

PSSu H m F DP ETH SD



Control system PSSuniversal multi

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SD means Secure Digital.

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1.1 Validity of the documentation

This documentation is valid for the product type **PSSu H m F DP ETH SD**. It is valid until new documentation is published.

Please also refer to the following documents:

- ▶ PSS4000 System Description
- ▶ PSSuniversal Installation Manual

This operating manual explains the function and operation, describes the installation and provides guidelines on how to connect the product.

1.1.1 Retaining the documentation

This documentation is intended for instruction and should be retained for future reference.

1.2 Overview of documentation

1 Introduction

The introduction is designed to familiarise you with the contents, structure and specific order of this manual.

2 Overview

This chapter provides information on the product's most important features.

3 Safety

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

4 Function Description

This chapter describes the product's functions.

5 Installation

This chapter explains how to install the product.

6 Interfaces

This chapter describes the product's interfaces.

7 Wiring

This chapter describes the product's wiring.

8 Operation

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

9 Technical Details

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

1.3 Definition of symbols

Information that is particularly important is identified as follows:



DANGER!

This warning must be heeded! It warns of a hazardous situation that poses an immediate threat of serious injury and death and indicates preventive measures that can be taken.



WARNING!

This warning must be heeded! It warns of a hazardous situation that could lead to serious injury and death and indicates preventive measures that can be taken.



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



NOTICE

This describes a situation in which the unit(s) could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.



INFORMATION

This gives advice on applications and provides information on special features.

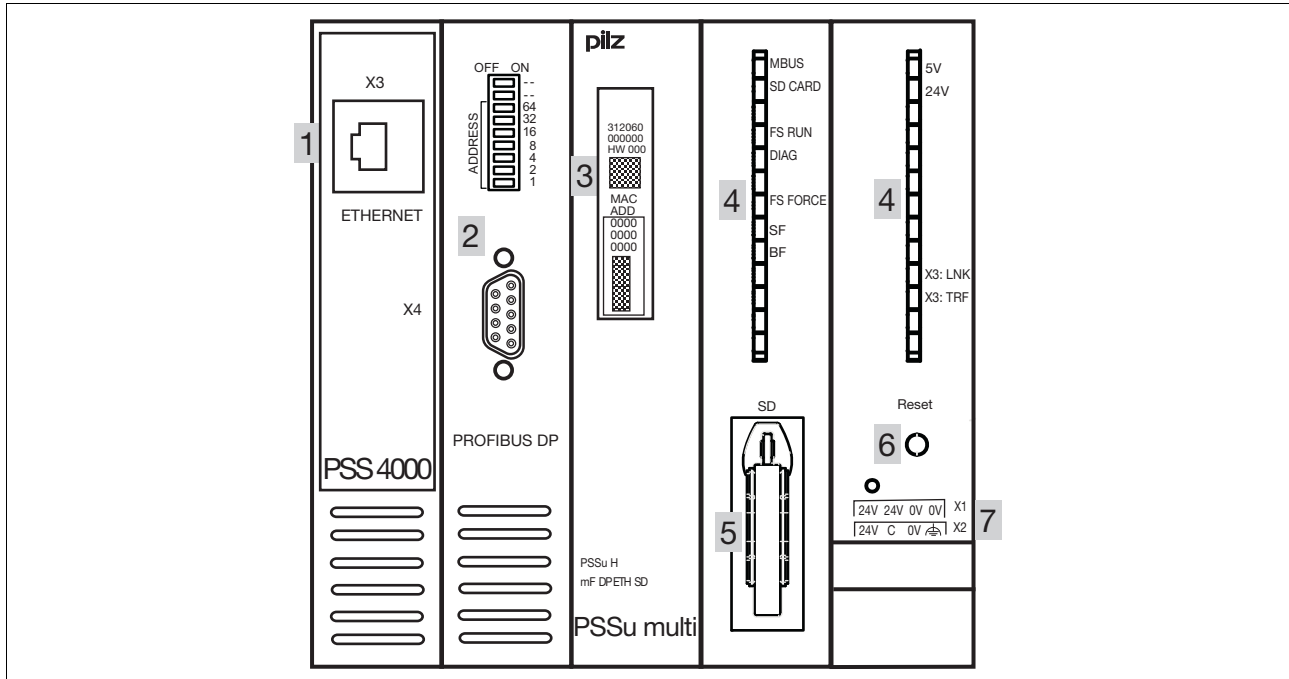
1 Introduction

2.1 Module features

The head module belongs to the performance class "Control system PSSu multi". The head module has the following features:

- ▶ Ethernet interface for
 - 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

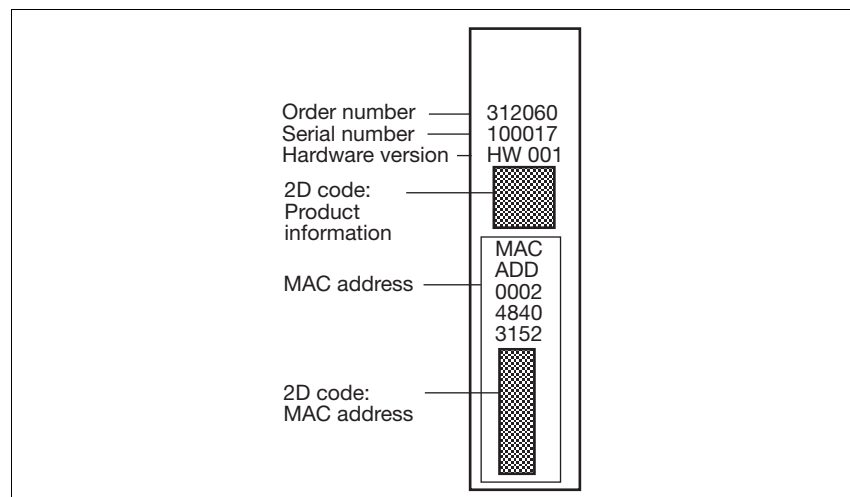
2.2 Front view



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:



3.1 Intended use

The module is designed for use in:

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

Intended use includes making the electrical installation EMC-compliant. Please refer to the guidelines stated in the "PSSuniversal Installation Manual". The module is designed for use in an industrial environment. It is not suitable for use in a domestic environment, as this can lead to interference.

The following is deemed improper use in particular:

- ▶ Any component, technical or electrical modification to the module
- ▶ Use of the module outside the areas described in this manual
- ▶ Use of the module outside the technical details (see chapter entitled "Technical Details")



INFORMATION

The module is supported by PAS4000 from Version 1.5.0. We recommend that you always use the latest version (download from www.pilz.de).

3.2 Safety regulations

3.2.1 Use of qualified personnel

The products may only be assembled, installed, programmed, commissioned, operated, maintained and decommissioned by competent persons.

A competent person is someone who, because of their training, experience and current professional activity, has the specialist knowledge required to test, assess and operate the work equipment, devices, systems, plant and machinery in accordance with the general standards and guidelines for safety technology.

It is the company's responsibility only to employ personnel who:

- ▶ Are familiar with the basic regulations concerning health and safety / accident prevention
- ▶ Have read and understood the safety guidelines given in this description
- ▶ Have a good knowledge of the generic and specialist standards applicable to the specific application.

3.2.2 Warranty and liability

All claims to warranty and liability will be rendered invalid if:

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

3.2.3 Disposal

- ▶ In safety-related applications, please comply with the mission time t_M in the safety-related characteristic data.
- ▶ When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

4.1 Module features

4.1.1 Control system

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.

4.1.2 Supply voltage

4.1.2.1 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 "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.

4.1 Module features

4.1.2.2 Current load capacity

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

► **Module supply**

The current load is the total current consumption of all the electronic and compact modules.

The module supply does not automatically switch off if values exceed or drop below their limits. However, the "5 V" LED will light and a message will be entered in the diagnostic list.

► **Periphery supply**

The current load is the total current consumption of the sensors, actuators and test pulses supplied via the input/output modules.

The periphery supply does not automatically switch off if values exceed or drop below their limits. However, the "24 V" LED will light and a message will be entered in the diagnostic list.

