSSu E F 2DOR 8-T (Electronic module, coated version)	314 225	3.5-28
PSSu E F 4DI (Electronic module)	312 200	3.5-2
PSSu E F 4DI-T (Electronic module, coated version)	314 200	3.5-2
PSSu E F 4DO 0.5 (Electronic module)	312 210	3.5-10
PSSu E F 4DO 0.5-T (Electronic module, coated version)	314 210	3.5-10
PSSu E F ABS SSI (Electronic module)	312 275	3.10-2
PSSu E F AI I (Electronic module)	312 260	3.7-2
PSSu E F AI I-T (Electronic module, coated version)	314 260	3.7-2
PSSu E F AI U (Electronic module)	312 265	3.7-12
PSSu E F AI U-T (Electronic module, coated version)	314 265	3.7-12
PSSu E F BSW (Electronic module)	312 230	3.3-28
PSSu E F BSW-T (Electronic module, coated version)	314 230	3.3-28
PSSu E F DI OZ 2 (Electronic module)	312 220	3.5-37
PSSu E F DI OZ 2-T (Electronic module, coated version)	314 220	3.5-37
PSSu E F INC (Electronic module)	312 280	3.10-9
PSSu E F PS (Electronic module)	312 190	3.3-2
PSSu E F PS1 (Electronic module)	312 191	3.3-12
PSSu E F PS1-T (Electronic module, coated version)	314 191	3.3-12
PSSu E F PS-P (Electronic module)	312 185	3.3-22
PSSu E F PS-P-T (Electronic module, coated version)	314 185	3.3-22
PSSu E F PS-T (Electronic module, coated version)	314 190	3.3-2
PSSu E PD (Electronic module)	312 195	3.11-2
PSSu E PD1 (Electronic module)	312 196	3.11-12
PSSu E PD1-T (Electronic module, coated version)	314 196	3.11-12

Modules

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PSSu E PD-T (Electronic module, coated version)	314 195	3.11-2
PSSu E PS-P +/-10V (Electronic module)	312 591	3.11-22
PSSu E PS-P +/-15V (Electronic module)	312 592	3.11-28
PSSu E PS-P 5V (Electronic module)	312 590	3.11-17
PSSu E S 2AI I se (Electronic module)	312 450	3.6-2
PSSu E S 2AI I se-T (Electronic module, coated version)	314 450	3.6-2
PSSu E S 2AI RTD (Electronic module)	312 490	3.6-41
PSSu E S 2AI RTD-T (Electronic module, coated version)	314 490	3.6-41
PSSu E S 2AI TC (Electronic module)	312 500	3.6-49
PSSu E S 2AI TC-T (Electronic module, coated version)	314 500	3.6-49
PSSu E S 2AI U (Electronic module)	312 440	3.6-15
PSSu E S 2AI U-T (Electronic module, coated version)	314 440	3.6-15
PSSu E S 2AO I (Electronic module)	312 470	3.6-22
PSSu E S 2AO I-T (Electronic module, coated version)	314 470	3.6-22
PSSu E S 2AO U (Electronic module)	312 460	3.6-35
PSSu E S 2AO U-T (Electronic module, coated version)	314 460	3.6-35
PSSu E S 2DO 2 (Electronic module)	312 410	3.4-29
PSSu E S 2DO 2-D (Electronic module)	312 411	3.4-35
PSSu E S 2DO 2-T (Electronic module, coated version)	314 410	3.4-29
PSSu E S 2DO 2-TD (Electronic module, coated version)	314 411	3.4-35
PSSu E S 2DOR 10 (Electronic module)	312 510	3.4-48
PSSu E S 2DOR 10-T (Electronic module, coated version)	314 510	3.4-48
PSSu E S 2DOR 2 (Electronic module)	312 511	3.4-41
PSSu E S 2DOR 2-T (Electronic module, coated version)	314 511	3.4-41
PSSu E S 4AI U (Electronic module)	312 445	3.6-8
PSSu E S 4AI U-T (Electronic module, coated version)	314 445	3.6-8
PSSu E S 4AO U (Electronic module)	312 465	3.6-28
PSSu E S 4AO U-T (Electronic module, coated version)	314 465	3.6-28
PSSu E S 4DI (Electronic module)	312 400	3.4-2
PSSu E S 4DI-D (Electronic module)	312 401	3.4-8

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PSSu E S 4DI-T (Electronic module, coated version)	314 400	3.4-2
PSSu E S 4DO 0.5 (Electronic module)	312 405	3.4-15
PSSu E S 4DO 0.5-D (Electronic module)	312 406	3.4-22
PSSu E S 4DO 0.5-T (Electronic module, coated version)	314 405	3.4-15
PSSu E S 4DO 0.5-TD (Electronic module, coated version)	314 406	3.4-22
PSSu E S ABS SSI (Electronic module)	312 480	3.9-2
PSSu E S ABS SSI(-T) (Electronic module, coated version)	314 480	3.9-2
PSSu E S INC 24V se (Electronic module)	312 486	3.9-17
PSSu E S INC 24V se-T (Electronic module, coated version)	314 486	3.9-17
PSSu E S INC (Electronic module)	312 485	3.9-9
PSSu E S INC-T (Electronic module, coated version)	314 485	3.9-9
PSSu E S PD-D (electronic module)	312 197	3.11-7
PSSu E S RS232 (Electronic module)	312 515	3.8-2
PSSu E S RS232-T (Electronic module, coated version)	314 515	3.8-2
PSSu E S RS485 (Electronic module)	312 516	3.8-9
PSSu E S RS485-T (Electronic module, coated version)	314 516	3.8-9
PSSu H CAN (Head module with CANopen interface)	312 047	3.2-37
PSSu H CAN-T (Head module with CANopen interface, coated version)	314 047	3.2-37
PSSu H DN (Head module with DeviceNet interface)	312 046	3.2-33
PSSu H DN-T (Head module with DeviceNet interface, coated version)	314 046	3.2-33
PSSu H DP (Head module with PROFIBUS DP interface)	312 045	3.2-29
PSSu H DP-T (Head module with PROFIBUS DP interface, coated version)	314 045	3.2-29
PSSu H F PN (Head module with PROFI-safe interface)	312 043	3.2-49
PSSu H FS SN SD (Head module with SafetyNET p interface)	312 085	3.2-57
PSSu H FS SN SD-T (Head module with SafetyNET p interface, coated version)	314 085	3.2-57
PSSu H IBSe (Head module with INTERBUS interface via copper cable)	312 048	3.2-41
PSSu H IBSo (Head module with INTERBUS interface via fibre-optic cable)	312 049	3.2-45
PSSu H PLC1 FS SN SD (Head module with SafetyNET p interface)	312 070	3.2-65
PSSu H PLC1 FS SN SD-T (Head module with SafetyNET p interface, coated version)	314 070	3.2-65
PSSu H S PN (Head module with PROFINET interface)	312 041	3.2-53

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PSSu H SB CAN (Head module with SafetyBUS p interface and CANopen interface)	312 035	3.2-15
PSSu H SB CAN-T (Head module with SafetyBUS p interface and CANopen interface, coated version)	314 035	3.2-15
PSSu H SB DN (Head module with SafetyBUS p interface and DeviceNet interface)	312 030	3.2-11
PSSu H SB DN-T (Head module with SafetyBUS p interface and DeviceNet interface, coated version)	314 030	3.2-11
PSSu H SB DP (Head module with SafetyBUS p interface and PROFIBUS DP interface)	312 025	3.2-6
PSSu H SB DP-T (Head module with SafetyBUS p interface and PROFIBUS DP interface, coated version)	314 025	3.2-6
PSSu H SB IBSe (Head module with SafetyBUS p interface and INTERBUS interface via copper cable)	312 015	3.2-20
PSSu H SB IBSo (Head module with SafetyBUS p interface and INTERBUS interface via fibre-optic cable)	312 020	3.2-25
PSSu H SB (Head module with SafetyBUS p interface)	312 010	3.2-2
PSSu H SB-T (Head module with SafetyBUS p interface, coated version)	314 010	3.2-2
PSSu K S 16DI (Compact module without connector, labelling bracket and labelling strips)	312 430	3.4-63
PSSu K S 16DO 0.5 (Compact module without connector, labelling bracket and labelling strips)	312 432	3.4-70
PSSu K S 8DI 8DO 0.5 (Compact module without connector, labelling bracket and labelling strips)	312 431	3.4-54
PSSu WB S IDN (Base station with InduraNET p interface for ST data, including chip card)	312 095	3.12-2
PSSu WR S IDN (Remote station with InduraNET p interface for ST data, including chip card)	312 096	3.12-9
PSSu XB F-T (Base station)	314 092	3.12-16
PSSu XR F-T (Remote station, including terminating plate PSSu A EC XB)	314 093	3.12-21

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312 010	PSSu H SB (Head module with SafetyBUS p interface)	3.2-2
312 015	PSSu H SB IBSe (Head module with SafetyBUS p interface and INTERBUS interface via copper cable)	3.2-20
312 020	PSSu H SB IBSo (Head module with SafetyBUS p interface and INTERBUS interface via fibre-optic cable)	3.2-25
312 025	PSSu H SB DP (Head module with SafetyBUS p interface and PROFIBUS DP interface)	3.2-6
312 030	PSSu H SB DN (Head module with SafetyBUS p interface and DeviceNet interface)	3.2-11
312 035	PSSu H SB CAN (Head module with SafetyBUS p interface and CANopen interface)	3.2-15
312 041	PSSu H S PN (Head module with PROFINET interface)	3.2-53
312 043	PSSu H F PN (Head module with PROFIsafe interface)	3.2-49
312 045	PSSu H DP (Head module with PROFIBUS DP interface)	3.2-29
312 046	PSSu H DN (Head module with DeviceNet interface)	3.2-33
312 047	PSSu H CAN (Head module with CANopen interface)	3.2-37
312 048	PSSu H IBSe (Head module with INTERBUS interface via copper cable)	3.2-41
312 049	PSSu H IBSo (Head module with INTERBUS interface via fibre-optic cable)	3.2-45
312 070	PSSu H PLC1 FS SN SD (Head module with SafetyNET p interface)	3.2-65
312 085	PSSu H FS SN SD (Head module with SafetyNET p interface)	3.2-57
312 095	PSSu WB S IDN (Base station with InduraNET p interface for ST data, including chip card)	3.12-2
312 096	PSSu WR S IDN (Remote station with InduraNET p interface for ST data, including chip card)	3.12-9
312 185	PSSu E F PS-P (Electronic module)	3.3-22
312 190	PSSu E F PS (Electronic module)	3.3-2
312 191	PSSu E F PS1 (Electronic module)	3.3-12
312 195	PSSu E PD (Electronic module)	3.11-2
312 196	PSSu E PD1 (Electronic module)	3.11-12
312 197	PSSu E S PD-D (electronic module)	3.11-7
312 200	PSSu E F 4DI (Electronic module)	3.5-2
312 210	PSSu E F 4DO 0.5 (Electronic module)	3.5-10
312 215	PSSu E F 2DO 2 (Electronic module)	3.5-19
312 220	PSSu E F DI OZ 2 (Electronic module)	3.5-37
312 225	PSSu E F 2DOR 8 (Electronic module)	3.5-28
312 230	PSSu E F BSW (Electronic module)	3.3-28

Modules

Numerically by order number

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312 260	PSSu E F AI I (Electronic module)	3.7-2
312 261	PSSu E AI SHT1 (Electronic module)	3.6-56
312 265	PSSu E F AI U (Electronic module)	3.7-12
312 275	PSSu E F ABS SSI (Electronic module)	3.10-2
312 280	PSSu E F INC (Electronic module)	3.10-9
312 400	PSSu E S 4DI (Electronic module)	3.4-2
312 401	PSSu E S 4DI-D (Electronic module)	3.4-8
312 405	PSSu E S 4DO 0.5 (Electronic module)	3.4-15
312 406	PSSu E S 4DO 0.5-D (Electronic module)	3.4-22
312 410	PSSu E S 2DO 2 (Electronic module)	3.4-29
312 411	PSSu E S 2DO 2-D (Electronic module)	3.4-35
312 430	PSSu K S 16DI (Compact module without connector, labelling bracket and labelling strips)	3.4-63
312 431	PSSu K S 8DI 8DO 0.5 (Compact module without connector, labelling bracket and labelling strips)	3.4-54
312 432	PSSu K S 16DO 0.5 (Compact module without connector, labelling bracket and labelling strips)	3.4-70
312 440	PSSu E S 2AI U (Electronic module)	3.6-15
312 445	PSSu E S 4AI U (Electronic module)	3.6-8
312 450	PSSu E S 2AI I se (Electronic module)	3.6-2
312 460	PSSu E S 2AO U (Electronic module)	3.6-35
312 465	PSSu E S 4AO U (Electronic module)	3.6-28
312 470	PSSu E S 2AO I (Electronic module)	3.6-22
312 480	PSSu E S ABS SSI (Electronic module)	3.9-2
312 485	PSSu E S INC (Electronic module)	3.9-9
312 486	PSSu E S INC 24V se (Electronic module)	3.9-17
312 490	PSSu E S 2AI RTD (Electronic module)	3.6-41
312 500	PSSu E S 2AI TC (Electronic module)	3.6-49
312 510	PSSu E S 2DOR 10 (Electronic module)	3.4-48
312 511	PSSu E S 2DOR 2 (Electronic module)	3.4-41
312 515	PSSu E S RS232 (Electronic module)	3.8-2
312 516	PSSu E S RS485 (Electronic module)	3.8-9
312 590	PSSu E PS-P 5V (Electronic module)	3.11-17

Modules

Numerically by order number

Order no.	Description	Page
312 591	PSSu E PS-P +/-10V (Electronic module)	3.11-22
312 592	PSSu E PS-P +/-15V (Electronic module)	3.11-28
312 600	PSSu BP 1/8S (Base module without C-rail with screw terminals)	(see electronic module)
312 601	PSSu BP 1/8C (Base module without C-rail with cage clamp terminals)	(see electronic module)
312 602	PSSu BP 1/8S-J (Base module without C-rail with screw terminals, integrated cold junction compensation)	(see electronic module)
312 603	PSSu BP 1/8C-J (Base module without C-rail with cage clamp terminals, integrated cold junction compensation)	(see electronic module)
312 610	PSSu BP-C 1/8S (Base module with C-rail with screw terminals)	(see electronic module)
312 611	PSSu BP-C 1/8C (Base module with C-rail with cage clamp terminals)	(see electronic module)
312 612	PSSu BP-C 1/8S-J (Base module with C-rail and screw terminals, integrated cold junction compensation)	(see electronic module)
312 613	PSSu BP-C 1/8C-J (Base module with C-rail and cage clamp terminals, integrated cold junction compensation)	(see electronic module)
312 618	PSSu BP 1/12S (Base module without C-rail with screw terminals)	(see electronic module)
312 619	PSSu BP 1/12C (Base module without C-rail with cage clamp terminals)	(see electronic module)
312 620	PSSu BP-C 1/12S (Base module with C-rail with screw terminals)	(see electronic module)
312 621	PSSu BP-C 1/12C (Base module with C-rail with cage clamp terminals)	(see electronic module)
312 995	PSS ANT 1 IDN (System antenna, including antenna cable)	3.12-2
312 996	PSS ANT 2 IDN (Diverse system antenna, including antenna cable)	3.12-2
312 999	PSS CAB IDN 2 (System extension cable, 2 m)	3.12-2
313 110	PSSu A Con 1/4 S (2 x screw terminals)	(see electronic module)
313 111	PSSu A Con 2/8 C (2 x spring-loaded terminals)	(see electronic module)
314 010	PSSu H SB-T (Head module with SafetyBUS p interface, coated version)	3.2-2
314 025	PSSu H SB DP-T (Head module with SafetyBUS p interface and PROFIBUS DP interface, coated version)	3.2-6
314 030	PSSu H SB DN-T (Head module with SafetyBUS p interface and DeviceNet interface, coated version)	3.2-11
314 035	PSSu H SB CAN-T (Head module with SafetyBUS p interface and CANopen interface, coated version)	3.2-15
314 045	PSSu H DP-T (Head module with PROFIBUS DP interface, coated version)	3.2-29
314 046	PSSu H DN-T (Head module with DeviceNet interface, coated version)	3.2-33
314 047	PSSu H CAN-T (Head module with CANopen interface, coated version)	3.2-37
314 070	PSSu H PLC1 FS SN SD-T (Head module with SafetyNET p interface, coated version)	3.2-65
314 085	PSSu H FS SN SD-T (Head module with SafetyNET p interface, coated version)	3.2-57
314 092	PSSu XB F-T (Base station)	3.12-16
314 093	PSSu XR F-T (Remote station, including terminating plate PSSu A EC XB)	3.12-21

Modules

Numerically by order number

6.1

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314 094	Connection cable PSSu A RJ45-CAB 1.5M	3.12-16
314 185	PSSu E F PS-P-T (Electronic module, coated version)	3.3-22
314 190	PSSu E F PS-T (Electronic module, coated version)	3.3-2
314 191	PSSu E F PS1-T (Electronic module, coated version)	3.3-12
314 195	PSSu E PD-T (Electronic module, coated version)	3.11-2
314 196	PSSu E PD1-T (Electronic module, coated version)	3.11-12
314 200	PSSu E F 4DI-T (Electronic module, coated version)	3.5-2
314 210	PSSu E F 4DO 0.5-T (Electronic module, coated version)	3.5-10
314 215	PSSu E F 2DO 2-T (Electronic module, coated version)	3.5-19
314 220	PSSu E F DI OZ 2-T (Electronic module, coated version)	3.5-37
314 225	PSSu E F 2DOR 8-T (Electronic module, coated version)	3.5-28
314 230	PSSu E F BSW-T (Electronic module, coated version)	3.3-28
314 260	PSSu E F AI I-T (Electronic module, coated version)	3.7-2
314 265	PSSu E F AI U-T (Electronic module, coated version)	3.7-12
314 400	PSSu E S 4DI-T (Electronic module, coated version)	3.4-2
314 405	PSSu E S 4DO 0.5-T (Electronic module, coated version)	3.4-15
314 406	PSSu E S 4DO 0.5-TD (Electronic module, coated version)	3.4-22
314 410	PSSu E S 2DO 2-T (Electronic module, coated version)	3.4-29
314 411	PSSu E S 2DO 2-TD (Electronic module, coated version)	3.4-35
314 440	PSSu E S 2AI U-T (Electronic module, coated version)	3.6-15
314 445	PSSu E S 4AI U-T (Electronic module, coated version)	3.6-8
314 450	PSSu E S 2AI I se-T (Electronic module, coated version)	3.6-2
314 460	PSSu E S 2AO U-T (Electronic module, coated version)	3.6-35
314 465	PSSu E S 4AO U-T (Electronic module, coated version)	3.6-28
314 470	PSSu E S 2AO I-T (Electronic module, coated version)	3.6-22
314 480	PSSu E S ABS SSI(-T) (Electronic module, coated version)	3.9-2
314 485	PSSu E S INC-T (Electronic module, coated version)	3.9-9
314 486	PSSu E S INC 24V se-T (Electronic module, coated version)	3.9-17
314 490	PSSu E S 2AI RTD-T (Electronic module, coated version)	3.6-41
314 500	PSSu E S 2AI TC-T (Electronic module, coated version)	3.6-49

