Visualisation; Diagnostics

Easy to Configure

Programming IEC 61131-3

Rapid Installation

# PSSu H FS SN SD (M12) (-T)(-R)

## PILZ
THE SPIRIT OF SAFETY

▶ Decentralised system PSSuniversal I/O

Contents

# 1 Introduction

## 1.1 Validity of documentation

The documentation is valid for the product types:

▸ PSSu H FS SN SD

▸ PSSu H FS SN SD–T

▸ PSSu H FS SN SD M12-T

▸ PSSu H FS SN SD–R

▸ PSSu H FS SN SD M12-R

▸ It is valid until new documentation is published.

Please also refer to the following documents:

▸ System Description PSS 4000

▸ 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 Definition of symbols

Information that is particularly important is identified as follows:

⚠️ **DANGER!**

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

⚠️ **WARNING!**

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

⚠️ **CAUTION!**

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

**NOTICE**

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

**INFORMATION**

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

# 2 Overview

## 2.1 Module 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

▸ Reset pushbutton

– 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

– 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

▸ T-type:

PSSu H FS SN SD (M12)-T: For increased environmental requirements

▸ R-type:

PSSu H FS SN SD (M12)-R: For railway applications

## 2.2　Front view

**Front view of head modules with an RJ45 female connector**
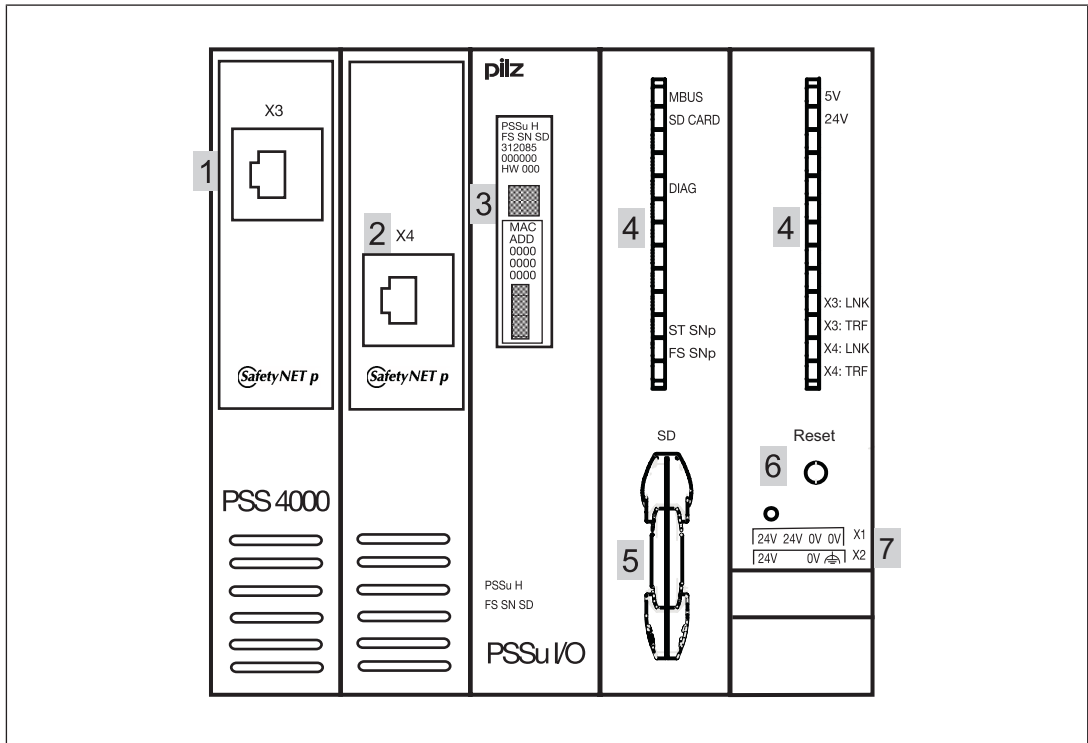
**Front view of head modules with an M12 female connector**
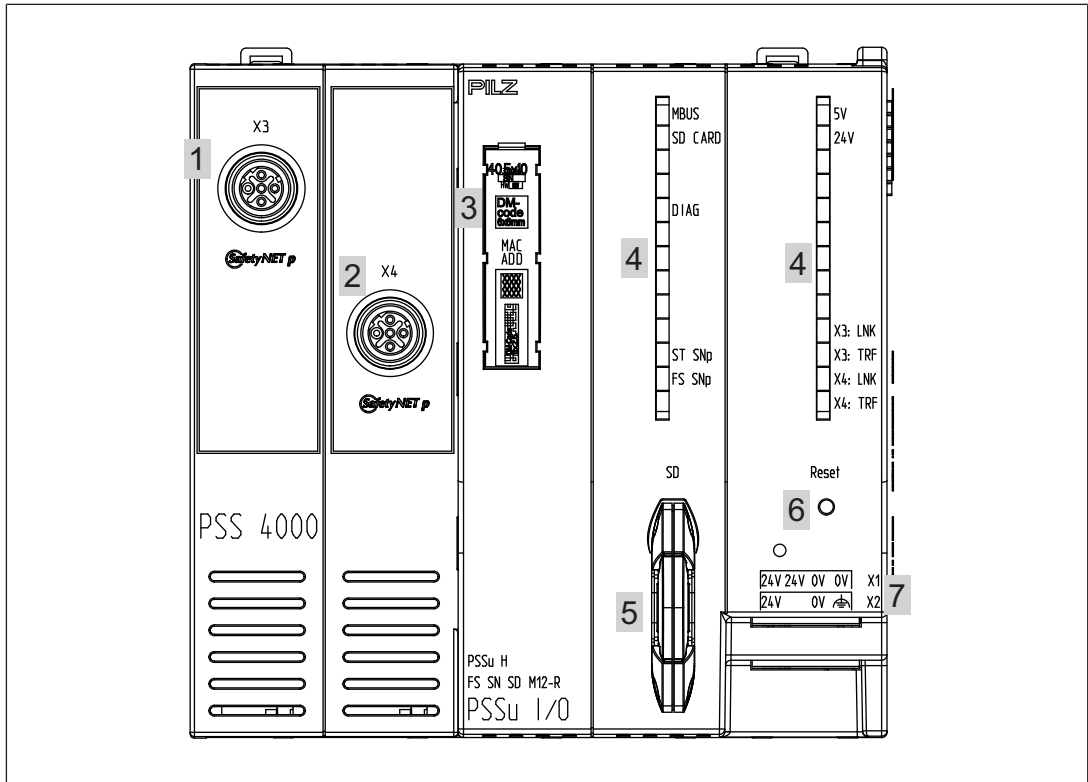