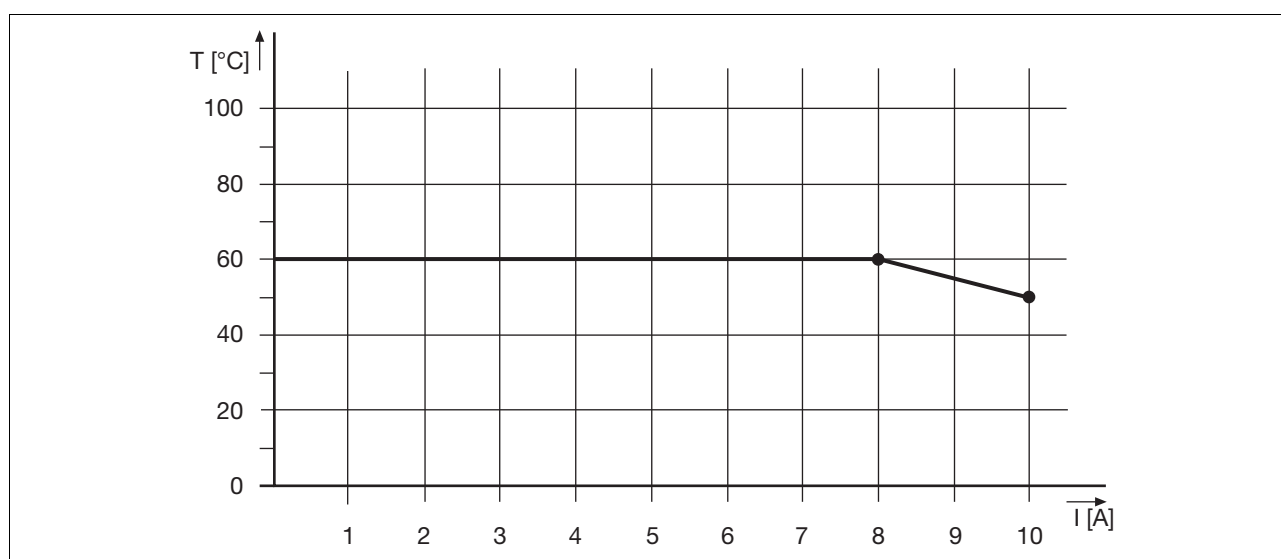
Please refer to the derating diagram.

► **C-rail**

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

Please refer to the derating diagram.

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



4.1 Module features

4.1.3 Integrated protection mechanisms

The module has the following protection mechanisms:

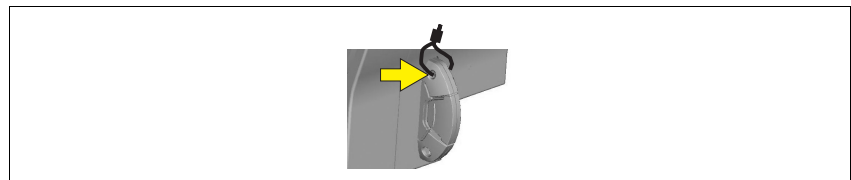
- ▶ Multi-channel diverse processor section
- ▶ Cyclical self tests
- ▶ Potentially isolated PROFIBUS DP interface
- ▶ Infeed for module supply
 - Polarity protection
 - Voltage monitoring
 - Transient voltage limitation
 - 20 ms voltage buffer if the supply voltage is interrupted
- ▶ Module supply
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

4.1.4 SD card

The SD card has the following functions:

- ▶ The SD card is used to store the naming data and the device project; see PSS 4000 System Description.
- ▶ The SD card is part of the safety concept on PSS 4000. If the SD card is missing or has been swapped, the next time the PSSu system is booted it will be unable to achieve the operating status "PSSu System in RUN condition without fault". The SD card has a locking mechanism, which protects it from being removed from the card holder unintentionally. The SD card can also be sealed to protect it from manipulation, whether accidental or intentional.

Sealing the SD card for additional protection:



4.1 Module features

4.1.5 Reset button

The "Reset" button on the head module has various functions:

- ▶ Perform a warm reset for the PSSu system
The reset button can be used to perform a warm reset for the PSSu system.
- ▶ Transfer the naming data and/or device project from the SD card (deliberate operator action to transfer the naming data and/or device project from the SD card to the device memory).



INFORMATION

The warm reset and the transfer of the naming data and/or device project are described in the "PSS 4000 System Description". This is also where the general effects on the PSSu system are described in detail.

4.2 PROFIBUS DP

4.2.1 Connection to 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).

4.2.2 Selector switch for setting the station address

The station address of a PSSu is set via the “ADDRESS” DIP switch. The DIP switch is binary coded. Permitted station addresses are in the range $0_D \dots 125_D$.

If station address 126_D is set via the DIP switch, the address can be assigned via the Master. The Set Slave Address command (SSA) must be run for this purpose.

The station address is set as follows:

DIP switch “ADDRESS”	Key		Example:
Switch designation	OFF	ON	Station address 52_D
--	Not connected		
--			
64	0	64_D	
32	0	32_D	
16	0	16_D	
8	0	8_D	
4	0	4_D	
2	0	2_D	
1	0	1_D	



INFORMATION

The station address should **only** be set when the module is switched off (no voltage applied).

The settings are **only** transferred when booting. Any changes made to the settings during operation will **not** be transferred.