Modules

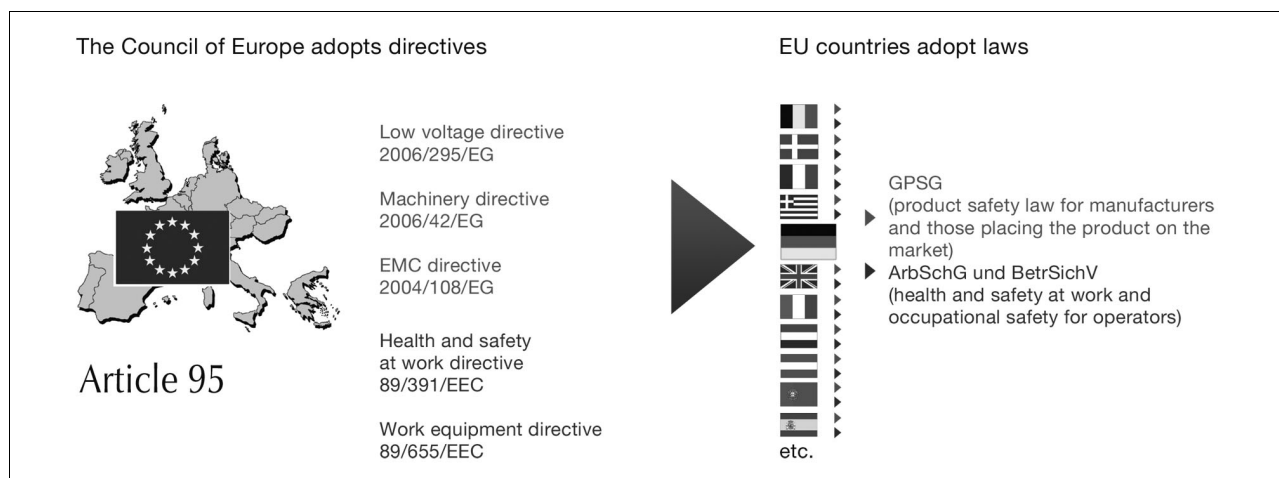
Numerically by order number

Order no.	Description	Page
314 510	PSSu E S 2DOR 10-T (Electronic module, coated version)	3.4-48
314 511	PSSu E S 2DOR 2-T (Electronic module, coated version)	3.4-41
314 515	PSSu E S RS232-T (Electronic module, coated version)	3.8-2
314 516	PSSu E S RS485-T (Electronic module, coated version)	3.8-9
314 600	PSSu BP 1/8S-T (Base module without C-rail with screw terminals, coated version)	(see electronic module)
314 601	PSSu BP 1/8C-T (Base module without C-rail with cage clamp terminals, coated version)	(see electronic module)
314 602	PSSu BP 1/8S-TJ (Base module without C-rail with screw terminals, integrated cold junction compensation, coated version)	(see electronic module)
314 603	PSSu BP 1/8C-TJ (Base module without C-rail with cage clamp terminals, integrated cold junction compensation, coated version)	(see electronic module)
314 610	PSSu BP-C 1/8S-T (Base module with C-rail with screw terminals, coated version)	(see electronic module)
314 611	PSSu BP-C 1/8C-T (Base module with C-rail with cage clamp terminals, coated version)	(see electronic module)
314 612	PSSu BP-C 1/8S-TJ (Base module with C-rail and screw terminals, integrated cold junction compensation, coated version)	(see electronic module)
314 613	PSSu BP-C 1/8C-TJ (Base module with C-rail and cage clamp terminals, integrated cold junction compensation, coated version)	(see electronic module)
314 618	PSSu BP 1/12S-T (Base module without C-rail with screw terminals, coated version)	(see electronic module)
314 619	PSSu BP 1/12C-T (Base module without C-rail with cage clamp terminals, coated version)	(see electronic module)
314 620	PSSu BP-C 1/12S-T (Base module with C-rail with screw terminals, coated version)	(see electronic module)
314 621	PSSu BP-C 1/12C-T (Base module with C-rail with cage clamp terminals, coated version)	(see electronic module)

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European directives and position of the standards in Europe

7.1



Incorporation of the directives into domestic law (using Germany as an example)

European directives

The concept of a single European internal market in terms of the "New Approach" can be traced right back to the start of the 70s: The low voltage directive is the first piece of European legislation to take into account the approach towards harmonisation of a common single market.

Products that are covered by one or more of the following directives have to apply a CE mark, i.e. the product must be accompanied by a declaration of conformity. With a declaration of conformity the manufacturer confirms that his product meets all the requirements of the European directives that relate to his product. This means he can launch and sell his product within the scope of the EU without consideration of any national regulations.

Key engineering directives:

- ▶ General product safety (2001/95/EC)
- ▶ Health and safety (89/391/EEC)
- ▶ Use of work equipment (89/655/EEC)
- ▶ Lifts (95/16/EC)
- ▶ Waste electrical and electronic equipment (2002/96/EC)
- ▶ Electromagnetic compatibility (EMC) (2004/108/EC)

- ▶ Devices for use in potentially explosive areas (ATEX) (94/9/EC)
- ▶ Machinery (98/37/EC) / (2006/42/EC)
- ▶ Low voltage equipment (2006/95/EC)
- ▶ Personal protective equipment (89/686/EEC)
- ▶ Cable cars (2000/9/EC)

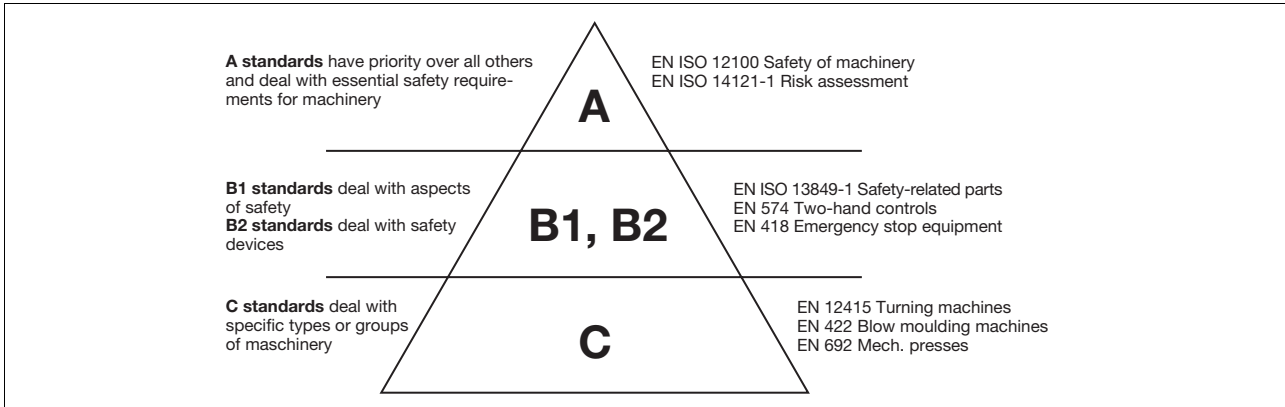
The directives are addressed to member states, who are obliged to incorporate the European directives into domestic law. In Germany this is normally achieved through the device safety law.

Position of the standards in Europe

The legal status of standards is constantly under discussion. Inside Europe, i.e. within the scope of the European directives that are subject to the CE marking obligation, a manufacturer is not bound by standards or other specifications. He simply needs to comply with the health and safety requirements of the directive(s). The associated benefits of a division between standards and legislation are obvious: It is easier for legislators to agree on the essential requirements than on technical details. Also, the directives do not regularly have to be adapted to the state of technology; member states can use their own legal system for incorporation and manu-

facturers are free to select the ways in which they implement the requirements of the directive.

European directives and position of the standards in Europe



7.1

Standards pyramid

So what are the benefits of applying the standards? With so-called harmonised standards with presumption of conformity, there is a shifting of the burden of proof, i.e. if manufacturers apply these standards, it is presumed that they will also comply with the specific requirements of the European directives. The regulatory authorities would therefore need to prove that a

manufacturer did not meet the legal requirements.

However, should a manufacturer deviate from the harmonised standards, he himself must prove how he has met the essential safety requirements. This is generally done via a hazard analysis. In practice one would endeavour to apply the harmonised standards, un-

less the products concerned are highly innovative and no harmonised standards yet exist. The standards for which this "presumption effect" applies can be researched in the Official Journal of the EU (e.g. on the Internet). Standards in Europe are subdivided into what are termed A, B, and C standards.

Risk analysis

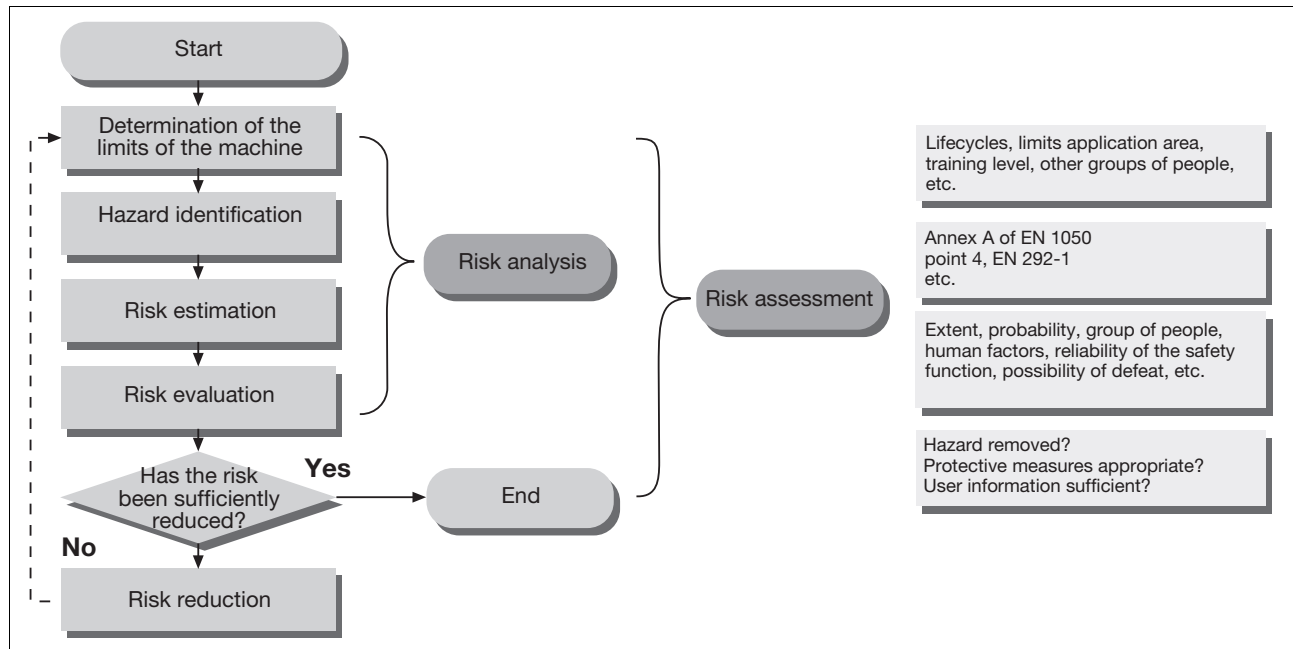
Risk analysis

Under the terms of the machinery directive, a machine manufacturer must assess the hazards in order to identify all the hazards that apply to his machine. He must then design and construct the machine to take account of his assessment. This requirement also applies to operators who act as manufacturers under the terms of the machinery directive. For example, this

may occur with machines that are interlinked or for machinery that has been upgraded and substantially modified.

EN ISO 14121-1 contains "Principles for risk assessment" on machinery. These approaches can be called upon as part of a comprehensive analysis. EN ISO 13849-1 expands on EN ISO 14121-1 with regard to the assessment of safety-related parts of control systems.

The hazards emanating from a machine may be many and varied, so for example, it is necessary to consider not just mechanical hazards through crushing and shearing, but also thermal and electrical hazards and hazards from radiation. Risk reduction is therefore an iterative process, i.e. it is carried out before and during the planning phase and after completion of the plant or machine.



Iterative process in accordance with EN ISO 14121-1

Legal regulations outside Europe and standards for functional safety

Legal regulations outside Europe

The situation is somewhat different in the USA: people there are mainly familiar with two types of standards: ANSI (American National Standards Institute) and OSHA (Occupational Safety and Health Administration).

OSHA standards are published by the state and compliance is mandatory. ANSI standards, on the other hand, are developed by private organisations and their application is generally not absolutely essential. However, ANSI standards can still be found included as part of a contract. Beyond that ANSI standards are being taken over by OSHA. You can also still come across the NFPA (National Fire Protection Association), which developed NFPA 79 as a counterpart to EN 60204-1, for example. OSHA standards can be compared with the European directives. Unlike the European directives, OSHA standards are more involved with formulating technical specifications than abstract requirements.

The legal basis in the USA can be seen as a mix of product standards, fire codes (NFPA), electrical codes (NEC) and national laws. Local government bodies have the authority to monitor that these codes are being enforced and implemented.

Russia and the CIS states have implemented GOST-R certification for some years now, in other words, technical devices that fall within a specific product area must undergo a certain certification process. Machinery and any corresponding technical accessories undergo a type approval test through a European notified body, for example. This test is generally recognised by a Russian-based approvals body. From the point of view of safety, the same requirements apply as in Europe.

China, on the other hand, has introduced CCC certification. Similar to the position in Russia, technical products are subject to mandatory certification through a national approvals body in China. In addition, production sites are

inspected. If a technical device falls with the scope of the product list, which is subdivided into 19 categories, certification is mandatory, otherwise it will be necessary to supply a type of “declaration of no objection” from a national notified body.

Japan is currently in a transition period: The plan is for Japan to adopt the European “new approach” – in other words, to keep standards and legislation separate. At the moment the international ISO and IEC standards are being directly incorporated into national legislation, which is why people are currently confronted with frequent amendments to laws and lengthy implementation periods.

Standards for functional safety

Different standards may be called upon to observe functional safety on control systems, depending on the application. In the area of machine safety, EN ISO 13849-1 is the main standard named for safety-related control systems. Irrespective of the technology, this applies for the whole chain from the sensor to the actuator. The risk graphs and corresponding risk parameters can be used to estimate the potential risk for danger zones on machinery. The category is then established without the use of risk-reducing measures.

Safety-related parts of control systems - General principles for design in accordance with EN ISO 13849-1

7.1

Determination of the required Performance Level (PL_r)

► S – Severity of injury

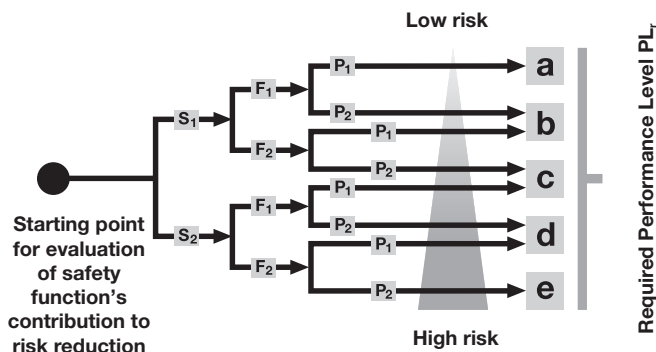
- S₁ = Slight (normally reversible injury)
- S₂ = Serious (normally irreversible injury, including death)

► F – Frequency and/or exposure to a hazard

- F₁ = Seldom to less often and/or the exposure time is short
- F₂ = Frequent to continuous and/or the exposure time is long

► P – Possibility of avoiding the hazard or limiting the harm

- P₁ = Possible under specific conditions
- P₂ = Scarcely possible



Safety-related parts of control systems – General principles for design in accordance with EN ISO 13849-1

As the successor standard to EN 954-1, EN ISO 13849-1 is based on the familiar categories. Equally, it examines complete safety functions, including all the components involved in their design. EN ISO 13849-1 goes beyond the qualitative approach of EN 954-1 to include a quantitative assessment of the safety functions. A performance level (PL) is used for this, building upon the categories.

Components/devices require the following safety parameters:

- Category (structural requirement)
- PL: Performance level
- MTTFd: Mean time to dangerous failure
- DC: Diagnostic coverage
- CCF: Common cause failure

The standard describes how to calculate the performance level (PL) for safety-related parts of control systems, based on designated architectures. EN ISO 13849-1 refers any deviations to IEC 61508.

Risk assessment in accordance with EN ISO 13849-1

Risk assessment is an iterative process, i.e. it will need to be carried out more than once. The risk must be estimated and the performance level defined for each hazard on which the risk is to be reduced through control measures. The risk is estimated through consideration of the severity of injury (S), the frequency and duration of exposure to the hazard (F) and the possibility of avoiding or limiting the harm (P).

Parameters S, F and P are used on the risk graph to determine the required performance level (PL_r) for a safety function. The selection of parameters is no different to the procedure used in EN 954-1 (1996). However, the result is no longer a category but a PL.

Safety-related parts of control systems - General principles for design in accordance with EN ISO 13849-1

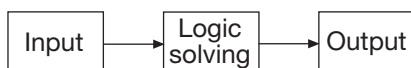
Performance level

The performance level (PL) classifies 5 levels of probability of failure. The table shows the relationship between PL and the probability of dangerous failure per hour (PFHD).

Performance Levels (PL) in accordance with EN ISO 13849-1	Probability of a dangerous failure per hour [1/h]
a	$10^{-5} < PFH < 10^{-4}$
b	$3 \times 10^{-6} < PFH < 10^{-5}$
c	$10^{-6} < PFH < 3 \times 10^{-6}$
d	$10^{-7} < PFH < 10^{-6}$
e	$10^{-8} < PFH < 10^{-7}$

7.1

Once the required PL has been established, the PL achieved by the safety function (SRP/CL) is calculated. To do this the SRP/CL can be divided into logical blocks, such as input, logic solving and output for example.