**Legend**

1      SafetyNET p interface

2      SafetyNET p interface

3      Labelling strip (see below for details)

4      Status LEDs

5      SD card

6      Reset pushbutton

7      Supply voltage connection (module and periphery supply)

The labelling strip contains the following information:



Order number — 312085
Serial number — 100017
Hardware version — HW 001

2D code:
Product
information

MAC address —

MAC
ADD
0002
4840
3152

2D code:
MAC address
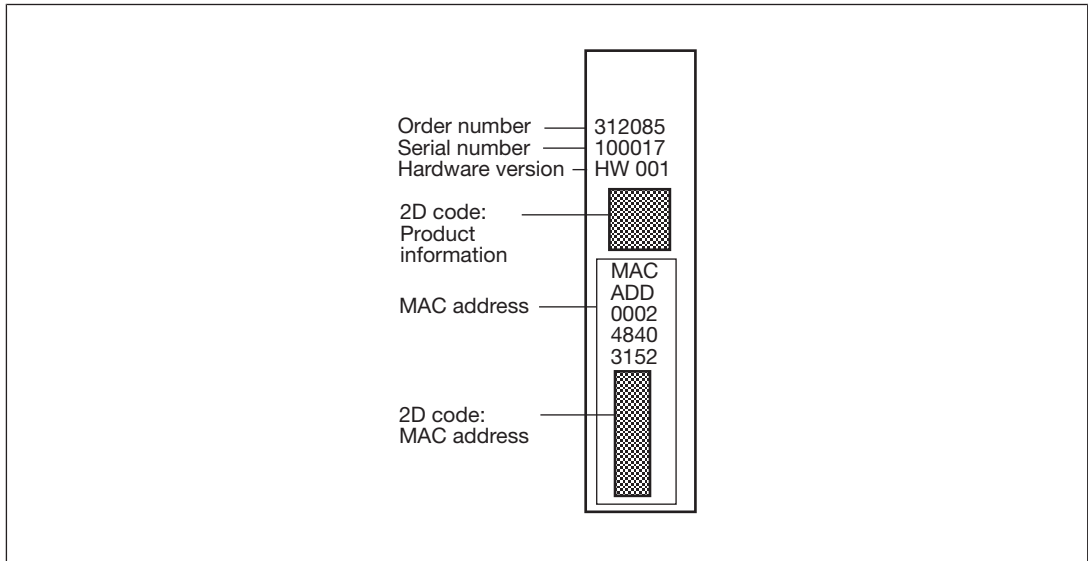
# 3 Safety

## 3.1 Intended use

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

The modules PSSu H FS SN SD and PSSu H FS SN SD-T may be used as a safety components in accordance with the Lifts Directive 95/16/EC in accordance with the requirements of EN 81-1/2:1998+A3:2009, EN 81-20:2015, EN 81-50:2015, EN 81-22:2014 and EN 115-1:2008+A1:2010.

The programmable safety system should be installed in a protected environment that meets at least the requirements of pollution degree 2. Example: Protected inside space or control cabinet with protection class IP54 and corresponding air conditioning.

The module PSSu H FS SN SD (M12)-T is suitable for use where there are increased environmental requirements (see Technical Details).

The module PSSu H FS SN SD (M12)-R is suitable for use where there are increased environmental requirements demanded by railway applications (see Technical details).

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

▶ Any use of the module that is not in accordance with the technical details.

## 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 a qualified and knowledgeable person who, because of their training, experience and current professional activity, has the specialist knowledge required. To be able to inspect, assess and operate devices, systems and machines, the person has to be informed of the state of the art and the applicable national, European and international laws, directives and standards.

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

▶ Are familiar with the basic regulations concerning health and safety / accident prevention,

▶ Have read and understood the information provided in the section entitled Safety

▶ Have a good knowledge of the generic and specialist standards applicable to the specific application.

### 3.2.2 Warranty and liability

All claims to warranty and liability will be rendered invalid if

▸ The product was used contrary to the purpose for which it is intended,

▸ Damage can be attributed to not having followed the guidelines in the manual,

▸ Operating personnel are not suitably qualified,

▸ Any type of modification has been made (e.g. exchanging components on the PCB boards, soldering work etc.).

### 3.2.3 Disposal

▸ In safety-related applications, please comply with the mission time $T_M$ in the safety-related characteristic data.

▸ When decommissioning, please comply with local regulations regarding the disposal of electronic devices (e.g. Electrical and Electronic Equipment Act).