4.3 Ethernet Interface

4.3.1 RJ45 interfaces ("Ethernet")

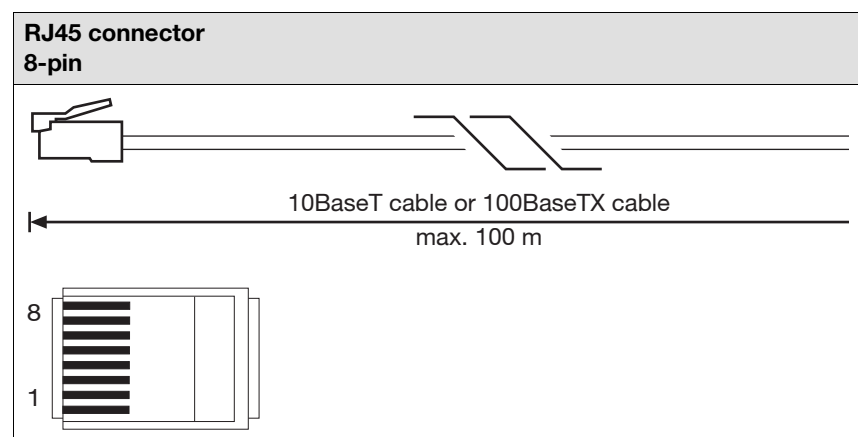
The Ethernet interface can be used for the following online actions:

- ▶ 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).

4.3.2 RJ45 connection cable



5.1 General installation guidelines

Please also refer to the PSSuniversal Installation Manual.

The description below assumes that the mounting rail is already installed.

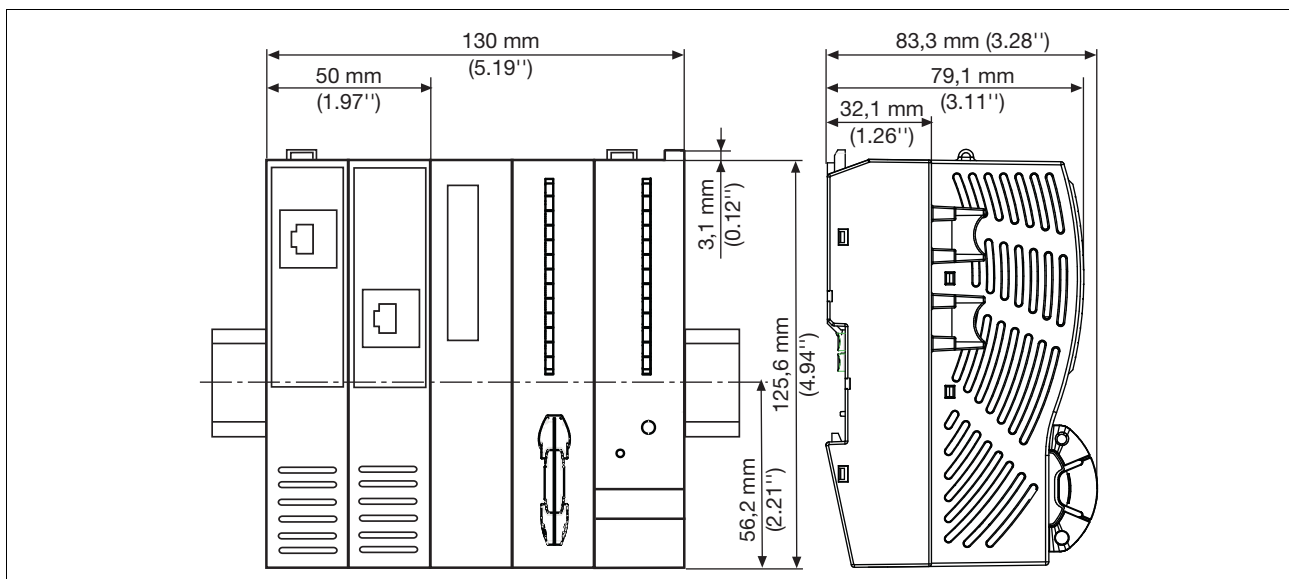


CAUTION!

Damage due to electrostatic discharge!

Electrostatic discharge can damage components. Ensure against discharge before touching the product, e.g. by touching an earthed, conductive surface or by wearing an earthed arm-band.

5.1.1 Dimensions



5.2 Installing the head module

Prerequisite:

- ▶ The mounting rail must be installed.