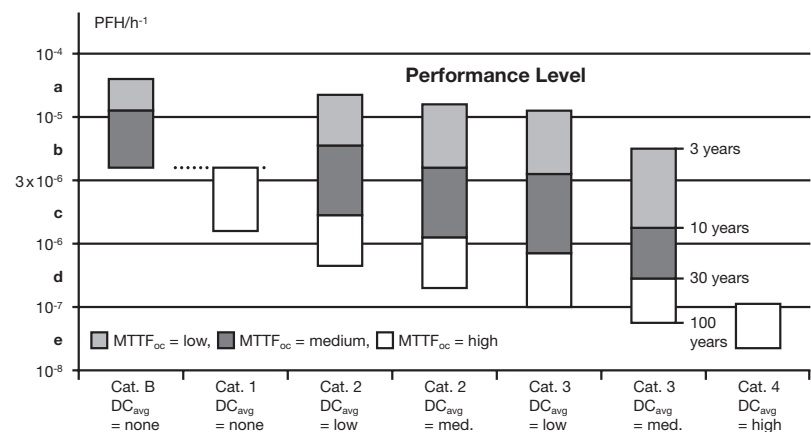
When using a designated architecture or an architecture of similar structure, the achieved PL can be calculated graphically using the bar chart. To do this the architecture of the SRP/CL is divided into categories. $MTTF_D$ and DC_{avg} are also required. From Category 2 onwards, the CCF will also need to be examined. A component's $MTTF_D$ value is usually provided by the manufacturer. The standard provides tables and check lists for calculating the other values.

It is also possible to calculate the achieved PL of an SRP/CL. The probability of dangerous failure of all the blocks that combine to form the safety function is added up:

$$PFH_{System} = PFH_{Input} + PFH_{Logic} + PFH_{Output}$$

The PL achieved by an SRP/CL must be at least as high as the PL required by the safety function. If this condition is not met, the safety function must be implemented differently.

Relationship between categories DC, $MTTF_D$ and PL



Functional safety and legal position of EN/IEC 61508

Functional safety with EN/IEC 61508?

EN/IEC 61508 is regarded as a generic safety standard, which deals with the functional safety of electrical, electronic and programmable electronic systems, irrespective of the application.

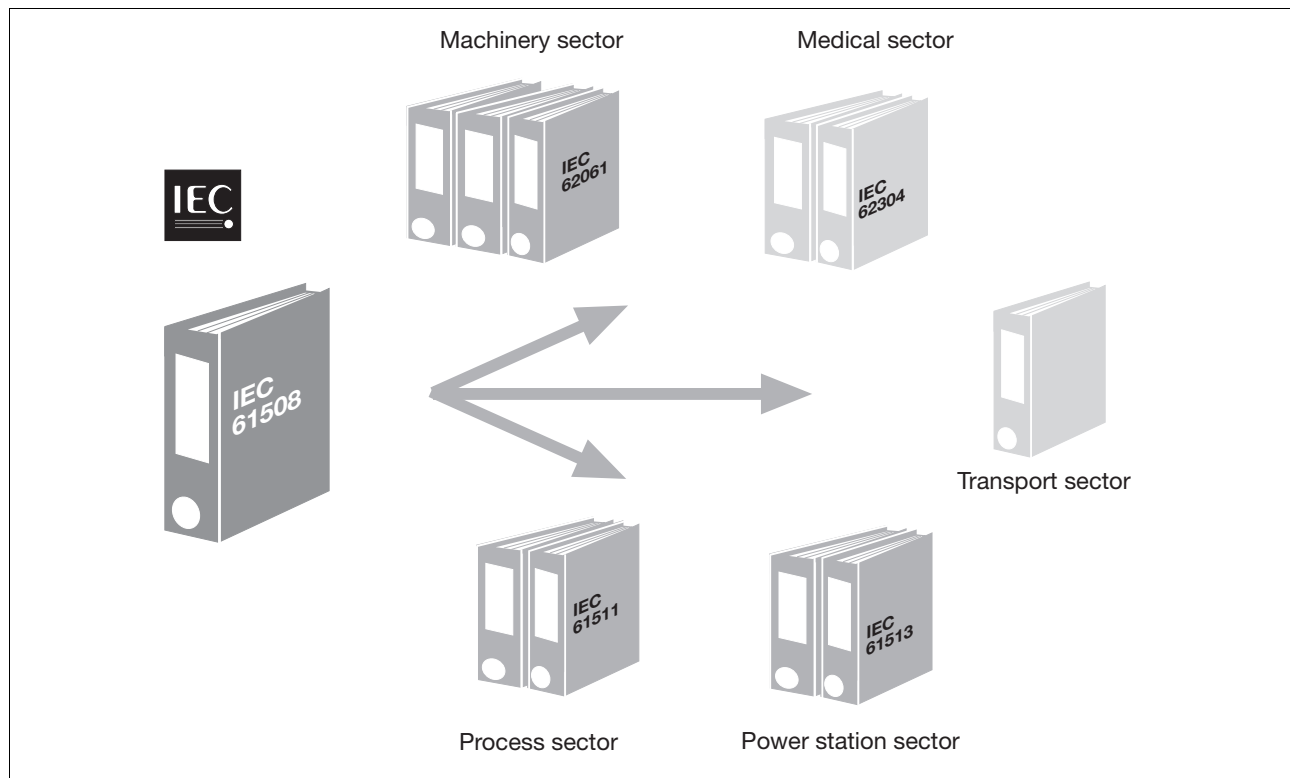
One of the main tasks of EN/IEC 61508 is to serve as a basis for the

development of application-oriented standards. Standards' committees are currently busy in the areas of machine safety with EN/IEC 62061, and process safety with EN/IEC 61511.

These sector-specific standards are intended to continue the principle approaches of EN/IEC 61508 and to implement the requirements for the relevant application area in a suitably practical manner.

What is the legal status of EN/IEC 61508?

As EN/IEC 61508 is not listed in the Official Journal of the European Communities for implementation as a European directive, it lacks the so-called "presumption effect": so if the standard is used on its own, a control system designer cannot presume that the relevant requirements of the specific European directive have been met.



Sector standards from EN/IEC 61508

Functional safety in accordance with EN/IEC 62061

Risk assessment and determination of required Safety Integrity Level (SIL)											
Consequences	S	Class CI					Frequency and duration	Fr	Probability of hzd. event	Pr	Avoidance
		3-4	5-7	8-10	11-13	14-15					
Death, losing an eye or arm	4	SIL 2	SIL 2	SIL 2	SIL 3	SIL 3	≤ 1 hour	5	Very high	5	
Permanent, losing fingers	3		OM	SIL 1	SIL 2	SIL 3	> 1 h – ≤ 1 day	5	Likely	4	
Reversible, medical attention	2			OM	SIL 1	SIL 2	> 1 day – ≤ 2 wks	4	Possible	3	Impossible
Reversible, first aid	1				OM	SIL 1	> 2 wks – ≤ 1 year	3	Rarely	2	Possible
							> 1 year	2	Negligible	1	Likely

□ AM = Other measures recommended

Functional safety of safety-related electrical, electronic and programmable electronic control systems in accordance with EN/IEC 62061

EN/IEC 62061 represents a sector-specific standard under EN/IEC 61508. It describes the implementation of safety-related electrical control systems on machinery and

examines the overall lifecycle from the concept phase through to decommissioning. Quantitative and qualitative examinations of the safety functions form the basis.

Risk estimation is an iterative process, i.e. it will need to be carried out more than once. The risk must be assessed and the SIL defined for each hazard on which the risk is to be reduced through

control measures. The risk is estimated through consideration of the severity of injury (Se), the frequency and duration of exposure to the hazard (Fr), probability of occurrence of a hazardous event (Pr) and the possibility of avoiding or limiting the harm (Av). The required SIL is assigned using the table above, where $CI = Fr + Pr + Av$.

Functional safety in accordance with EN/IEC 62061

7.1

Safety Integrity Level (SIL) in accordance with EN IEC 62061	Probability of a dangerous failure per hour [1/h]
No special safety requirement	$10^{-5} < PFH < 10^{-4}$
1 (1 failure in 100 000 h)	$3 \times 10^{-6} < PFH < 10^{-5}$
1 (1 failure in 100 000 h)	$10^{-6} < PFH < 3 \times 10^{-6}$
2 (1 failure in 1 000 000 h)	$10^{-7} < PFH < 10^{-6}$
3 (1 failure in 10 000 000 h)	$10^{-8} < PFH < 10^{-7}$

SIL assignment

The safety integrity level (SIL) classifies three levels of probability of failure. The table shows the relationship between SIL and the probability of dangerous failure per hour (PFH_D).

The SRECS (safety-related electrical control system) is divided into subsystems. These subsystems are assigned to actual devices, known as subsystems and subsystem elements. The SIL must be defined for each subsystem.

The probability of a dangerous failure is calculated by adding the probabilities of failure of all the subsystems of the SRECS:

$$PFH_D = PFH_{D1} + \dots + PFH_{Dn}$$

The selection or design of the SRECS must always meet the following minimum requirements:

Requirements for hardware safety integrity, comprising

- Architectural constraints for hardware safety integrity
- Requirements for the probability of dangerous random hardware failures

plus requirements for systematic safety integrity, comprising

- Requirements for avoidance of failures and
- Requirements for the control of systematic failures.

The following parameters are required in assessing hardware safety integrity:

λD: Dangerous failure rate
T1: Proof test
T2: Diagnostic test interval
DC: Diagnostic coverage
β: Common cause failure

The calculated probability of failure (PFH_D) of each SRECS must be less than the probability of failure required by the safety function. The required probability of failure, depending on the SIL, can be taken from the table. If this condition is not met, the safety function must be implemented differently.

The achieved SIL can only be as high as the lowest SILCL (SIL Claim Limit) of a subsystem involved in performing the safety function.

Safe failure fraction (SFF)	Hardware fault tolerance 0	Hardware fault tolerance 1	Hardware fault tolerance 2
< 60 %	Not allowed	SIL 1	SIL 2
60 % – < 90 %	SIL 1	SIL 2	SIL 3
90 % – < 99 %	SIL 2	SIL 3	SIL 3
99 %	SIL 3	SIL 3	SIL 3

Risk parameters and categories in accordance with EN 954-1/ EN ISO 13849-1*

Risk parameters

S = Severity of injury:

- 1 = Slight (normally reversible) injury
- 2 = Serious (normally irreversible) injury including death

F = Frequency and/or exposure time to the hazard:

- 1 = Seldom to quite often and/or the exposure time is short
- 2 = Frequent to continuous and/or the exposure time is long

P = Possibility of avoiding the hazard:

- 1 = Possible under specific conditions
- 2 = Scarcely possible

Example: Safety switch with forced-opening contacts.

Well-tried safety principles are circuits that are constructed in such a way that certain faults can be avoided by the appropriate arrangement or layout of components.

Example: avoiding a short circuit through appropriate separation, avoiding component failures that result from over-dimensioning, using the failsafe principle (on switching off).

Note: The occurrence of a fault can lead to the loss of the safety function.

In general Category 2 can be realised with electronic techniques. The system behaviour allows the occurrence of a fault to lead to the loss of the safety function between checks; the loss of the safety function is detected by the check.

Category 3

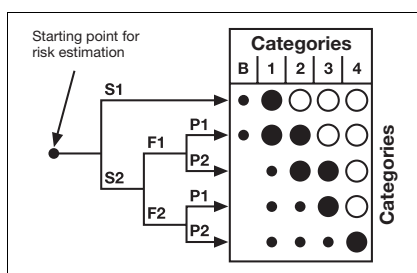
Safety-related parts of control systems shall be designed so that a single fault in any of these parts does not lead to the loss of the safety function. Whenever reasonably practicable, the single fault shall be detected at or before the next demand upon the safety function.

This does not mean that all faults will be detected. The accumulation of undetected faults can lead to an unintended output and a hazardous situation at the machine.

Category 4

Safety-related parts of control systems must be designed so that a single fault in any of these parts does not lead to a loss of the safety function; the single fault must be detected at or before the next demand upon the safety functions (e.g. immediately at switch on, at the end of a machine operating cycle). If this detection is not possible, then an accumulation of faults shall not lead to a loss of the safety function.

**Only applicable until November 2009. Replaced by EN ISO 13849-1*



Risk graph from EN 954

Categories in accordance with EN 954-1

The control system requirements derived from the risk graph are specified as follows:

Category B

Basic category with no special requirements = "good industrial standard"

Category 1

Safety-related parts shall be designed and constructed using well-tried components and well-tried safety principles.

Well-tried means: the components have been widely used in the past with successful results in similar applications, or they have been manufactured using principles that demonstrate its suitability and reliability for safety-related applications.

Category 2

Safety-related parts of control systems shall be designed so that their safety function(s) are checked at suitable intervals by the machine control system. The safety function(s) must be checked: at the machine start-up and prior to the initiation of any hazardous situation; periodically during operation, if the risk assessment and the kind of operation show that it is necessary.

This check may be initiated automatically or manually. Automatically, for example, the check may be initiated by a signal generated from a control system at suitable intervals. The automatic test should be provided by preference. The decision about the type of test depends on the risk assessment and the judgement of the end user or machine builder. If no fault is detected, operation may be approved as a result of the test. If a fault is detected, an output must be generated to initiate appropriate control action. A second, independent shutdown route is required for this.

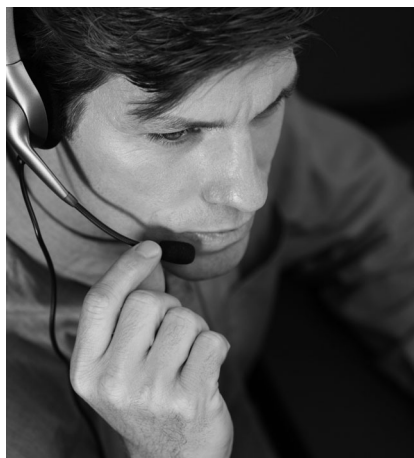
Notes: In some cases Category 2 is not applicable because the checking of the safety function cannot be applied to all components and devices. Moreover, the cost involved in implementing Category 2 correctly may be considerable, so that it may make better economic sense to implement a different category.

Contents	Page
Service	
Pre-sales/after sales	
	Services, concepts and so- 8.1-2 lutions
Business terms and conditions	
	Terms of delivery and pay- 8.1-3 ment

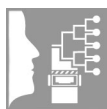
Pre-sales/after sales

Services, concepts and solutions

8.1



We can provide consulting and engineering, training and support, from the project configuration phase through to commissioning.



Risk analysis

Assessment of the hazards and risks on plant and machinery, based on norms and standards.



Safety concept

Based on the risk analysis, appropriate protective measures can be selected and a safety concept drawn up.



Safety design

As part of the safety design, Pilz produces detailed documentation regarding the implementation, taking into account the safety concept.



System implementation

Pilz undertakes all the tasks required to implement a project: component selection, preparation of circuit diagrams, programming, control cabinet, installation, commissioning.



Safety validation

All the relevant safety-related documents are examined, check lists are created and the plant and machinery checked.



CE services

Co-ordination and implementation of all the activities necessary for the "CE conformity" of plant and machinery.



Plant assessment

Analysis and assessment of the safety-related condition of your plant and machinery. Proposal of basic recommendations for improvement.



Training and education

A wide range of seminars and training courses on machinery safety helps to communicate the fundamentals for minimising risk and assuring your success.



Technical support

Our engineers can support you in the selection, use and application of our products. They are in constant contact with customers from the widest range of areas and industrial sectors and are happy to answer your queries at any time.



E-Mail:

techsupport@pilz.de



24-hour hotline:

+49 711 3409-444



Supply and repair service

From a fast, economical repair through to a long supply guarantee to safeguard your investment - always expect more from Pilz.



Certificates and approvals

Pilz is certified to DIN ISO 9001. International approvals and certification from recognised test houses confirm our products' suitability for worldwide use.



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Our homepage at www.pilz.com provides the latest information, electronic shopping, direct dialogue and enquiry functions as well as extensive download options.



E-Business

The focus of Pilz's E-Business activities is to strengthen customer orientation through the use of new media and to increase added value via a supplementary business model for Business-to-Business.



Worldwide representatives

Our worldwide network of subsidiaries and sales partners ensures comprehensive support and assistance with your questions and problems.

Business terms and conditions

Terms of delivery and payment



The terms of delivery and of payment of the respective Pilz company with whom a sales contract is closed are applied. As a rule this is the Pilz company that places the order. Please select the legal contract partner from the order confirmation.

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

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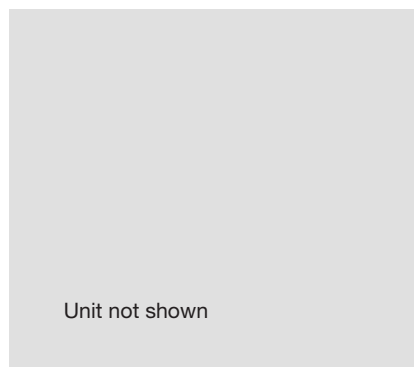
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pilz

Data sheets

Head modules

PSSu H m F DP ETH SD



Head module to connect the "Control system PSSU multi" to PROFIBUS-DP.

Approvals

	PSSu H m F DP ETH SD
	◆
	◆
	◆

Module features

The head module belongs to the performance class "Control system PSSU multi". The head module has the following features:

- ▶ PROFIBUS DP interface
- ▶ an FS resource
- ▶ SD card used to store the device project and the naming data
- ▶ Reset button
 - For warm reset
 - To transfer the naming data and/or device project from the SD card to the device memory
- ▶ Supply voltage
 - Integrated supply voltage for periphery supply and module supply
 - Infeed for C-rail supply
 - Module supply is buffered for 20 ms if the supply voltage is interrupted
 - Plug-in connection terminals (either spring-loaded terminal or screw terminal)
- ▶ Status LEDs
- ▶ Supports FS and ST modules

Module description

The module is designed for use in:

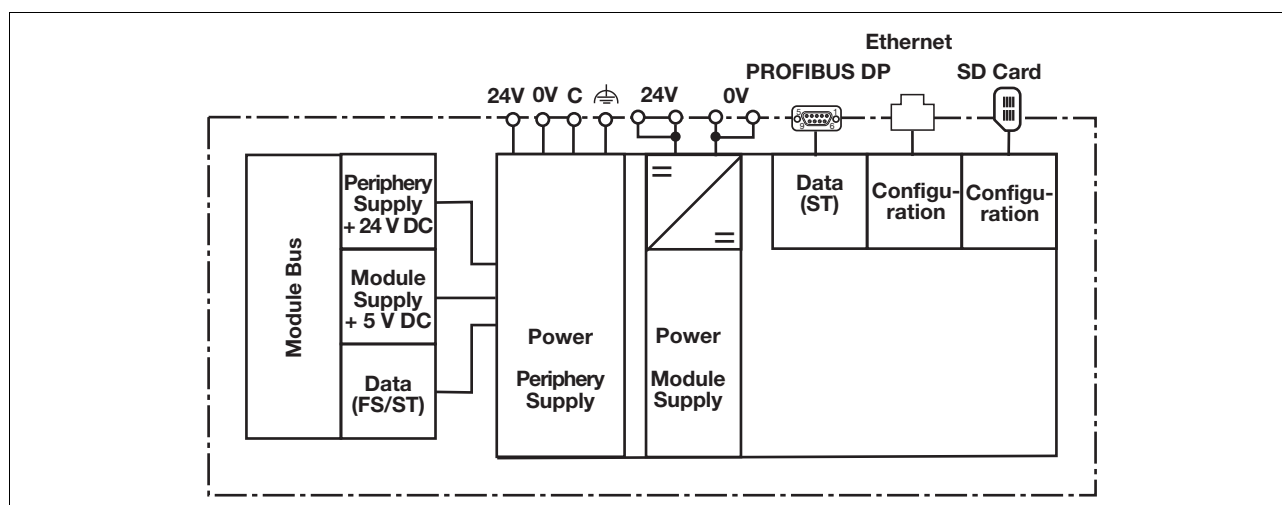
- ▶ Safety-related applications with
 - PROFIBUS DP with local enable principle
- ▶ Non-safety-related applications with
 - PROFIBUS DP

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated PROFIBUS DP interface
- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
 - 20 ms voltage buffer if the supply voltage is interrupted
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

Block diagram



Head modules

PSSu H m F DP ETH SD

Function description

The head module is a programmable logic controller (PLC), which can be used in safety-related and non-safety-related applications. The control system has memory areas for the operating system, the data and the device project with the user program.