# 4 Function description

## 4.1 Block diagram
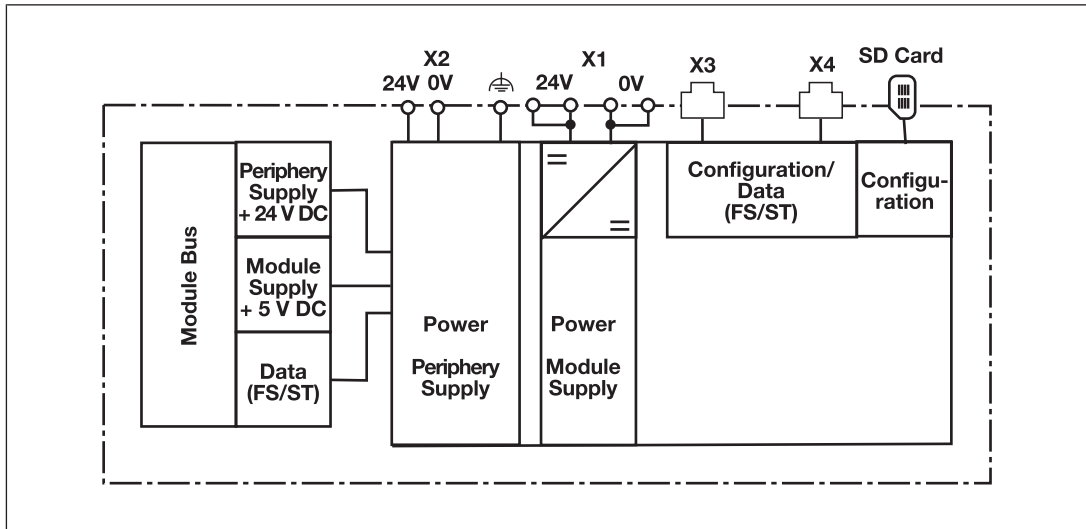


## 4.2 Supply voltage

### 4.2.1 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

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.

### 4.2.2 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 diagrams.

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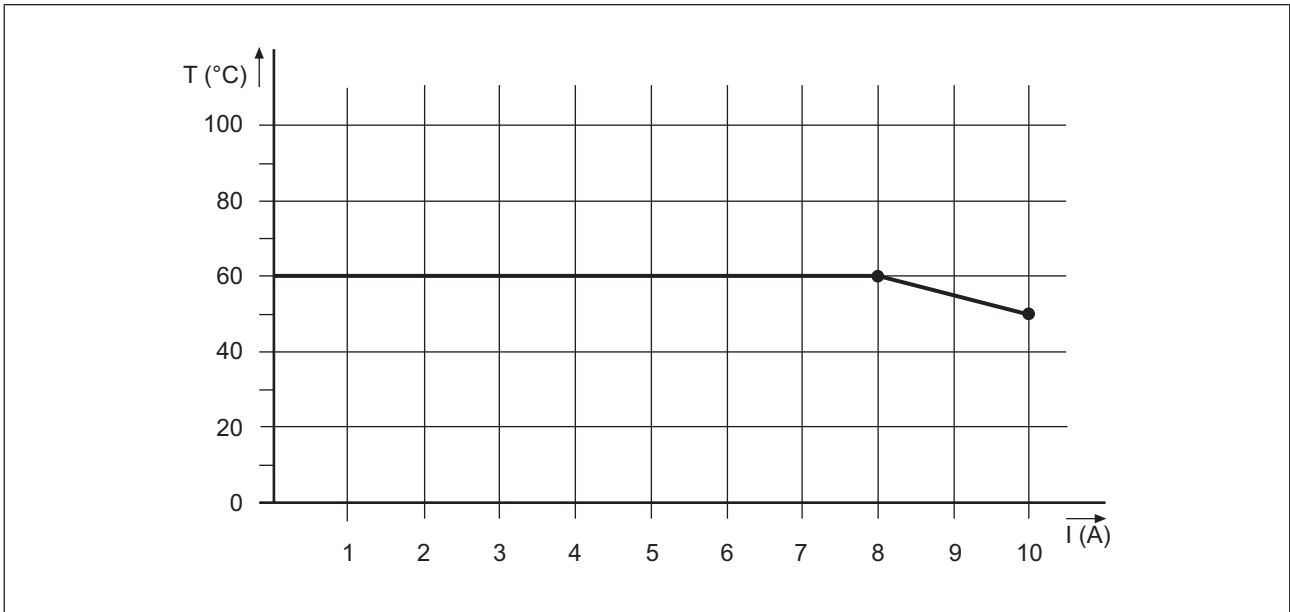