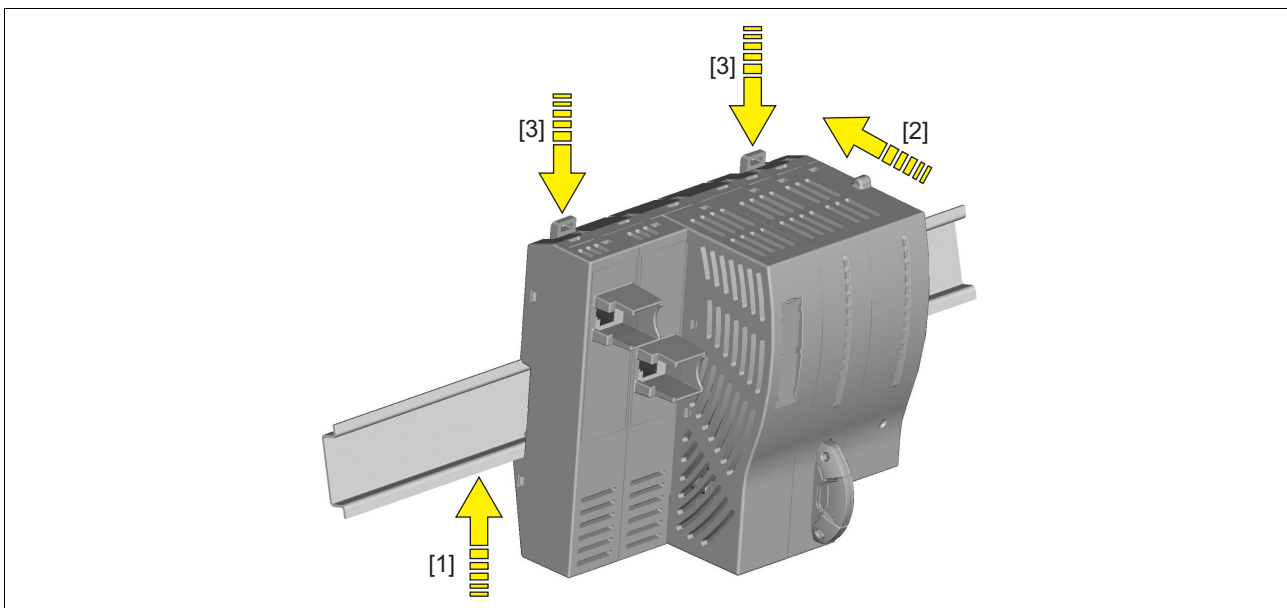
Please note:

- ▶ All contacts should be protected from contamination.

Procedure:

- ▶ Install an end bracket to the left of the head module or leave enough space for one.
- ▶ Slot the groove on the head module on to the mounting rail from below [1].
- ▶ Push the head module back as far as it will go [2].
- ▶ Make sure that the locking mechanisms [3] are pushed downwards, connecting the module firmly to the mounting rail.

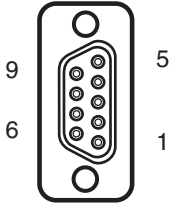
Schematic representation:



6.1 Interface configuration

6.1.1 PROFIBUS DP

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	

6.1.1.1 Connection to PROFIBUS DP

The PSSu is connected to PROFIBUS DP via RS 485 communication. The PSSu supplies the PROFIBUS DP bus terminating resistors with voltage (+5 VDC).



INFORMATION

The two data lines are also called A and B on PROFIBUS. Always connect the A-line ("RxD/TxD-N") to the A-lines of all the other PROFIBUS subscribers.

The B-line ("RxD/TxD-P") should only be connected to the B-lines of the other PROFIBUS subscribers.

If communication is not established, check the connections using a continuity tester.

- Connect the connector housing to the screening on the PROFIBUS cable. The connector housing should be connected with low impedance to the mounting rail.



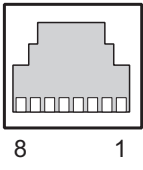
CAUTION!

Do not use the signals VP (+5 V ext.) and DGND (GND ext.) to supply voltage to external devices! They are exclusively used to supply the PROFIBUS DP bus terminating resistors.

6.1 Interface configuration

6.1.2 Ethernet

Ethernet Interface

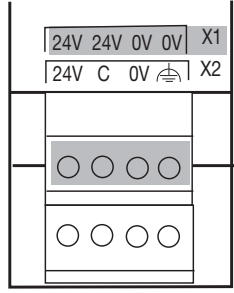
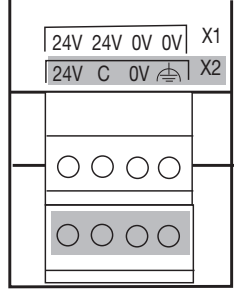
RJ45 socket 8-pin	PIN	Standard	Crossover
	1	TD+ (Transmit+)	RD+ (Receive+)
	2	TD- (Transmit-)	RD- (Receive-)
	3	RD+ (Receive+)	TD+ (Transmit+)
	4	n.c.	n.c.
	5	n.c.	n.c.
	6	RD- (Receive-)	TD- (Transmit-)
	7	n.c.	n.c.
	8	n.c.	n.c.