User programs can be created in Multi programming.

For safety-related applications, the processor section is designed with multi-channel diversity.

The control system communicates with the input and output modules via the local module bus.

LEDs provide information on the status of the control system and indicate any errors.

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

- ▶ **Module supply**
Supply voltage for subsequent module (right-hand side)
- ▶ **Periphery supply**
Supply voltage for sensors, actuators and test pulses
- ▶ **C-rail**
Infeed of the permitted additional supplies for the C-rail; a detailed description of how to use the C-rail can be found in the "PSS 4000 System Description".

When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

PROFIBUS DP

PROFIBUS is an open fieldbus standard whose communication is defined in the international standards IEC 61158 and IEC 61784. Further provisions have been defined in specifications published by the PROFIBUS User Group. These specifications are available from PROFIBUS International (see www.profibus.com).

Ethernet

The Ethernet interface can be used for the following online actions:

- ▶ Project download
- ▶ Read the diagnostic data
- ▶ Firmware update

The connection is established via a RJ45 socket.

The Ethernet interface is configured in PAS4000 (see description in chapter "Network" in PAS4000's online help).

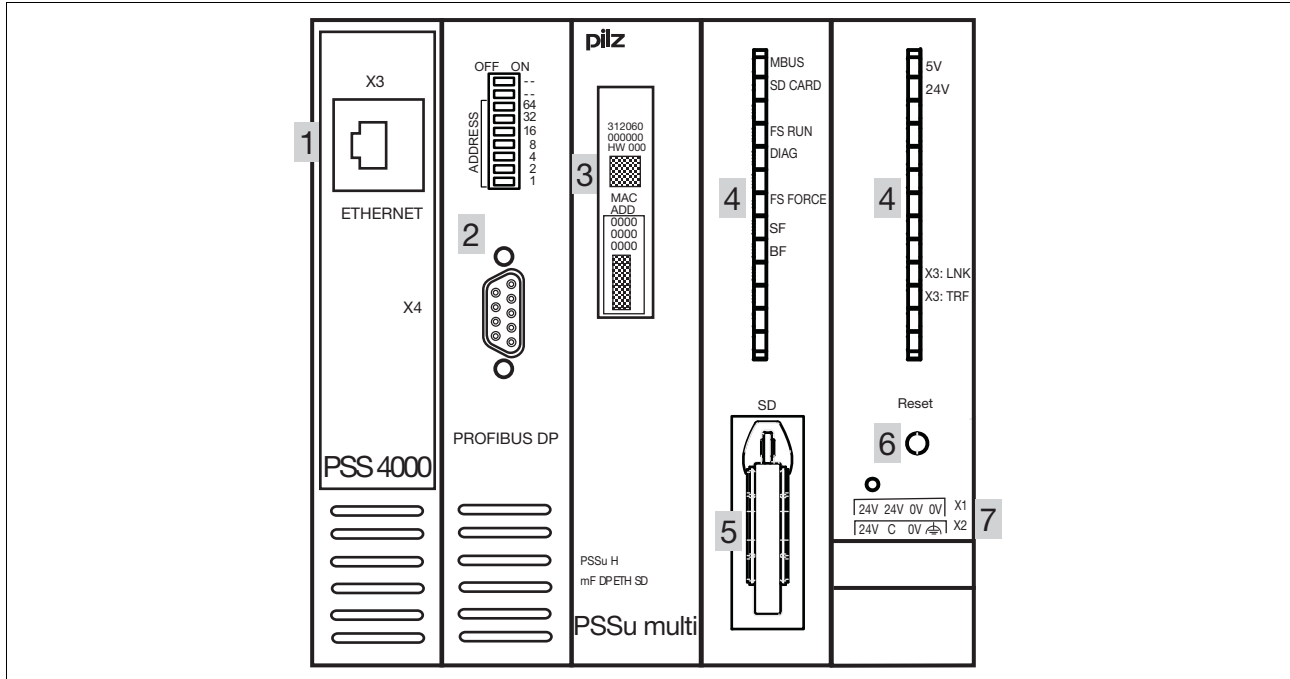
Wiring

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

Head modules

PSSu H m F DP ETH SD

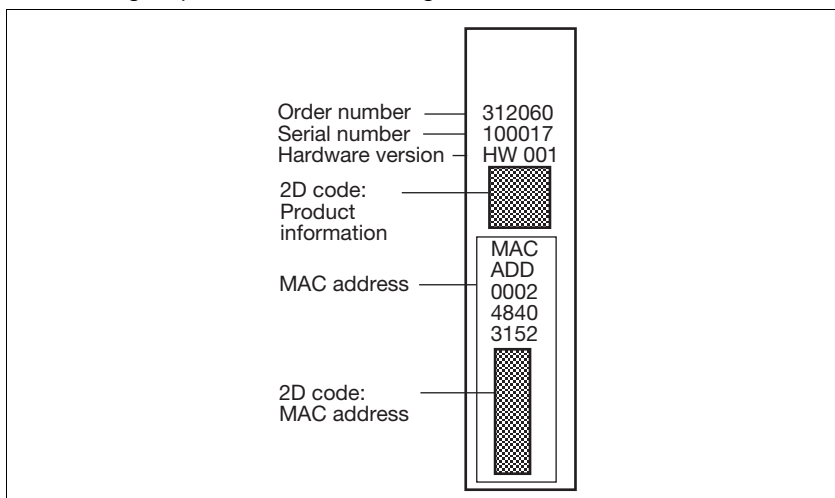
Front view



Key:

- ▶ 1: ETHERNET interface
- ▶ 2: PROFIBUS DP interface
- ▶ 3: Labelling strip (see below for details)
- ▶ 4: Status LEDs
- ▶ 5: SD card
- ▶ 6: Reset button
- ▶ 7: Supply voltage connection (module and periphery supply)

The labelling strip contains the following information:



Head modules
PSSu H m F DP ETH SD

Connection

The head module can be incorporated into the PROFIBUS as slave.

PROFIBUS DP	Layout	
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

Ethernet Interface

RJ45 socket 8-pin	PIN	Standard	Crossover
	1	TD+ (Transmit+)	RD+ (Receive+)
	2	TD- (Transmit-)	RD- (Receive-)
	3	RD+ (Receive+)	TD+ (Transmit+)
	4	n.c.	n.c.
	5	n.c.	n.c.
	6	RD- (Receive-)	TD- (Transmit-)
	7	n.c.	n.c.
	8	n.c.	n.c.

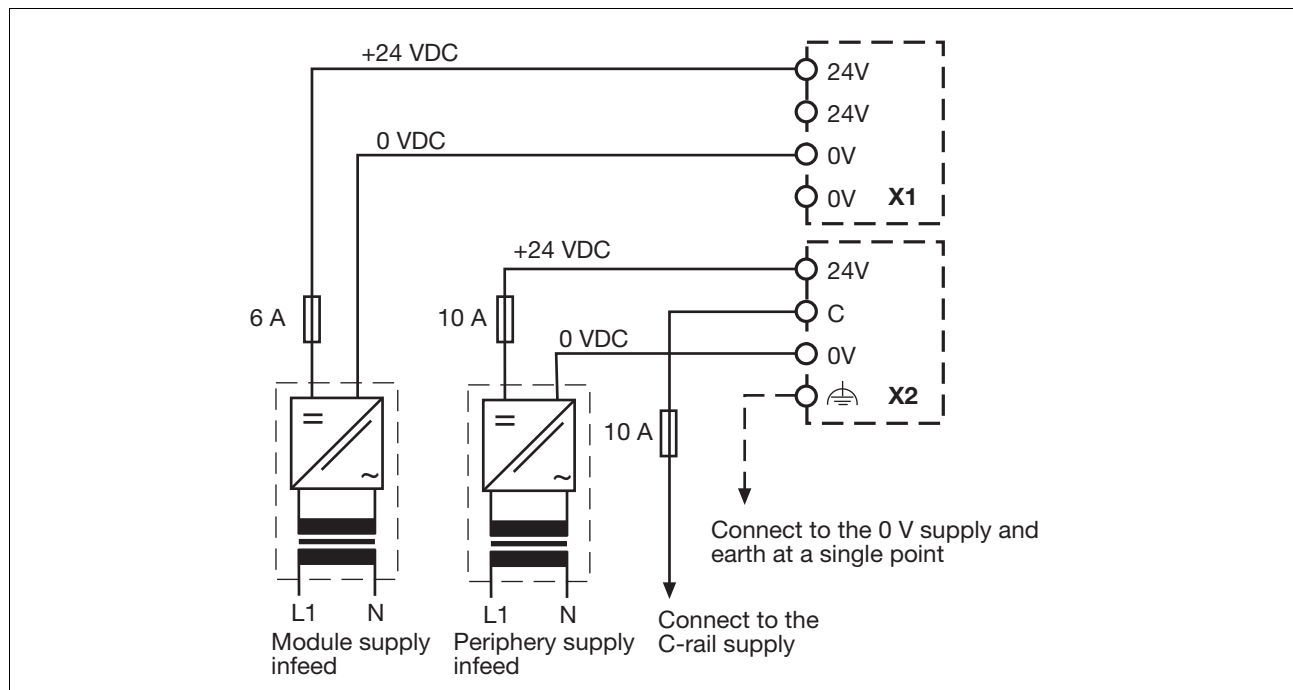
Module supply	Terminal configuration		X1
4-pin female connector	24V	+24 V infeed for module supply	
	0V	0 V infeed for module supply	

Head modules

PSSu H m F DP ETH SD

Periphery supply	Terminal configuration		X2
4-pin female connector	24V:	+24 V infeed for periphery supply	
	C	C-rail supply	
	0V	0 V infeed for periphery supply	
		Functional earth 	

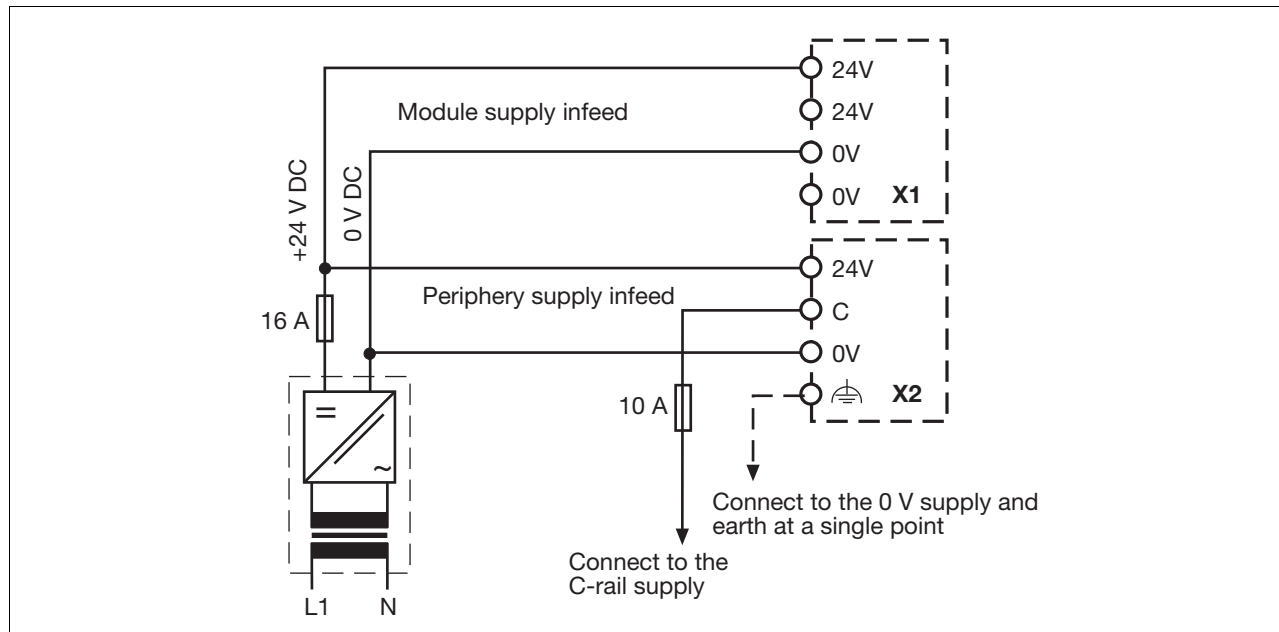
Separate power supplies for module supply and periphery supply:



Head modules

PSSu H m F DP ETH SD

Common power supply for module supply and periphery supply:



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details

Application range	Standard/Failsafe
System sections	
ST resource	no
FS resource	yes
ST module bus	yes
FS module bus	yes
ST SNp interface	no
FS SNp interface	no
External communication	
IP connections	no
Fieldbuses	yes
Diagnostic Server	no
OPC Server	no
Programming	
IEC 61131 programming	no
Multi programming	yes
Non-volatile variables	no
Electrical data	
Infeed for	Module Supply
voltage	24 VDC
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	16.1 W
Max. continuous current that the external power supply must provide	1.0 A
Inrush current that the external power supply must provide	4.0 A

Head modules

PSSu H m F DP ETH SD

Electrical data	
Infeed for voltage	Periphery Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply
Voltage	5 V DC
Voltage tolerance	-2 %/+3 %
Current load capacity	2.0 A
Buffer in the case of supply interruptions in accordance with	EN 61131-2, EN 61496-1
Short circuit-proof	yes
Potential isolation between Module Supply and Periphery Supply	3050 V
Potential isolation between module supply and PROFIBUS DP	700 V
CPU	
Real-time clock for time and date, buffered	
Resolution	1 s
Deviation	+/- 10s/Tag
Max. number of FS tasks	1
Min. cycle time of FS tasks	10 ms
Module's overall RAM memory	64 MB
Program and data memory	1 MB
Removable data medium	
Type	SD card
SafetyNET p	
Application range	Standard/Failsafe
Number	1
Connection	RJ45
Transmission rates	100 MBit/s
Set via	automatic
IP address (set automatically from)	169.254.X.Y
PROFIBUS DP	
Application range	Standard applications Failsafe applications with local enable principle
Device type	Slave
Station address	0 ... 126d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	244 Byte
Maximum data length of the fieldbus interface: Output	244 Byte
Maximum data length of the fieldbus interface: Diagnostics	2 Byte
Transmission rates	1.5 MBit/s, 12 MBit/s, 185.5 kBit/s, 19.2 kBit/s, 3 MBit/s, 45.45 kBit/s, 500 kBit/s, 6 MBit/s, 9.6 kBit/s, 93.75 kBit/s
Set via	automatic
Cycle time (t_ExtCo)	10...300 000 ms
Connection	Female 9-pin D-SUB connector
Protocol	DPV0
Operating modes	AutoBaud, Freeze Mode, Set Slave Address, Sync Mode
Certification	PNO
Description file	Pilz0CB0.gsd
Manufacturer's ID	0CB0h
Environmental data	
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no

Head modules

PSSu H m F DP ETH SD

Environmental data	
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Bottom	PC
Cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG
Torque setting with screw terminals	0.50 Nm
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 2.50 mm ² , 24 - 12 AWG
Stripping length	9 mm
Dimensions	
Height	125.6 mm
Width	130.0 mm
Depth	83.7 mm
Weight	405 g

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	4.14E-09	20

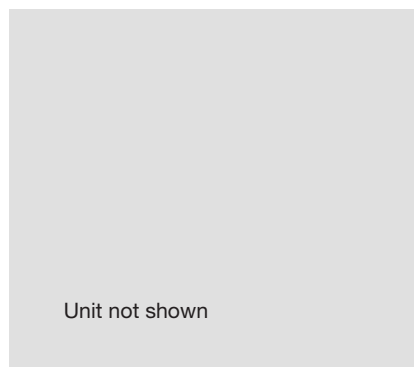
All the units used within a safety function must be considered when calculating the safety characteristic data.

The standards current on **2009-07** apply.

Order reference		
Product type	Features	Order no.
PSSu H m F DP ETH SD	Head module with PROFIBUS-DP and an Ethernet interface	312 060
PSSu A Con 1/4 S	2 x screw terminals	313 110
PSSu A Con 2/8 C	2 x spring-loaded terminals	313 111

Head modules

PSSu H m F DP SN SD



Head module to connect the "Control system PSSU multi" to SafetyNET p and PROFIBUS-DP.