PSSu H FS SN SD(-T)(-R): Derating diagram for periphery supply: Permitted ambient temperature T dependent on load current I
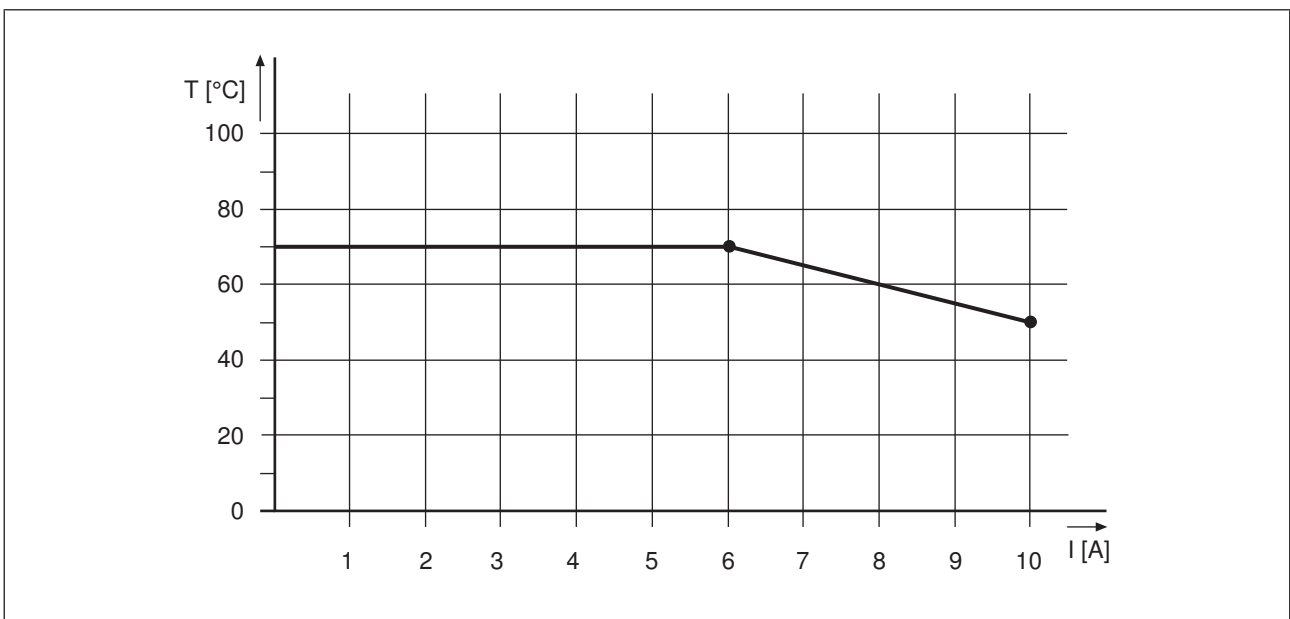
PSSu H FS SN SD(-T)(-R): Derating diagram for infeed for module supply: Permitted ambient temperature T dependent on load current I
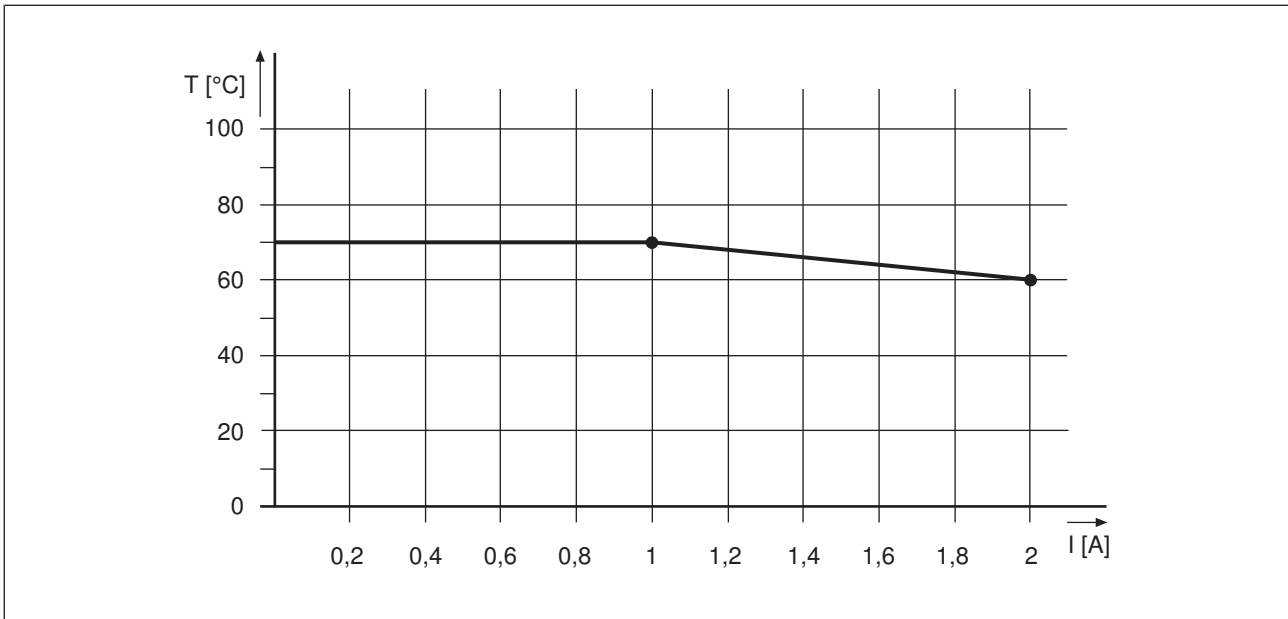