7.1 General wiring guidelines

Please note:

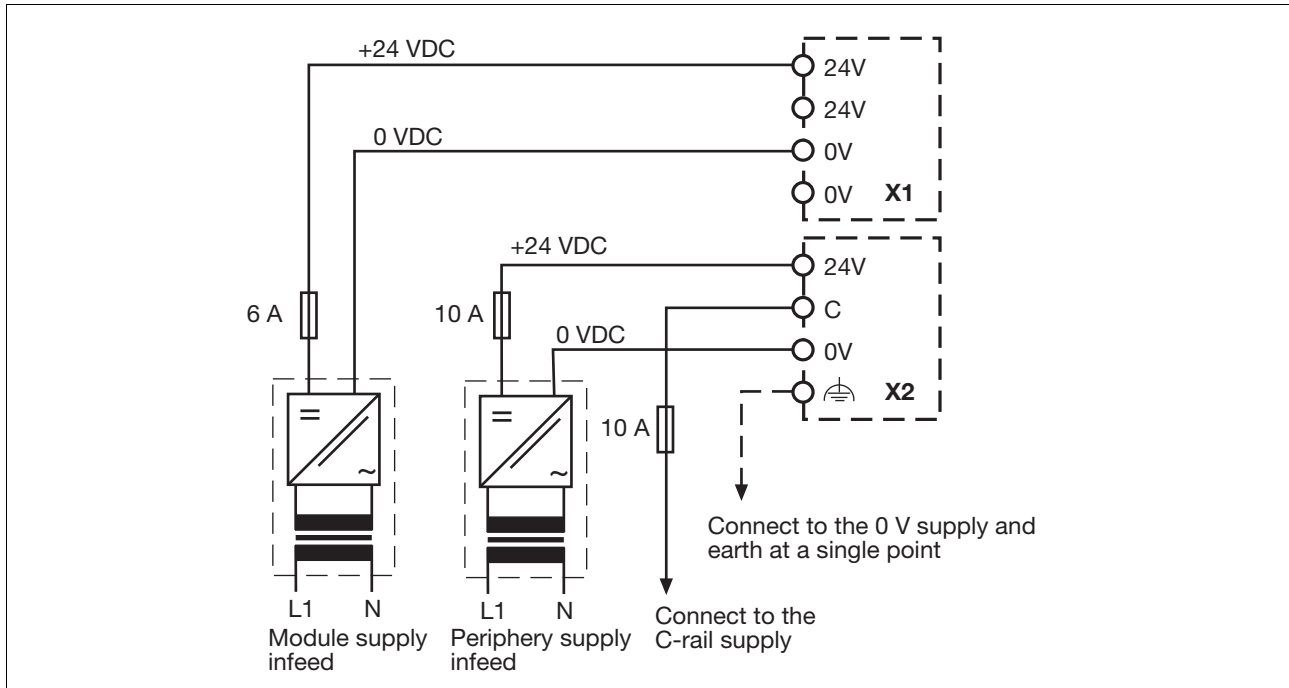
- ▶ The requirements of the supply voltages can be found in the chapter entitled "Technical Details".
- ▶ Safe electrical isolation must be ensured for the external power supplies that generate the supply voltages. Failure to do so could result in electric shock.
- ▶ The external power supplies must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