Approvals

	PSSu H m F DP SN SD
	◆
	◆
	◆

Module features

The head module belongs to the performance class "Control system PSSu multi". The head module has the following features:

- ▶ 1 free Ethernet port for:
 - Connection to SafetyNET p
 - Project download
 - Read the diagnostic data
- ▶ PROFIBUS DP interface
- ▶ an FS resource
- ▶ SD card used to store the device project and the naming data
- ▶ Reset button
 - For warm reset
 - To transfer the naming data and/or device project from the SD card to the device memory
- ▶ Supply voltage
 - Integrated supply voltage for periphery supply and module supply
 - Infeed for C-rail supply
 - Module supply is buffered for 20 ms if the supply voltage is interrupted
 - Plug-in connection terminals (either spring-loaded terminal or screw terminal)
- ▶ Status LEDs
- ▶ Supports FS and ST modules

Module description

The module is designed for use in:

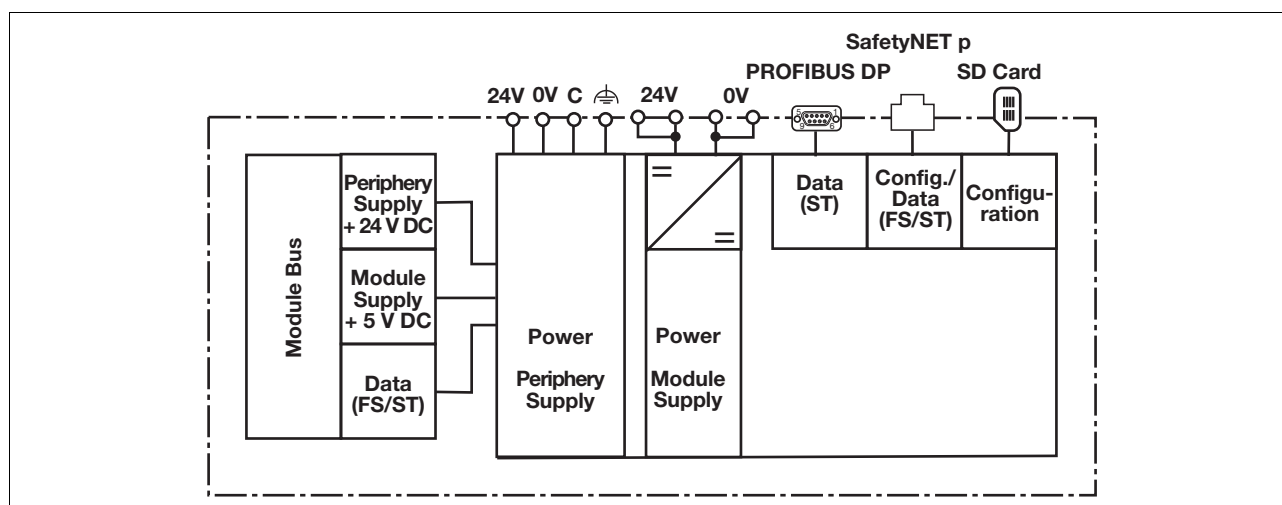
- ▶ Safety-related applications with
 - SafetyNET p
 - PROFIBUS DP with enable principle
- ▶ Non-safety-related applications with
 - PROFIBUS DP
 - SafetyNET p

Integrated protection mechanisms

The module has the following protection mechanisms:

- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated **SafetyNET p** interface
- ▶ Potentially isolated PROFIBUS DP interface
- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
 - 20 ms voltage buffer if the supply voltage is interrupted
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

Block diagram



Head modules PSSu H m F DP SN SD

Function description

The head module is a programmable logic controller (PLC), which can be used in safety-related and non-safety-related applications. The control system has memory areas for the operating system, the data and the device project with the user program. User programs can be created in Multi programming.

For safety-related applications, the processor section is designed with multi-channel diversity. The control system communicates with the input and output modules via the local module bus.

LEDs provide information on the status of the control system and indicate any errors. The product provides the module supply and periphery supply for the modules on the module bus:

- ▶ Module supply
Supply voltage for subsequent module (right-hand side)
- ▶ Periphery supply
Supply voltage for sensors, actuators and test pulses
- ▶ C-rail
Infeed of the permitted additional supplies for the C-rail; a detailed description of how to use the C-rail can be found in the "PSS 4000 System Description".

When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

SafetyNET p

Functions

- ▶ The SafetyNET p interface enables safety-related and non-safety-related data transfer between the PSSu system and other network subscribers.
- ▶ The head module receives signals from other network subscribers; it processes these signals in the user program and passes them on to the connected input/output modules.

- ▶ The head module receives signals from the connected input/output modules; it processes these signals in the user program and passes them on to the other network subscribers.
- ▶ If a fault occurs, the module switches the connected failsafe outputs to a safe condition.

MAC address

- ▶ The MAC address is a factory-set default. It can be found on the labelling strip on the front of the module.

INFORMATION

Further information on SafetyNET p can be found in the "PSS 4000 System Description".

PROFIBUS DP

PROFIBUS is an open fieldbus standard whose communication is defined in the international standards IEC 61158 and IEC 61784. Further provisions have been defined in specifications published by the PROFIBUS User Group. These specifications are available from PROFIBUS International (see www.profibus.com).

Wiring

- ▶ The requirements of the supply voltages can be found in the chapter entitled "Technical Details".
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the periphery supply on the module bus is 10 A. Please refer to the derating diagram in the chapter entitled "Function Description".
- ▶ The maximum current load for the C-rail is 10 A. Please refer to the derating diagram in the chapter entitled "Function Description".
- ▶ Permitted infeed at the C-rail:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... +30 VDC

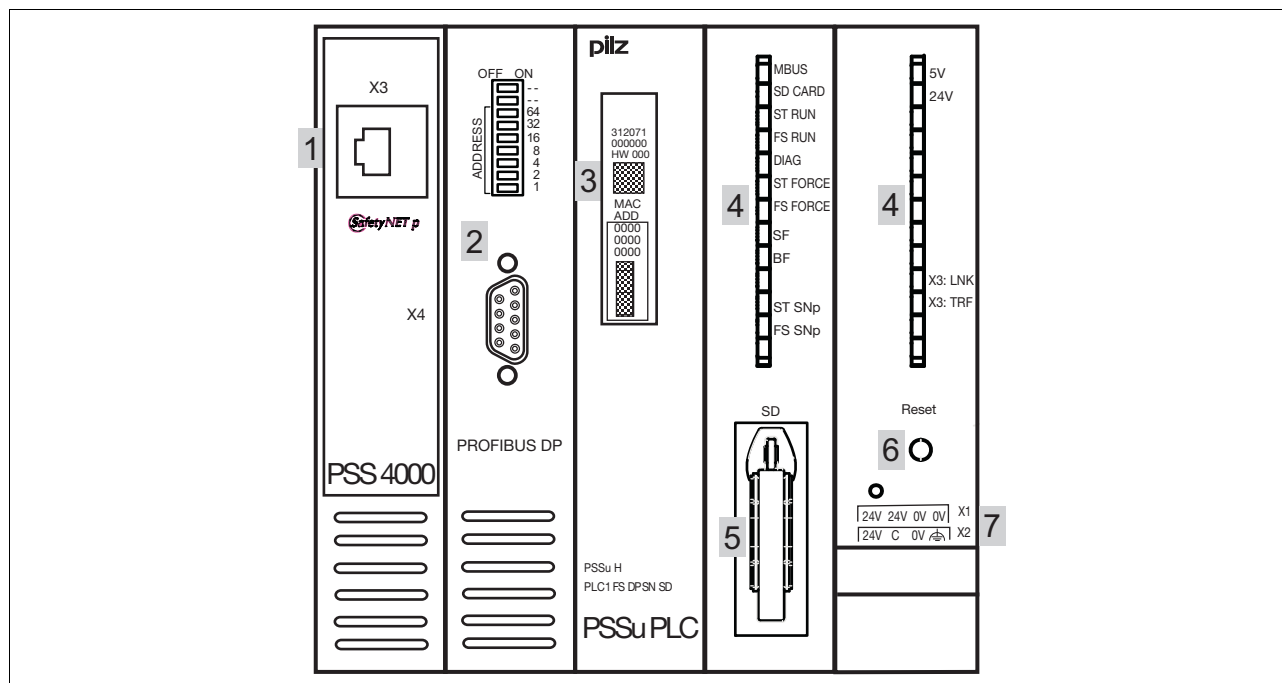
– - 48 VAC ... + 48 VAC

- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Details of the minimum range for cable cross sections on connection terminals can be found in the section entitled "Technical Details".
- ▶ Use copper wiring.

Head modules

PSSu H m F DP SN SD

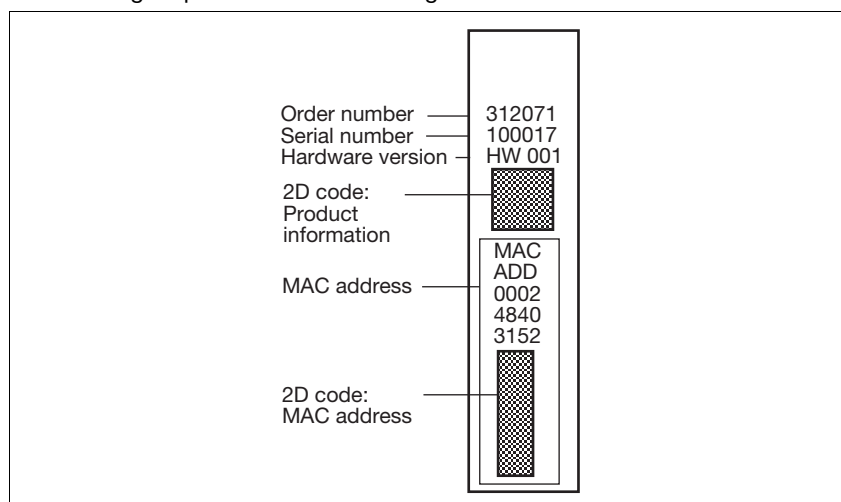
Front view



Key:

- ▶ 1: SafetyNET p interface
- ▶ 2: PROFIBUS-DP interface
- ▶ 3: Labelling strip (see below for details)
- ▶ 4: Status LEDs
- ▶ 5: SD card
- ▶ 6: Reset button
- ▶ 7: Supply voltage connection (module and periphery supply)

The labelling strip contains the following information:

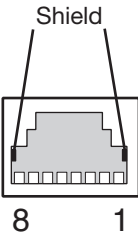


Head modules

PSSu H m F DP SN SD

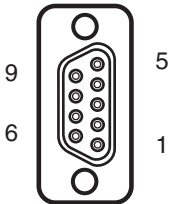
Connection

SafetyNET p is an Ethernet interface.
Further information can be found in the
System Description PSS 4000.

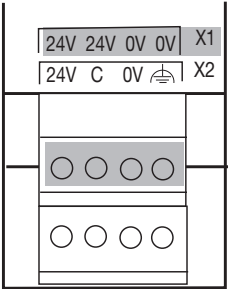
SafetyNET p	Layout	
RJ45 female connector	1: TD+ 2: TD- 3: RD+ 4: n.c. 5: n.c. 6: RD- 7: n.c. 8: n.c.	

► n.c. = not connected

The head module can be incorporated into the PROFIBUS as slave.

PROFIBUS DP	Layout	
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

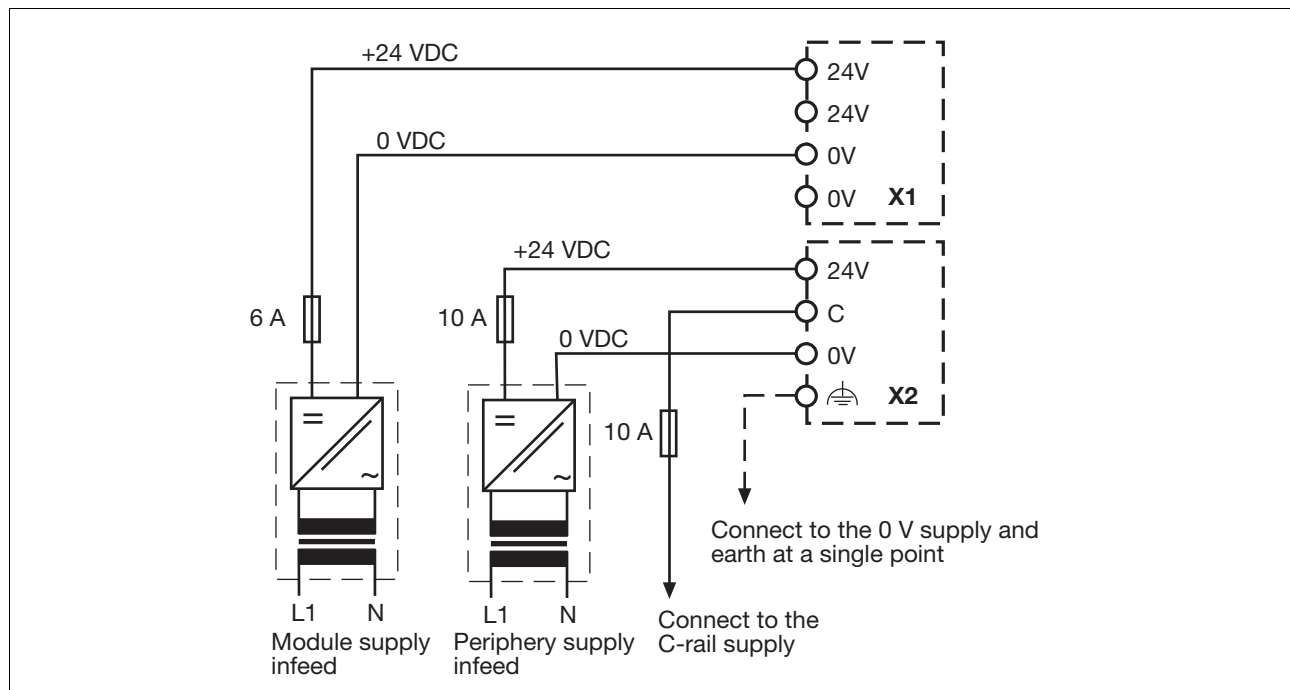
Module supply	Terminal configuration		X1
4-pin female connector	24V	+24 V infeed for module supply	
	0V	0 V infeed for module supply	

Head modules

PSSu H m F DP SN SD

Periphery supply	Terminal configuration		X2
4-pin female connector	24V:	+24 V infeed for periphery supply	
	C	C-rail supply	
	0V	0 V infeed for periphery supply	
		Functional earth 	

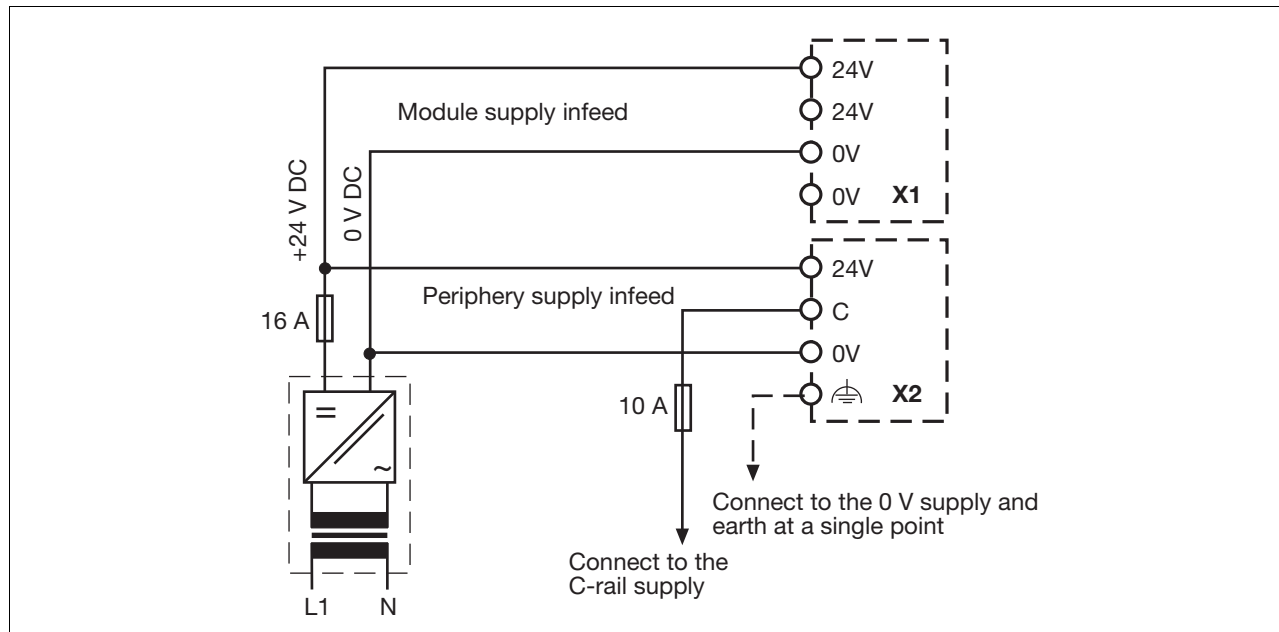
Separate power supplies for module supply and periphery supply:



Head modules

PSSu H m F DP SN SD

Common power supply for module supply and periphery supply:



Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
System sections	
ST resource	no
FS resource	yes
ST module bus	yes
FS module bus	yes
ST SNp interface	yes
FS SNp interface	yes
External communication	
IP connections	no
Fieldbuses	yes
Diagnostic Server	no
OPC Server	no
Programming	
IEC 61131 programming	no
Multi programming	yes
Non-volatile variables	no
Electrical data	
Infeed for	Module Supply
voltage	24 VDC
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	16.1 W
Max. continuous current that the external power supply must provide	1.0 A
Inrush current that the external power supply must provide	4.0 A

Head modules

PSSu H m F DP SN SD

Electrical data	
Infeed for voltage	Periphery Supply 24 VDC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply
Voltage	5 V DC
Voltage tolerance	-2 %/+3 %
Current load capacity	2.0 A
Buffer in the case of supply interruptions in accordance with	EN 61131-2, EN 61496-1
Short circuit-proof	yes
Potential isolation between Module Supply and Periphery Supply	3050 V
Potential isolation between module supply and PROFIBUS DP	700 V
CPU	
Real-time clock for time and date, buffered	
Resolution	1 s
Deviation	+/- 10s/Tag
Max. number of FS tasks	1
Min. cycle time of FS tasks	10 ms
Module's overall RAM memory	64 MB
Program and data memory	1 MB
Removable data medium	
Type	SD card
SafetyNET p	
Application range	Standard/Failsafe
Number	1
Connection	RJ45
Transmission rates	100 MBit/s
Set via	automatic
Max. number of ST-Tx- and ST-Rx connections	5
Max. number of FS-Tx- and FS-Rx connections	5
Cycle time (t _{SNp})	10...60 000 ms
Max. number of variables with elementary ST data types	2500
Max. number of variables with elementary FS data types	2000
IP address (set automatically from)	169.254.X.Y
PROFIBUS DP	
Application range	Standard applications Failsafe applications with local enable principle
Device type	Slave
Station address	0 ... 126d
Set via	DIP switch
Maximum data length of the fieldbus interface: Input	244 Byte
Maximum data length of the fieldbus interface: Output	244 Byte
Maximum data length of the fieldbus interface: Diagnostics	2 Byte
Transmission rates	1.5 MBit/s, 12 MBit/s, 185.5 kBit/s, 19.2 kBit/s, 3 MBit/s, 45.45 kBit/s, 500 kBit/s, 6 MBit/s, 9.6 kBit/s, 93.75 kBit/s
Set via	automatic
Cycle time (t _{ExtCo})	10...300 000 ms
Connection	Female 9-pin D-SUB connector
Protocol	DPV0
Operating modes	AutoBaud, Freeze Mode, Set Slave Address, Sync Mode
Certification	PNO
Description file	Pilz0CB0.gsd
Manufacturer's ID	0CB0h

Head modules

PSSu H m F DP SN SD

Environmental data	
Ambient temperature	0 - 60 °C
Storage temperature	-25 - 70 °C
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Climatic suitability in accordance with EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Bottom	PC
Cross section of external conductors with screw terminals	
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG
Torque setting with screw terminals	0.50 Nm
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 2.50 mm ² , 24 - 12 AWG
Stripping length	9 mm
Dimensions	
Height	125.6 mm
Width	130.0 mm
Depth	83.7 mm
Weight	405 g

Safety characteristic data						
Unit	Operating mode	EN ISO 13849-1 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	t _M [year]
Logic	---	PL e (Cat. 4)	Cat. 4	SIL CL 3	4.14E-09	20

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

The standards current on **2009-07** apply.