## 4.3 Integrated protection mechanisms

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)

## 4.4 SafetyNET p

### 4.4.1 Connection to 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 found on the labelling strip on the front of the module.

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

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## 4.5 Decentralised inputs and outputs

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)

## 4.6 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 error". 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:
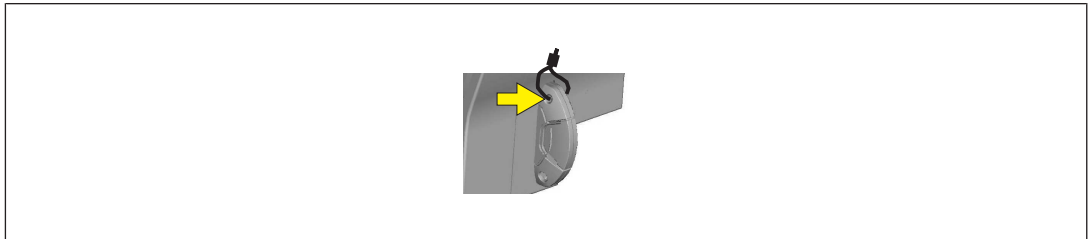
## 4.7 Reset button

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

▸ Perform a warm reset for the PSSu system.

The reset pushbutton 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.

# 5 Installation

## 5.1 General installation guidelines

Please also refer to the PSSuniversal Installation Manual.

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

> **!** **NOTICE**
>
> Damage due to electrostatic discharge!
>
> Electrostatic discharge can damage components. Ensure against discharge before touching the product, e.g. by touching an earthed, conductive surface or by wearing an earthed armband.