7.2 Terminal configuration

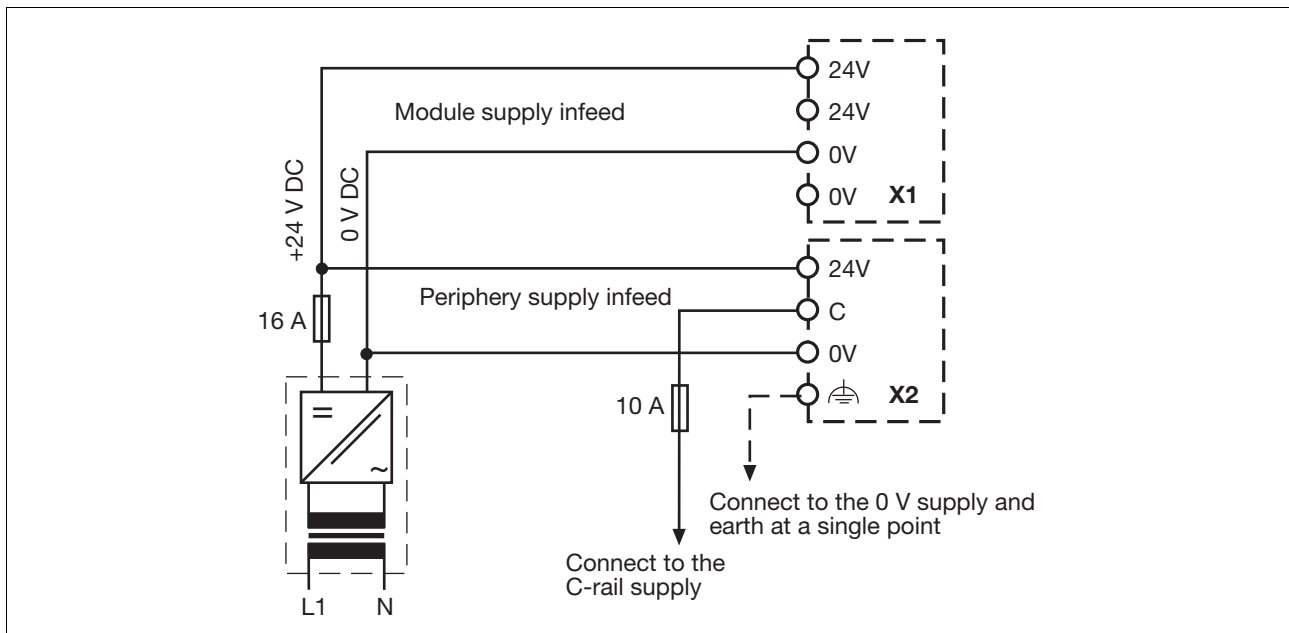
Module supply	Terminal configuration		X1
4-pin female connector	24V	+24 V infeed for module supply	
	0V	0 V infeed for module supply	
Periphery supply	Terminal configuration		X2
4-pin female connector	24V:	+24 V infeed for periphery supply	
	C	C-rail supply	
	0V	0 V infeed for periphery supply	
		Functional earth 	

7.3 Connecting the module

Separate power supplies for module supply and periphery supply:



Common power supply for module supply and periphery supply:



8.1 Messages

The PSSu system provides many options for diagnostics, fault detection and communication with other control systems.

Diagnostics for the PSSu system can be run via the

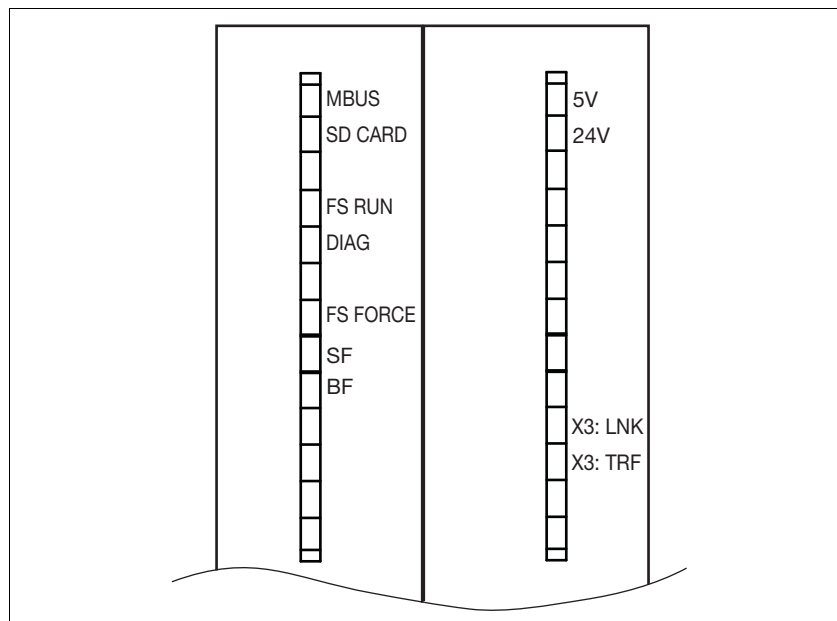
- ▶ LEDs on the head module,
- ▶ Diagnostic table and diagnostic log.

All errors and faults detected by the electronic or compact modules in a PSSu system are signalled to the head module and entered in the diagnostic table and diagnostic log. You can read the head module's diagnostic table and diagnostic log, e.g. using the PAS4000 or the combination of OPC Server and PSS 4000 Diag Control.