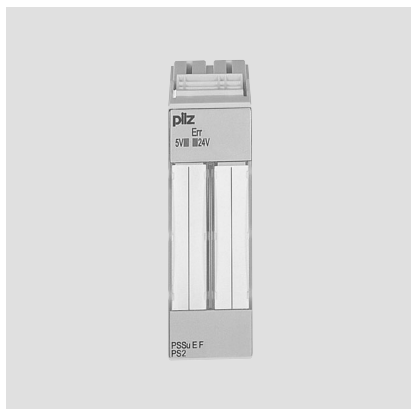
Head modules

PSSu H m F DP SN SD

Order reference

Product type	Features	Order no.
PSSu H m F DP SN SD	Head module with SafetyNET p and PROFIBUS	312 065
PSSu A Con 1/4 S	2 x screw terminals	313 110
PSSu A Con 2/8 C	2 x spring-loaded terminals	313 111

Voltage supply PSSu E F PS2



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

Module features

- ▶ Power supply for max. **1.0 A**
- ▶ When the supply voltage is interrupted, the module supply is buffered for 20 ms.
- ▶ Separate infeed for periphery supply
- ▶ Separate infeed for module supply
- ▶ Infeed for C-rail supply
- ▶ Potential isolation from module supply
- ▶ High EMC immunity
- ▶ For system environment B (automation system PSS 4000)
- ▶ LEDs for:
 - Module supply
 - Periphery supply
 - Module error
- ▶ Coated version of the module:
PSSu E F PS2-T: for increased environmental requirements

Module description

The module may be used in system environment B (automation system PSS 4000).

The module has high immunity and is suitable for use in an industrial environment with a strong electromagnetic field.

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

The module may be used as:

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

The module **PSSu E F PS2-T** is suitable for use where there are increased environmental requirements (see Technical Details).

Integrated protection mechanisms

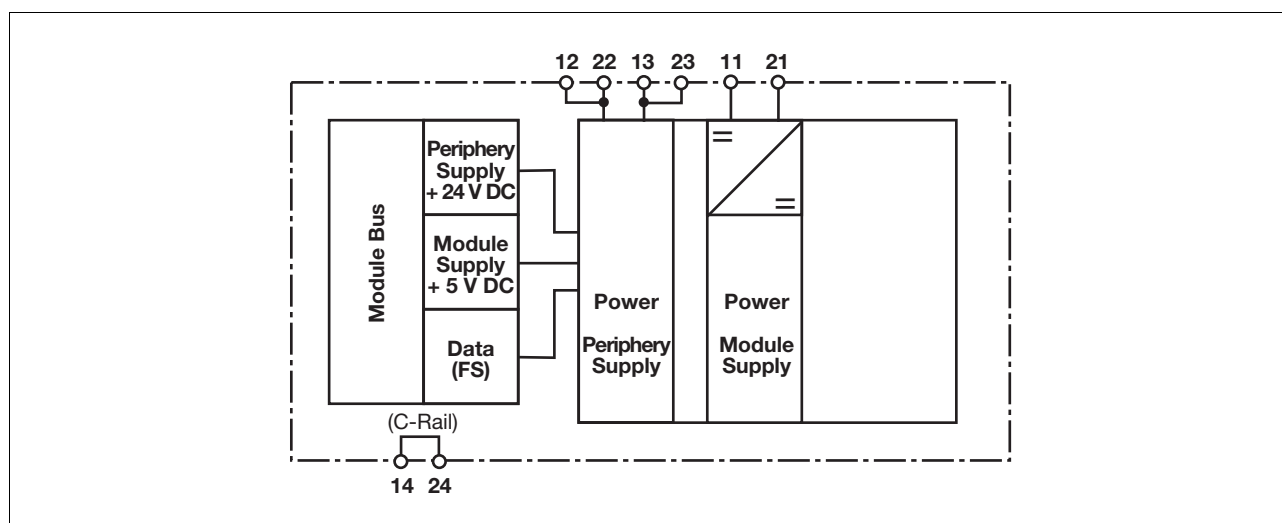
The module has the following protection mechanisms:

- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
 - Potential isolation
- ▶ Module supply
 - Short circuit-proof
- ▶ Periphery supply
 - Voltage monitoring (exceeding upper/lower limit)

The module registers the following errors:

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

Block diagram



Voltage supply PSSu E F PS2

Function description

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

- ▶ **Module supply**
Supply voltage for subsequent module (right-hand side)
- ▶ **Periphery supply**
Supply voltage for sensors, actuators and test pulses
- ▶ **C-rail**
Infeed of the permitted additional supplies for the C-rail; a detailed description of how to use the C-rail can be found in the system description.

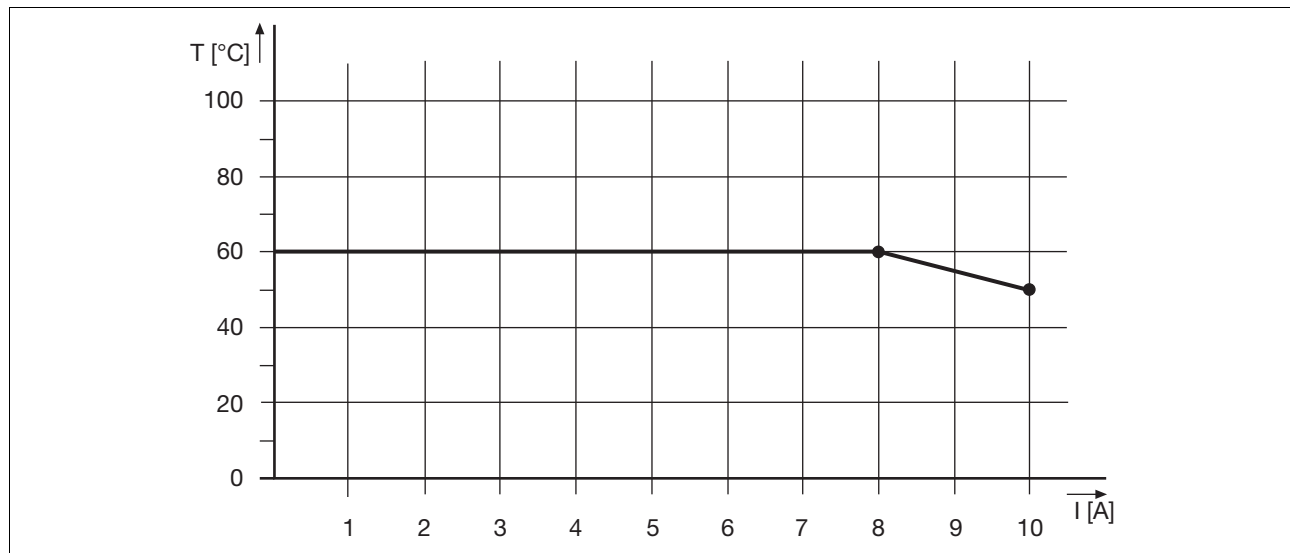
When the supply voltage is fed in separately, the module supply and periphery supply are galvanically isolated. If galvanic isolation is not required, a common power supply may be used for the periphery supply and module supply.

The module enables

- ▶ The module supply and periphery supply to be refreshed:
The relevant base module interrupts the connection to the incoming (left-hand) module supply, periphery supply and C-rail on the module bus. The 0 V supply on the module supply is connected to the left and right.

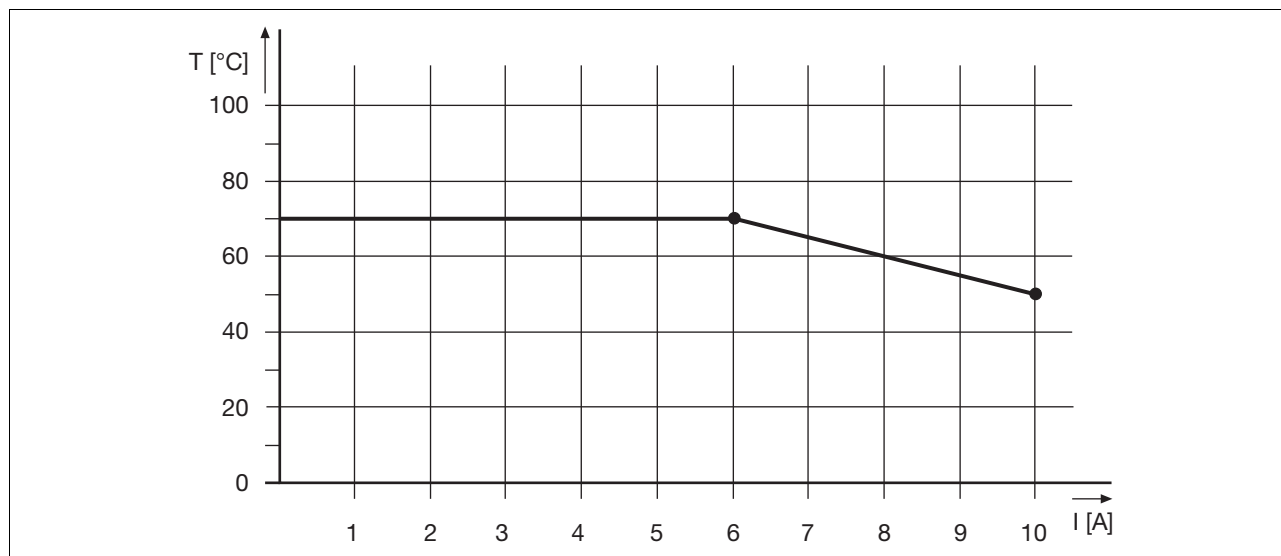
- ▶ **Supply groups to be formed**
The relevant base module interrupts the connection to the incoming (left-hand) periphery supply and C-rail on the module bus. Each supply group requires its own supply module.

PSSu E F PS2: Derating diagram for periphery supply and C-rail: Temperature T dependent on load current I



Voltage supply PSSu E F PS2

PSSu E F PS2-T: Derating diagram for periphery supply and C-rail: Permitted ambient temperature T dependent on load current I

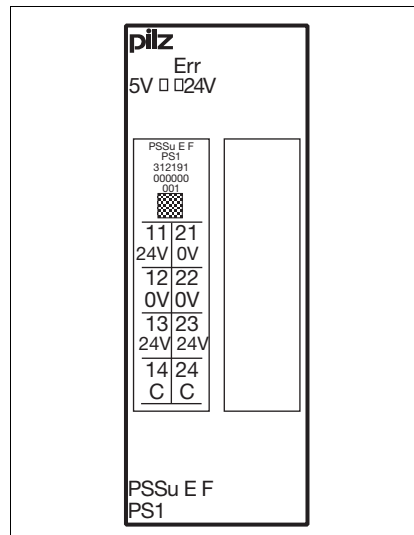


Voltage supply PSSu E F PS2

Wiring

- ▶ Please refer to the technical details regarding the requirements of the supply voltages.
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must comply with the current applicable standard EN 60950-1, EN 61140, EN 50178 or EN 61558-1.
- ▶ The maximum current load for the periphery supply on the module bus is 10 A. Please refer to the derating diagram.
- ▶ The maximum current load for the C-rail is 10 A. Please refer to the derating diagram.
- ▶ Permitted infeed at the C-rail:
 - PE
 - 0 V
 - Shield
 - - 30 VDC ... +30 VDC
 - - 48 VAC ... + 48 VAC
- ▶ Earth the 0 V supply on the periphery supply or monitor each supply group for earth faults.
- ▶ The connection of the 0 V supply to the central earth bar or earth fault monitor must be in accordance with the relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).
- ▶ Minimum range for cable cross sections on connection terminals in mm²:
 - Power supply: 1.5 (AWG16) ... 2.5 (AWG12)
 - Functional earth: 1.5 (AWG16) ... 2.5 (AWG12)
- ▶ Use copper wiring.

Front view



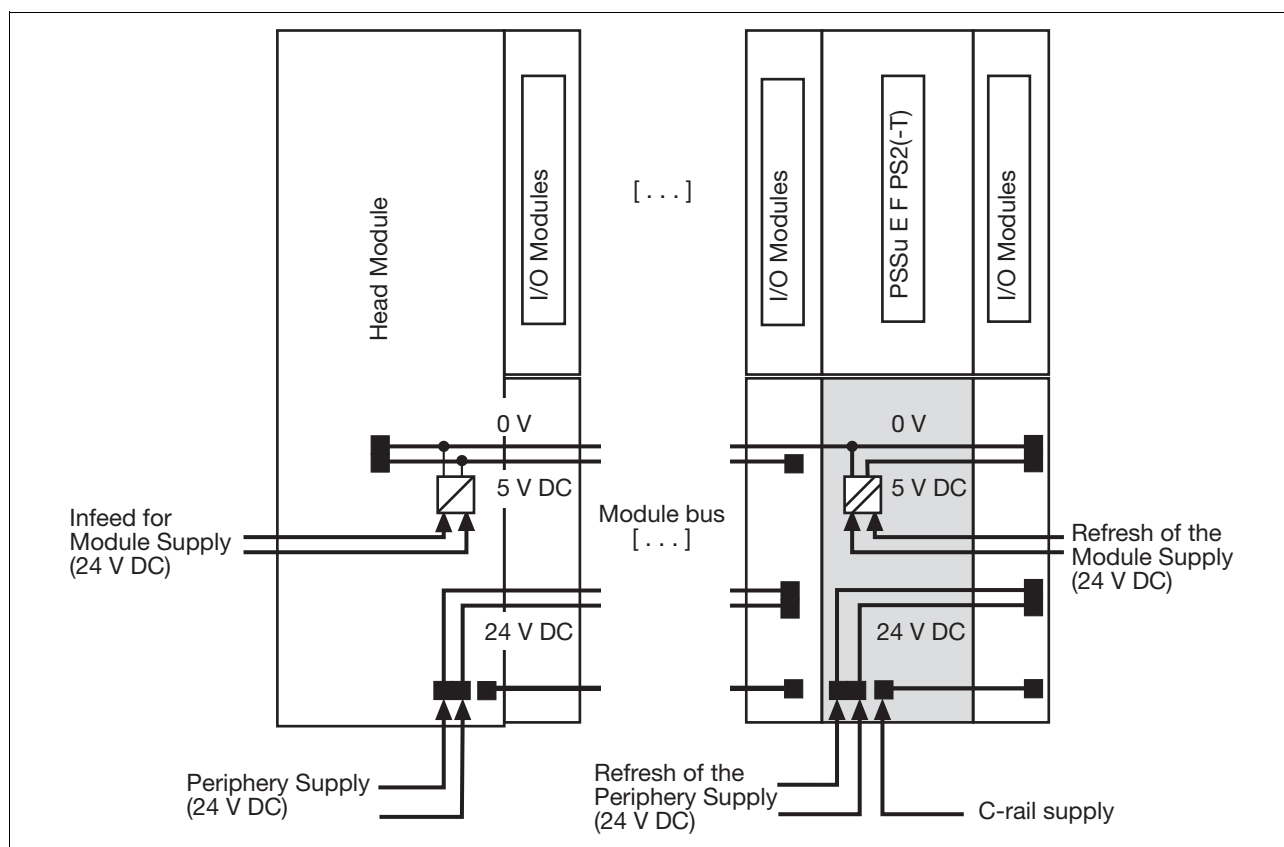
Voltage supply PSSu E F PS2

Terminal configuration

- ▶ For use as a supply module to refresh the module supply and periphery supply
- ▶ For use as a supply module to form supply groups
 - To interrupt the incoming periphery supply and C-rail
 - To provide subsequent modules

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

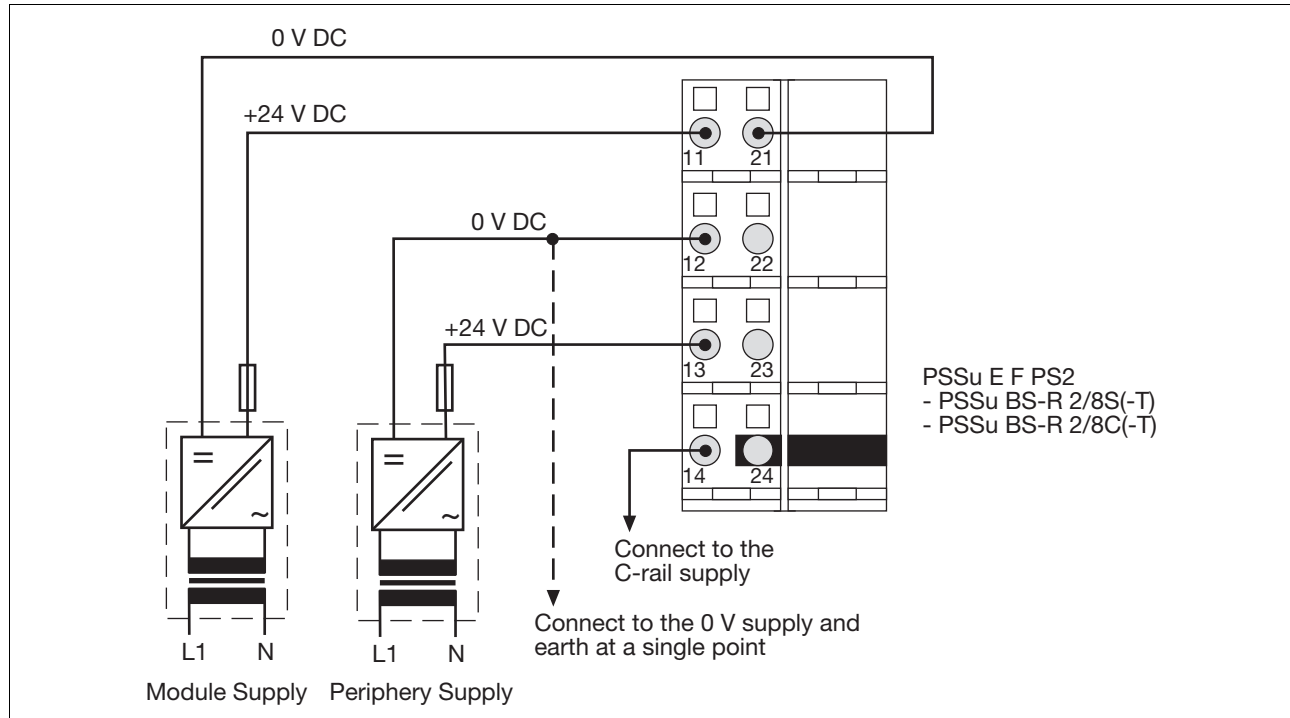
Base module	Terminal configuration	
Screw terminals: PSSu BS-R 2/8S PSSu BS-R 2/8S-T	11: +24 V infeed for module supply, interrupted to the left	
Cage clamp terminals: PSSu BS-R 2/8C PSSu BS-R 2/8C-T	21: 0 V infeed for module supply	
	12-22: 0 V periphery supply, interrupted to the left (12-22 linked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