## 5.2 Dimensions
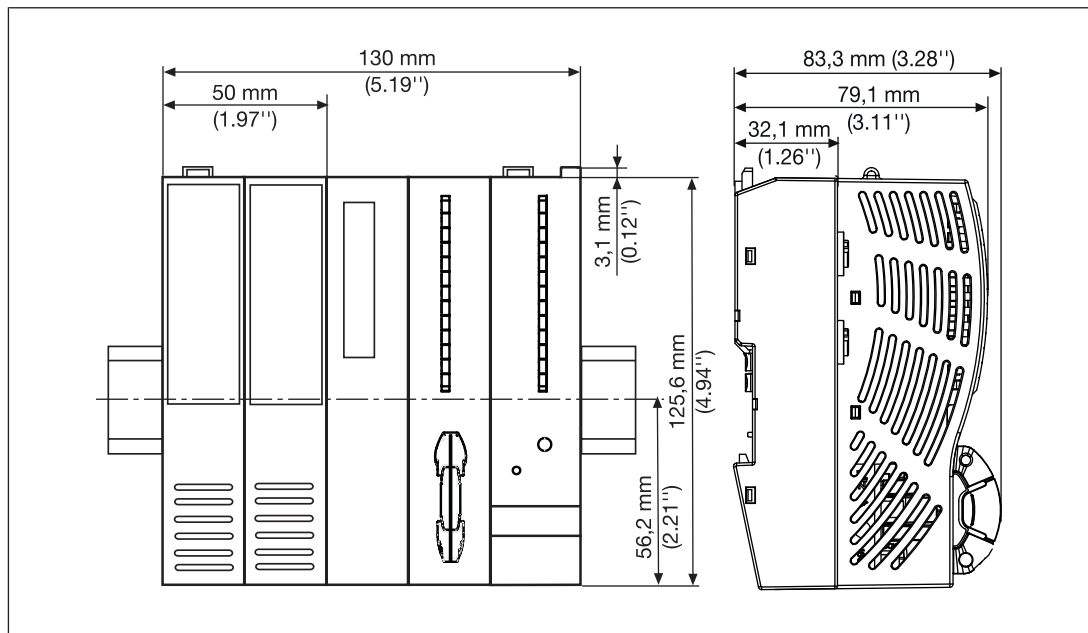


## 5.3 Installing the head module

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.
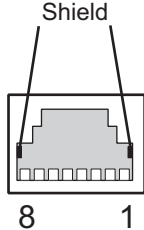
Schematic representation:
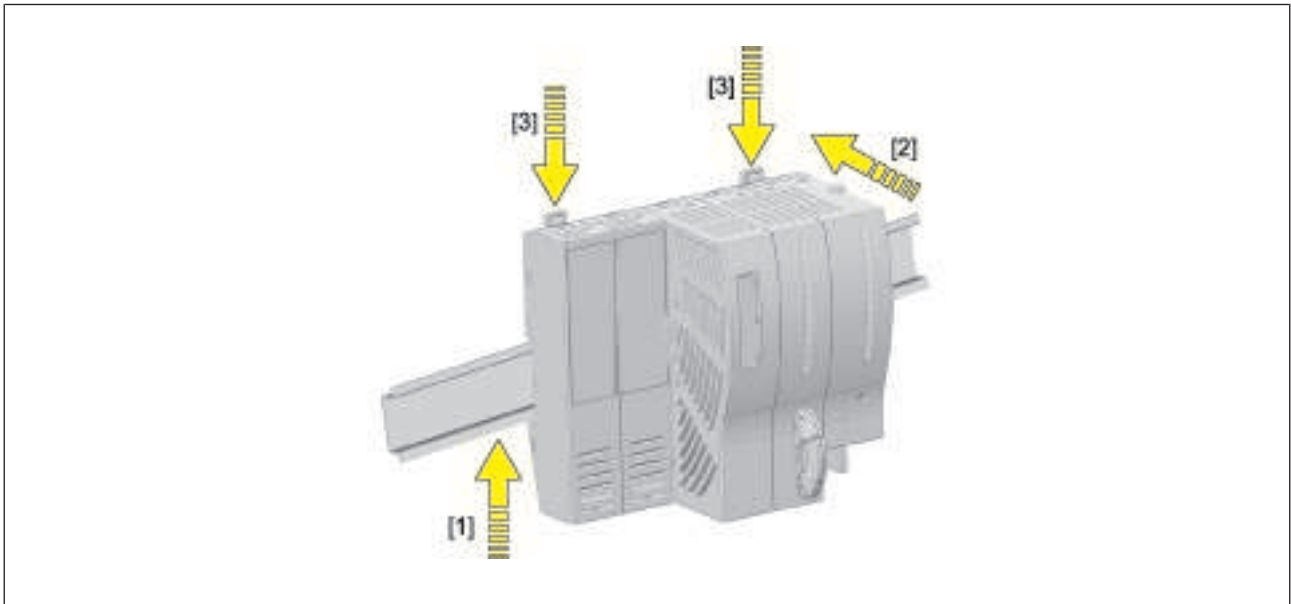
# 6 Interface assignment
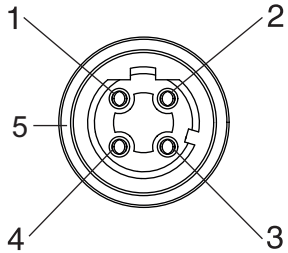
Further information on the Ethernet interface can be found in the system description PSS 4000.