8.2 Display elements

The head module contains a number of status LEDs, which provide information on the status of various system sections.

LEDs on the **PSSu H m F DP ETH SD**:



Legend:

	LED on
	LED flashes
	LED off

8.2 Display elements

8.2.1 MBUS

The "MBUS" LED indicates the status of the FS and ST module bus.

Colour	State	Meaning
---		No modules present
Green		FS and ST module bus are operating error-free
Red		Operating status "Safe condition of all FS outputs on the PSSu system" or Unable to locate at least one module (e.g. a module has been removed during operation, actual/registered hardware does not match)
		Operating status "FS module bus in a STOP condition with error: Major FS error"

8.2.2 SD CARD

The "SD CARD" LED shows the status of the removable data medium.

Colour	State	Meaning
---		Supply voltage for module supply is missing
Red		SD card is missing or SD card not recognised or SD card defective
Green		Naming data and device project on the PSSu system and SD card match
		Product type on the SD card does not match the head module or No device project on the SD card
Green-red		Naming data and device project on the PSSu system and SD card do not match
Orange		Device identification activated by user

8.2 Display elements

8.2.3 FS RUN

The "FS RUN" LED shows the status of the FS resource.

Colour	State	Meaning
---		FS resource has not been started
Green		Operating status: "FS resource in RUN condition without error": The tasks of the FS resource are running error-free. The project is licensed.
		Operating status "FS resource in RUN condition with error": - Task in TERMINATED state or - Task in STOP state At least one FS resource task is not running. The project is licensed.
Orange		Operating status "FS resource in RUN condition without error": The tasks of the FS resource are running error-free. The project is unlicensed.
		Operating status "FS resource in RUN condition with error": - Task in TERMINATED state or - Task in STOP state At least one FS resource task is not running. The project is unlicensed.

► Only one task is present on the FS resource.

8.2 Display elements

8.2.4 DIAG

The "DIAG" LED indicates whether there is a fault on a system section of the PSSu system. Precise evaluation can be made via the diagnostic list.

Colour	Status	Key
- - -		No system section is started, module supply is missing.
Green		All system sections are in a RUN condition.
		Booting system sections is active
Red		A message of "Error" severity is present for at least one system section (see diagnostic list).
		A major FS error is present for at least one FS system section (see diagnostic list).
Orange		A message of at least "Warning" severity is present for the PSSu system (see diagnostic list).
Red - green		Start of "deliberate operator action" (function of reset button)

8.2.5 FS FORCE

The "FS FORCE" LED shows the status of forcing on the FS resource.

Colour	State	Meaning
- - -		Forcing on the FS resource is inactive
yellow		Forcing on the FS resource is active

8.2 Display elements

8.2.6 SF, BF

The LEDs "SF" and "BF" show errors in the bus connection of errors by a subscriber in in the bus.

Colour SF	Colour BF	State SF	State BF	Key
---	---	●	●	Supply voltage is missing
---	Red	●	☼	No connection to the bus subscribers
---	Red	●	☼	Configuration faulty
Red	---	☼	●	Error in the head module
---	Green	●	☼	Data transmission error-free

8.2.7 5V, 24V

The "5 V" LED shows the status of the module supply.

Colour	Status	Meaning
---	●	No supply voltage for module supply or supply voltage is faulty
Green	☼	Module supply is available on the module bus

The "24 V" LED shows the status of the periphery supply.

Colour	Status	Meaning
---	●	No supply voltage for periphery supply or supply voltage is faulty
Green	☼	Periphery supply is available on the module bus

8.2 Display elements

8.2.8 X3: LNK, X3: TRF

These status LEDs are the display elements for the Ethernet/ SafetyNET p interfaces. The interface is assigned two LEDs at the head module. Various operating and fault statuses on the Ethernet/ SafetyNET p interface are displayed via the LEDs.

X3: LNK

Colour	State	Key
---		No network connection
Green		Network connection is error-free

X3: TRF

Colour	State	Key
---		No data traffic
yellow		Data traffic is error-free

9.1 Technical details

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 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	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

9.1 Technical details

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
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

9.1 Technical details

Environmental data	
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 mm² , 24 - 12 AWG
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm² , 24 - 16 AWG
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm² , 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 mm² , 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.

9.2 Order reference

Order reference

Product Type	Features	Order no.
PSSu H m F DP ETH SD	Head module with PROFIBUS-DP interface and an Ethernet interface	312 060
PSSu A Con 1/4 S	2 pieces screw terminals	313 110
PSSu A Con 2/8 C	2 pieces spring-loaded terminals	313 111



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