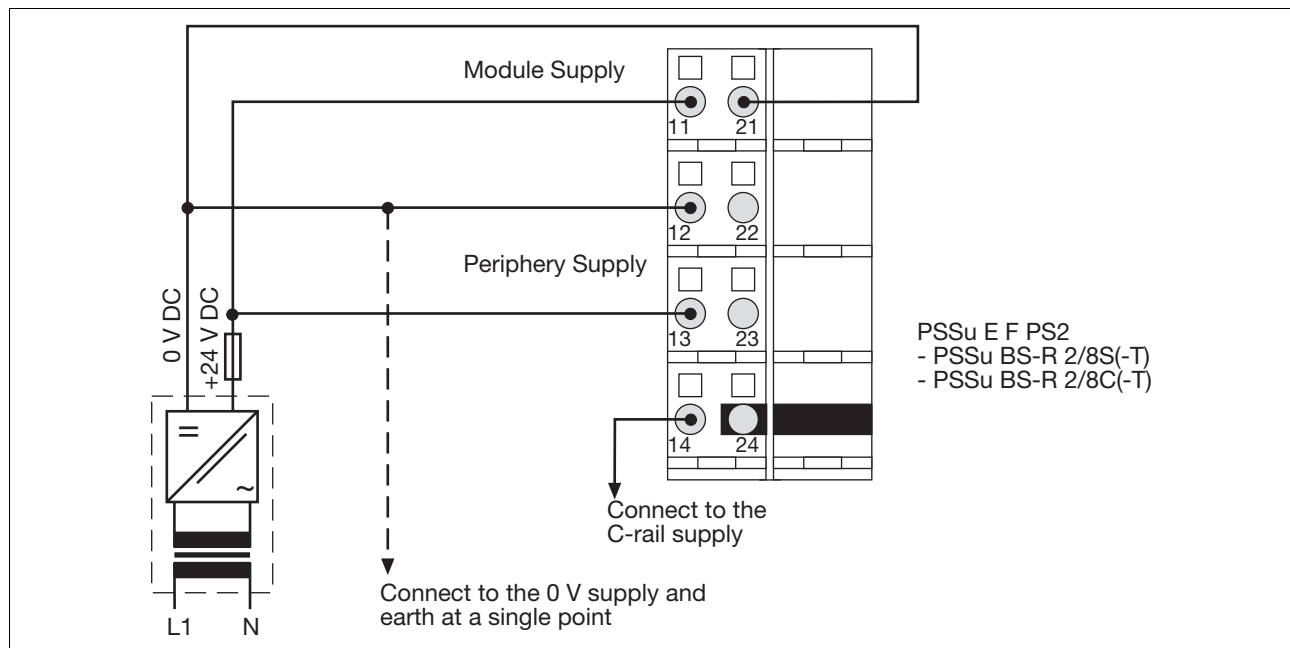
Voltage supply PSSu E F PS2

Connection

Separate power supplies for module supply and periphery supply



Common power supply for module supply and periphery supply



Voltage supply

PSSu E F PS2

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard/Failsafe
Module's device code	0803h
Support in system environment A	no
Support in system environment B	
from head module FS firmware version	1.3.0
from head module ST firmware version	1.3.0
Electrical data	
Infeed for	Module Supply
Voltage	24 V DC
Voltage tolerance	-30 %/+25 %
Output of external power supply (DC)	7.0 W
Max. continuous current that the external power supply must provide	0.5 A
Inrush current that the external power supply must provide	4.0 A
Module's current consumption	40 mA
Module's power consumption	0.20 W
Infeed for	Periphery Supply
Voltage	24 V DC
Voltage tolerance	-30 %/+25 %
Max. continuous current that the external power supply must provide	10.0 A
Voltage output	Module Supply
Voltage	5 V DC
Voltage tolerance	-2 %/+3 %
Current load capacity	1.0 A
Buffer in the case of supply interruptions in accordance with	DIN V EN V 1954, EN 61131-2, EN 61496-1
Short circuit-proof	yes
Potential isolation between Module Supply and Periphery Supply	3050 V
Max. power dissipation of the module	2.00 W
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature	0 - 60 °C -40 - 70 °C coated version (-T)
Storage temperature	-25 - 70 °C -40 - 70 °C coated version (-T)
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no yes coated version (-T)
Max. operating height above sea level	5000 m coated version (-T)
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 55 Hz
Max. acceleration	1g

Voltage supply PSSu E F PS2

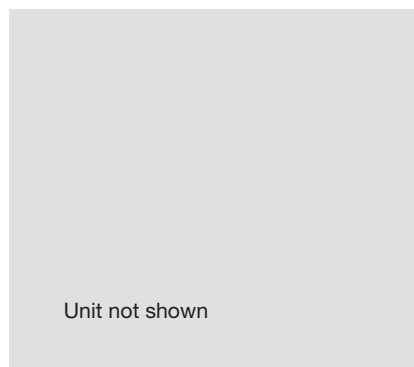
Environmental data	
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Terminals	IP 20
Airgap creepage in accordance with EN 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Front	PC
Bottom	PC
Coding	PA
Dimensions	
Height	76.0 mm
Width	25.4 mm
Depth	60.2 mm
Weight	51 g
Mechanical coding	
Type	B
Colour	yellow

Order reference	
Description	Order no.
PSSu E F PS2 (Electronic module)	312 192
PSSu E F PS2-T (Electronic module, coated version)	314 192

Base modules	Order no.
PSSu BS-R 2/8S (Base module with screw terminals, for use only to refresh the voltage and form supply groups)	312 654
PSSu BS-R 2/8S-T (Base module with screw terminals, for use only to refresh the voltage and form supply groups, coated version)	314 654
PSSu BS-R 2/8C (Base module with cage clamp terminals, for use only to refresh the voltage and form supply groups)	312 655
PSSu BS-R 2/8C-T (Base module with cage clamp terminals, for use only to refresh the voltage and form supply groups, coated version)	314 655

Counter modules (failsafe)

PSSu K F INC



Compact module for direct connection of an incremental encoder

Approvals

	PSSu K F INC
	◆
	◆
	◆

Module features

- ▶ Inputs for
 - Counter pulses (inputs A, B)
 - Zero pulse (Input C)
 - Stopping the counter (Input G, Gate)
 - Memory function (Input L, Latch)
 - Rotary encoder status (Input S, Status)
- ▶ Resolution of the counter and latch memory: **32 Bit**
- ▶ Operating modes:
 - Incremental encoder
 - Counter
- ▶ Inputs A, B, C are operated as differential inputs with inverted signals (A-, B-, C-).
- ▶ LEDs for:
 - Data transfer per input A, B, C
 - Status per functional input (Gate, Latch, Status)
 - Module error
 - Sensor supply
- ▶ For failsafe applications in system environment B (automation system PSS 4000)

Module description

With the counter module you can implement the following safety functions: Monitoring of:

- ▶ Position
- ▶ Speed
- ▶ Standstill

To guarantee safety integrity you must use

- ▶ 2 sensors and
- ▶ 2 counter modules: a PSSu E F INC and a PSSu E F ABS SSI and
- ▶ the function blocks
FS_IncrementalEncoder,
FS_AbsoluteEncoder and
FS_CounterDual

With redundant and diverse input values **PL e (Cat. 4)** and **SIL CL 3** can be achieved.

Requirements of the PSSu system:

- ▶ The counter modules must be part of a control system PSSu PLC or PSSu multi (not decentralised I/O system).
- ▶ The function blocks have to be assigned to the FS resource of the PSSu system where the counter modules are inserted. Control via SafetyNet is not permitted.

Demands on the sensors:

- ▶ Incremental encoders with RS422 interfaces may be used as sensors.
- ▶ Connect the sensors mechanically independently to the axis. If this is not possible, the connection should be positive-locking without wearing parts as e.g. chains or drive belts. If it is not possible to avoid this, the mechanical connection of the sensors must be monitored. Alternatively, it is possible to use a sensor that internally has 2 independent measured value recording systems.

Please note during configuration and within the user program:

- ▶ The input values must be diverse. This can be achieved through different
 - Scaling
 - Direction of rotation/count direction
 - Offset
- ▶ If more than two counters are used, each individual counter module of a PSSu system must supply diverse input values to the other counter modules of the PSSu system.
- ▶ Safe standstill monitoring must be carried out by feasibility with a safe travel command in the function block.
- ▶ Test the safety functions when commissioning or recommissioning.

Integrated protection mechanisms

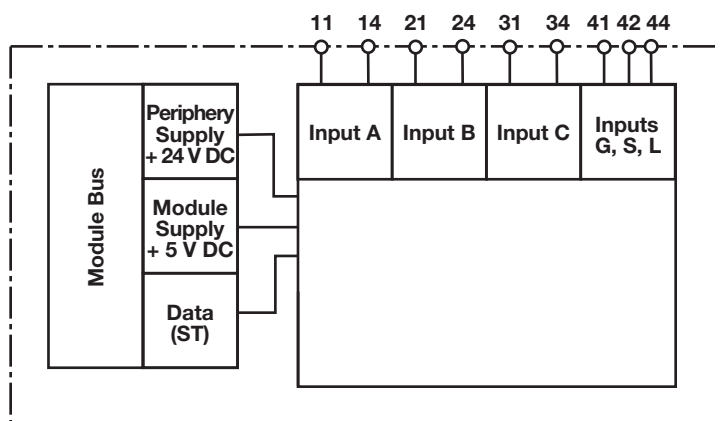
When the PSSu E F PS1(-T) is used to supply the system, the module supply is buffered for 20 ms if the supply voltage is interrupted.

The module provides the following diagnostic data:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error
- ▶ Temperature error

Counter modules (failsafe)

PSSu K F INC

Block diagram

Counter modules (failsafe)

PSSu K F INC

Function description

Module supply

- ▶ The module supply provides the module with voltage.

The module has two operating modes:

- ▶ Incremental encoder (default)
- ▶ Counter

In incremental encoder mode the module evaluates inputs A and B. In counter mode, only the rising edges at input A are counted. The user can define the operating modes and any additional options using the system software

In both operating modes, the counter status and the status of the latch memory are each transmitted to the head module via the module bus with a 32 bit data word. The module sends additional status information.

The module has three dual-pole, differential inputs (A, B, C) and three single-pole inputs referenced to earth (G, L, S). Signals with ± 5 V are connected to the dual-pole inputs in accordance with RS 422.

The single-pole inputs are used for special functions. Inputs G and L may be connected to external signal sources, e.g. to a higher order control system.

- ▶ Input G (gate input)
The counter is stopped with a 1 signal.
- ▶ Input L (input for external latch pulse)
At a rising edge, the module stores the current counter value in the latch memory upon request.
- ▶ Input S (input for external status)
The encoder's fault signal output can be connected to the status input. The module transmits the input status to the head module with the status information.

Additional module functions:

- ▶ Counter overflow
- ▶ Period length measurement
The resolution is 200 ns.
- ▶ Set counter status

Incremental encoder operating mode

The counter outputs and the output for the incremental encoder's zero pulse are connected to the dual-pole inputs.

- ▶ Inputs A, B
The first channel of the encoder is connected to input A, the second to input B.
- ▶ Input C
The output for the incremental encoder's zero pulse is connected to input C. Upon request, the module stores the counter value at the time of the zero pulse in the latch memory.

Counter operating mode

In counter mode the module's dual-pole differential inputs A, B, C have different functions to those of incremental encoder mode.

- ▶ Input A (Count)
Input A is used to connect the counter pulses.
- ▶ Input B (Up/down)
At a 0 signal the module counts forwards. At a 1 signal the module counts backwards.
- ▶ Input C (Gate/Latch)
The counter is stopped with a 1 signal. Upon request, the module stores the current counter value in the latch memory.

The single-pole inputs have the same function in both operating modes.

Wiring

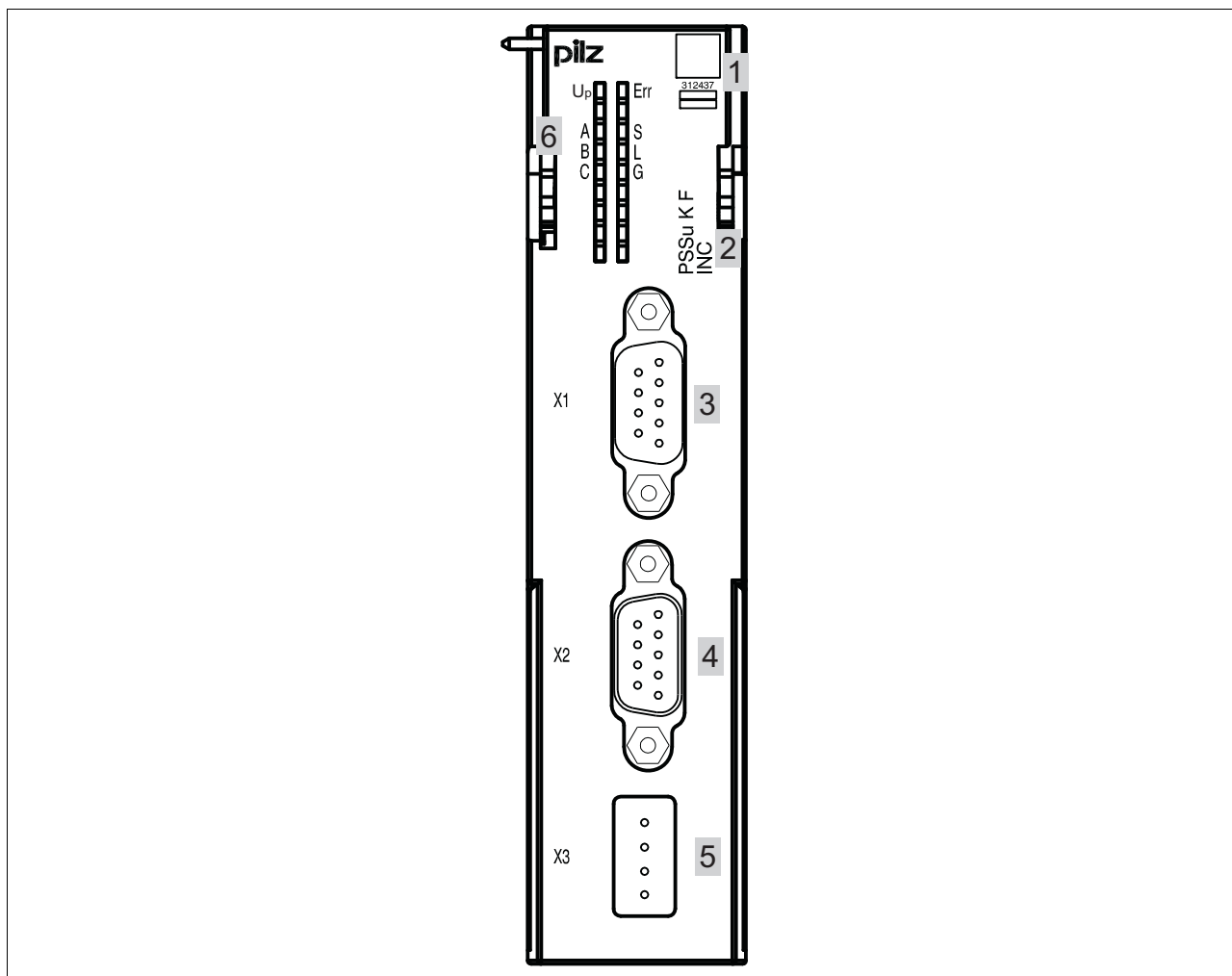
- ▶ The module's connections are galvanically isolated from the module supply and periphery supply.
- ▶ For EMC reasons we recommend that you operate inputs A, B, C exclusively as differential inputs with inverted signals (A+/A-, B+/B-, C+/C-).
- ▶ The module evaluates open differential inputs (A+/A-, B+/B-, C+/C-) as a 1 signal.
- ▶ The module evaluates open function inputs (G, L, S) as a 0 signal.
- ▶ Use twisted pair cables to carry the inverted signals. This will increase the noise immunity.
- ▶ Use shielded signal cables with metallic plugs. The screening should be connected to the housing of the D-Sub connector.

- ▶ The channel for the incremental encoder's zero pulse has a different designation depending on the manufacturer (N, C, Z, 0,...)
- ▶ The supply voltages must be extra low voltages with safe electrical separation (PELV or SELV) in accordance with VDE 0100, Part 410.
- ▶ Use copper wiring.
- ▶ Connect the two sensors via separate cables. This also applies to compact encoders.

Counter modules (failsafe)

PSSu K F INC

Front view



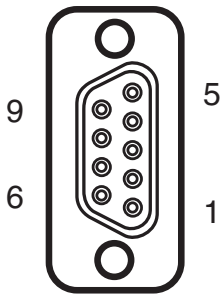
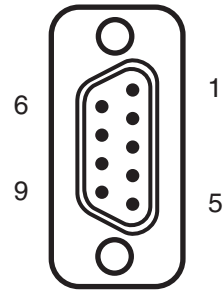
Key:

- ▶ 1: Labelling strip with:
 - 2D code
 - Order Number
 - Serial Number
 - Hardware version number
- ▶ 2: Name of compact module
- ▶ 3: Female 9-pin D-Sub connector X1
- ▶ 4: Male 9-pin D-Sub connector X2
- ▶ 5: Male 4-pin connector X3
- ▶ 6: LEDs for status display and module diagnostics

Counter modules (failsafe)

PSSu K F INC

Interface configuration

Connection encoder signals	Layout	
Female 9-pin D-Sub connector	X1 1: C+ 2: B+ 3: A+ 4: n. c. 5: 0 V counter 6: C- 7: B- 8: A- 9: U _p (+5 V for sensor)	
Connection control	Layout	
Male 9-pin D-Sub connector	X2 1: C+ 2: B+ 3: A+ 4: n. c. 5: 0 V counter 6: C- 7: B- 8: A- 9: U _p (+5 V for sensor)	
Connection functional outputs input devices	Layout	
4-pin connector	X3 1: 0 V 2: Status S 3: Latch L 4: Gate G	

n.c. = not connected

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Failsafe
Module's device code	0324h
Number of ST input bits	64
Number of ST output bits	32
Number of ST status bits	8
Number of ST control bits	8
Support in system environment A	no
Support in system environment B	yes
from head module FS firmware version	1,0,0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	157 mA
Module's power consumption	0.79 W

Counter modules (failsafe)

PSSu K F INC

Electrical data	
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption with no load	15 mA
Module's power consumption with no load	0.37 W
Max. power dissipation of the module	1.20 W
Counter interface	
Number of counter inputs	1
Type of counter inputs	Incremental encoder
Max. number of bits on the counter input	32 Bit
Evaluation of counter pulses	1x, 2x, 4x
Maximum threshold frequency	5.0 MHz
Phase offset between differential signals A and B	90 deg
Phase offset tolerance	30 deg
Signal at counter inputs A and B and/or C	Differential signal (RS 422)
Time constant of input filter on LATCH signal	50 µs
Time constant of input filter on GATE signal	50 µs
Time constant of input filter on STATUS signal	50 µs
Permitted low signal range on LATCH/GATE/STATUS signals	-3 - 5 V
Permitted high signal range on LATCH/GATE/STATUS signals	11 - 30 V
Typ. input current of the LATCH and/or GATE and/or STATUS signals at low level	0 mA
Typ. input current of the LATCH and/or GATE and/or STATUS signals at high level	4.0 mA
Potential isolation between input/output and periphery supply	yes
Potential isolation between input/output and voltage for the internal module bus	yes
Typ. processing time	0.1 ms
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-4
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz, 10 - 55 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g
	11 ms
EN 60068-2-29	10g
	16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with IEC 60664-1	
Overvoltage category	II
Pollution degree	2
Mechanical data	
Housing material	
Top	PC
Bottom	PC

Counter modules (failsafe)

PSSu K F INC

Mechanical data

Dimensions	
Height	128.9 mm
Width	30.0 mm
Depth	56.0 mm
Weight	90 g

The standards current on **2005-04** apply.

Safety characteristic data

Unit	Operating mode	EN ISO 13849-1: 2006 PL	EN 954-1 Category	EN IEC 62061 SIL CL	PFH [1/h]	EN ISO 13849-1: 2006 T _M [year]
		PL e (Cat. 4)	Cat. 4	SIL CL 3	3.34E-09	20

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

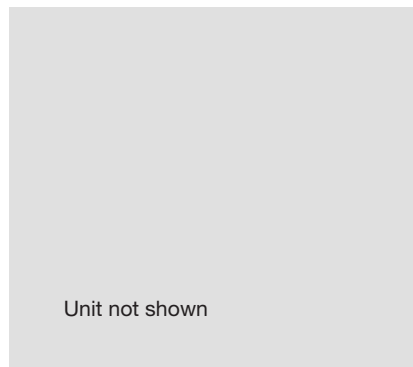
Order reference

Designation	Order no.
PSSu K F INC (Compact module without connector, labelling bracket and labelling strips)	312 437

Accessories	Order no.
PSSu A Con 1/10 C, scope of supply: 2 pieces Connector with spring-loaded terminals 1-row/10-pin	313 115
PSSu A Con 3/30 C, scope of supply: 2 pieces Connector with spring-loaded terminals 3-row/30-pin	313 116
PSSu A Con 4 S, (connector with screw terminals 4-pin)	313 117
PSSu A Con 4 C, (connector with spring-loaded terminals 4-pin)	313 118
PSSu A LC 0.1, scope of delivery: 5 pieces (labelling bracket)	312 966
PSSu A LA0, scope of delivery: 1080 pieces (10 x DIN A4 sheet, 108 on each) (Labelling strips, laser printable)	312 958

Serial interfaces (standard)

PSSu K S RS232



Compact module with a serial interface for standard applications

Approvals

	PSSu K S RS232
	◆
	◆
	◆

Module features

- ▶ Serial interface: RS232
- ▶ Communication channels: 2 (Tx/Rx, full duplex)
- ▶ Configurable transmission rates
- ▶ Receive buffer: 1023 Byte
- ▶ Send buffer: 127 Byte
- ▶ Max. number per system: 6
- ▶ LEDs for:
 - Operational readiness
 - Module error
 - Data transmission
- ▶ Male D-Sub connector
- ▶ For standard applications in system environment B (automation system PSS 4000)

Integrated protection mechanisms

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

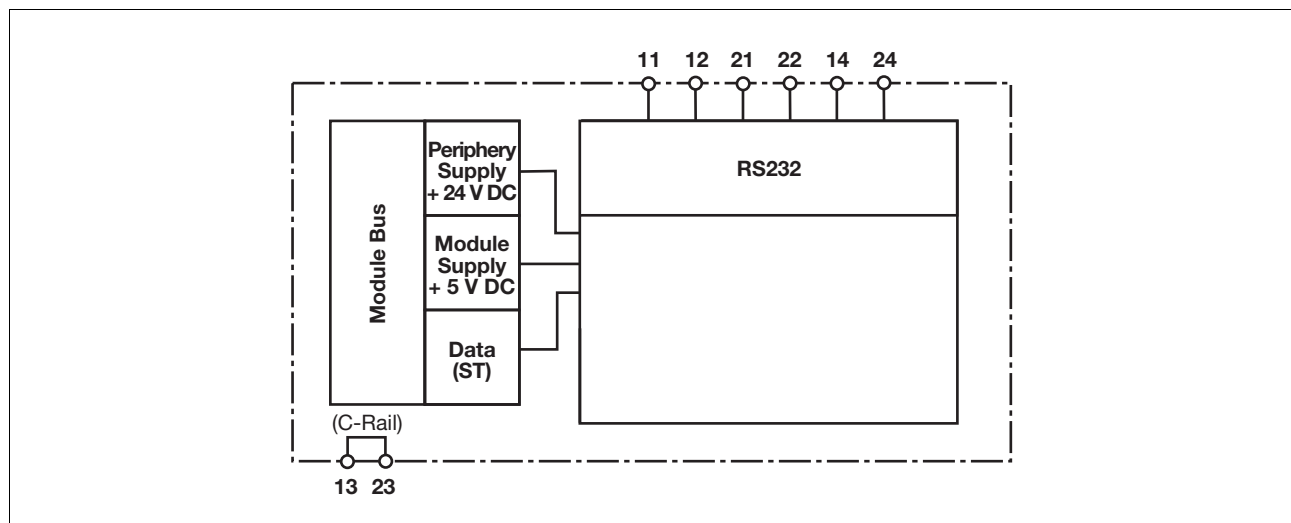
The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Module description

The module provides a serial interface. It is designed for communication in non-safety-related applications in system environment B (automation system PSS 4000).

Block diagram



Serial interfaces (standard)

PSSu K S RS232

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The periphery supply provides the serial interface with voltage.

Signal processing

- ▶ In each cycle, a max. of 8 Bytes of data can be transferred in both directions between control system and module. The data to be transferred is stored temporarily in a send and receive buffer.
- ▶ Two additional status bytes and control bytes are available in the process image for data exchange

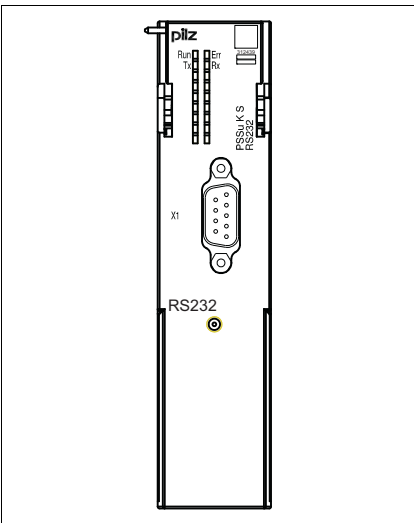
between control system and module.

- ▶ All the configuration data is stored in the head module and is assigned to the module on restart. This way the configuration data is retained even if you change the module.

Schematic representation of signal processing with the PSSu PLC/PSSu multi control system:



Front view



Interface configuration

RS 232	Layout	X1
Male D-Sub connector	1: n.c. 2: Input Rx (receive data) 3: Output Tx (send data) 4: n.c. 5: GND 6: n.c. 7: Output RTS 8: Input CTS 9: n.c.	

n.c. = not connected

Serial interfaces (standard)

PSSu K S RS232

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0720h
Support in system environment A	no
Support in system environment B	yes
from head module ST firmware version	1,0,0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	125 mA
Module's power consumption	0.63 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption	20 mA
Module's power consumption	0.48 W
Max. power dissipation of the module	1.20 W
Serial interface	
Number of RS232 interfaces	1
Transmission rate (configurable)	1.2 kBit/s, 19.2 kBit/s, 2.4 kBit/s, 300 Bit/s, 4.8 kBit/s, 600 Bit/s, 9.6 kBit/s
Max. cable run	15 m
Size of receive buffer	1,023 Byte
Size of send buffer	127 Byte
Potential isolation between interface and Module Supply	yes
Potential isolation between interface and Periphery Supply	yes
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	no
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10 - 150 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 61131-2, IEC 60664-1	
Overvoltage category	II
Pollution degree	2

Serial interfaces (standard)**PSSu K S RS232****Mechanical data**

Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.9 mm
Width	30.0 mm
Depth	56.0 mm
Weight	81 g

The standards current on **2009-03** apply.

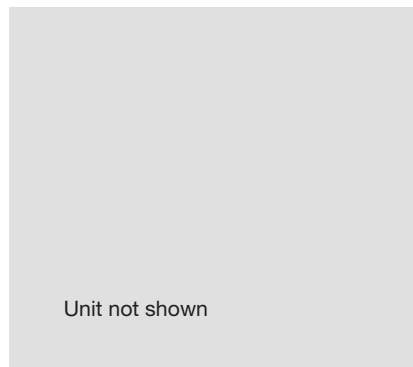
Order reference

Description	Order no.
PSSu K S RS232 (Compact module without connector, labelling bracket and labelling strips)	312 439

Accessories

Accessories	Order no.
PSSu A Con 1/10 C, Scope of delivery: 2 pieces (Connector with spring-loaded terminals, 1-row/10-pin)	313 115
PSSu A Con 3/30 C, Scope of delivery: 2 pieces (Connector with spring-loaded terminals, 3-row/30-pin)	313 116
PSSu A LC 0.1, Scope of delivery: 5 pieces (Labelling bracket)	312 966
PSSu A LA0, Scope of delivery: 1080 pieces (10 x DIN A4 sheet, 108 on each) (Labelling strips, laser printable)	312 958

Serial interfaces (standard) PSSu K S RS232 Modbus ASCII



Compact module with a serial interface for standard applications

Approvals

	PSSu K S RS232 Modbus ASCII
	◆
	◆
	◆

Module features

- ▶ Serial interface: RS232
- ▶ Communication channels: 2 (Tx/Rx, full duplex)
- ▶ Configurable transmission rates
- ▶ Receive buffer: 1023 Byte
- ▶ Send buffer: 127 Byte
- ▶ Max. number per system: 6
- ▶ Data exchange based on the Modbus ASCII protocol
- ▶ LEDs for:
 - Operational readiness
 - Module error
 - Data transmission
- ▶ Male D-Sub connector
- ▶ For standard applications in system environment B (automation system PSS 4000)

Integrated protection mechanisms

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

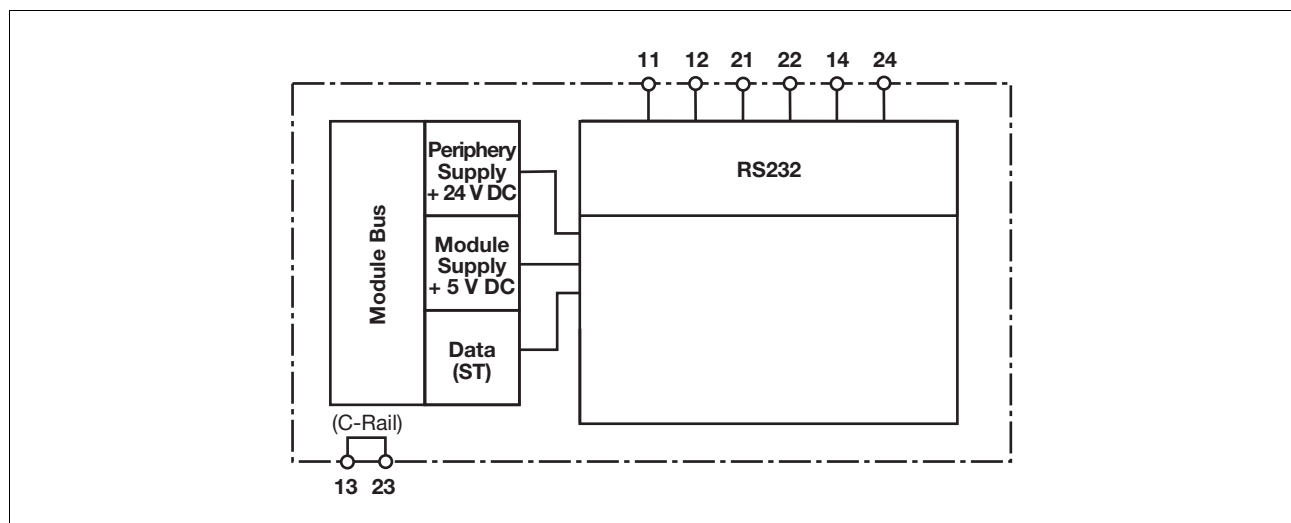
The module detects the following errors:

- ▶ Start-up error
- ▶ Configuration error
- ▶ ST communication error
- ▶ Bus termination error

Module description

The module provides a serial interface. It is designed for communication in non-safety-related applications in system environment B (automation system PSS 4000).

Block diagram



Serial interfaces (standard) PSSu K S RS232 Modbus ASCII

Function description

Module supply

- ▶ The module supply provides the module with voltage.

Periphery supply

- ▶ The periphery supply provides the serial interface with voltage.

Signal processing

- ▶ In each cycle, a max. of 8 Bytes of data can be transferred in both directions between control system

and module. The data to be transferred is stored temporarily in a send and receive buffer.

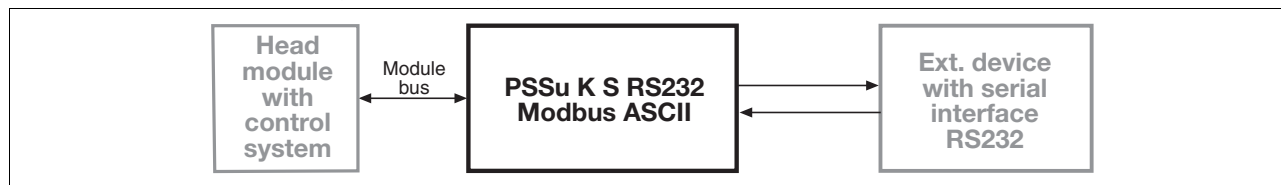
- ▶ Two additional status bytes and control bytes are available in the process image for data exchange between control system and module.
- ▶ All the configuration data is stored in the head module and is assigned to the module on restart. This way

the configuration data is retained even if you change the module. Data is exchanged between subscribers via a special protocol based on the Modbus ASCII protocol.

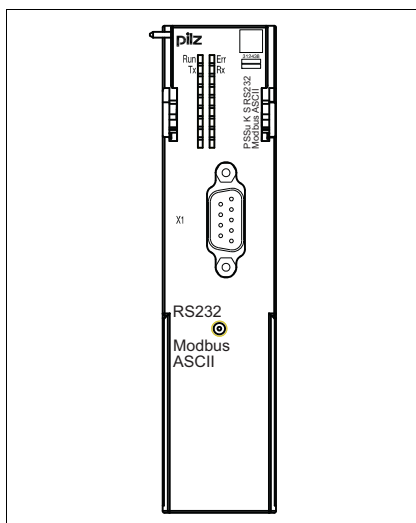
INFORMATION

The necessary function block is available from Technical Support (telephone: +49 711 3409-444).

Schematic representation of signal processing with the control system PSSu PLC/PSSu multi:



Front view



Interface configuration

RS 232	Layout	X1
Male D-Sub connector	1: n.c. 2: Input Rx (receive data) 3: Output Tx (send data) 4: n.c. 5: GND 6: n.c. 7: Output RTS 8: Input CTS 9: n.c.	

n.c. = not connected

Serial interfaces (standard)

PSSu K S RS232 Modbus ASCII

Notice

This data sheet is only intended for use during configuration. Please refer to the operating manual for installation and operation.

Technical details	
Application range	Standard
Module's device code	0720h
Support in system environment A	no
Support in system environment B	yes
from head module ST firmware version	1.0.0
Electrical data	
Internal supply voltage (module supply)	
Supply voltage range of module supply	4.8 - 5.4 V
Module's current consumption	125 mA
Module's power consumption	0.63 W
Periphery's supply voltage (periphery supply)	
Voltage range	16.8 - 30.0 V
Module's current consumption	20 mA
Module's power consumption	0.48 W
Max. power dissipation of the module	1.20 W
Serial interface	
Number of RS232 interfaces	1
Transmission rate (configurable)	1.2 kBit/s, 19.2 kBit/s, 2.4 kBit/s, 300 Bit/s, 4.8 kBit/s, 600 Bit/s, 9.6 kBit/s
Max. cable run	15 m
Size of receive buffer	1,023 Byte
Size of send buffer	127 Byte
Potential isolation between interface and Module Supply	yes
Potential isolation between interface and Periphery Supply	yes
Environmental data	
Climatic suitability	EN 60068-2-14, EN 60068-2-1, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78
Ambient temperature in accordance with EN 60068-2-14	0 - 60 °C
Storage temperature in accordance with EN 60068-2-1/-2	-25 - 70 °C
Climatic suitability in accordance with EN 60068-2-30, EN 60068-2-78	93 % r. h. at 40 °C
Condensation	not permitted
Max. operating height above sea level	2000 m
EMC	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61131-2
Vibration to EN 60068-2-6	
Frequency	10.0 - 150.0 Hz
Max. acceleration	1g
Shock stress	
EN 60068-2-27	15g 11 ms
EN 60068-2-29	10g 16 ms
Protection type in accordance with EN 60529	
Mounting (e.g. cabinet)	IP54
Housing	IP20
Airgap creepage in accordance with EN 61131-2, IEC 60664-1	
Overvoltage category	II
Pollution degree	2

Serial interfaces (standard)

PSSu K S RS232 Modbus ASCII

Mechanical data	
Housing material	
Front	PC
Bottom	PC
Dimensions	
Height	128.9 mm
Width	30.0 mm
Depth	56.0 mm
Weight	81 g

The standards current on **2009-03** apply.

Order reference	
Description	Order no.
PSSu K S RS232 Modbus ASCII (Compact module without connector, labelling bracket and labelling strips)	312 438

Accessories	Order no.
PSSu A Con 1/10 C, Scope of delivery: 2 pieces (Connector with spring-loaded terminals, 1-row/10-pin)	313 115
PSSu A Con 3/30 C, Scope of delivery: 2 pieces (Connector with spring-loaded terminals, 3-row/30-pin)	313 116
PSSu A LC 0.1, Scope of delivery: 5 pieces (Labelling bracket)	312 966
PSSu A LA0, Scope of delivery: 1080 pieces (10 x DIN A4 sheet, 108 on each) (Labelling strips, laser printable)	312 958