**Assignment of the interfaces on head modules with an RJ45 female connector**

| SafetyNET p | Assignment | |
|---|---|---|
| RJ45 female connector | 1: TD+<br>2: TD-<br>3: RD+<br>4: n.c.<br>5: n.c.<br>6: RD-<br>7: n.c.<br>8: n.c. | Shield<br><br>8      1 |

▸ n.c. = not connected

**Assignment of the interfaces on head modules with an M12 female connector**

| SafetyNET p | Assignment | |
|---|---|---|
| 4-pin M12 female connector<br><br>D-coded | 1: TD+<br>2: RD+<br>3: TD-<br>4 RD-<br>5: Connection to functional earth on the connector housing | 1      2<br>5<br>4      3 |

# 7 Wiring

## 7.1 General wiring guidelines

Please note:

▸ The requirements of the supply voltages can be found in the chapter entitled "Technical Details".

▸ Protective separation 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".

▸ 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 relevant national regulations (e.g. EN 60204-1, NFPA 79:17-7, NEC: Article 250).

▸ Details of the minimum range for conductor 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 | |
| | 0V | 0 V infeed for periphery supply | |
| | ⏚ | Functional earth | |

## 7.3 Connecting the module

Separate power supplies for module supply and periphery supply:
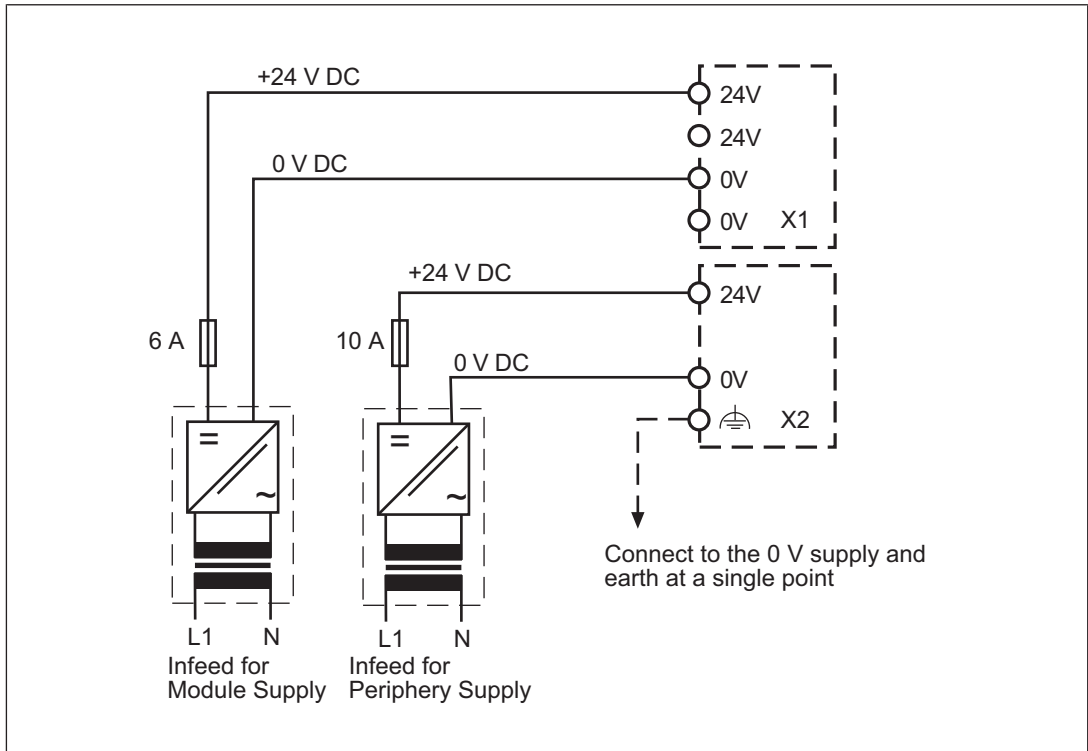


Common power supply for module supply and periphery supply:
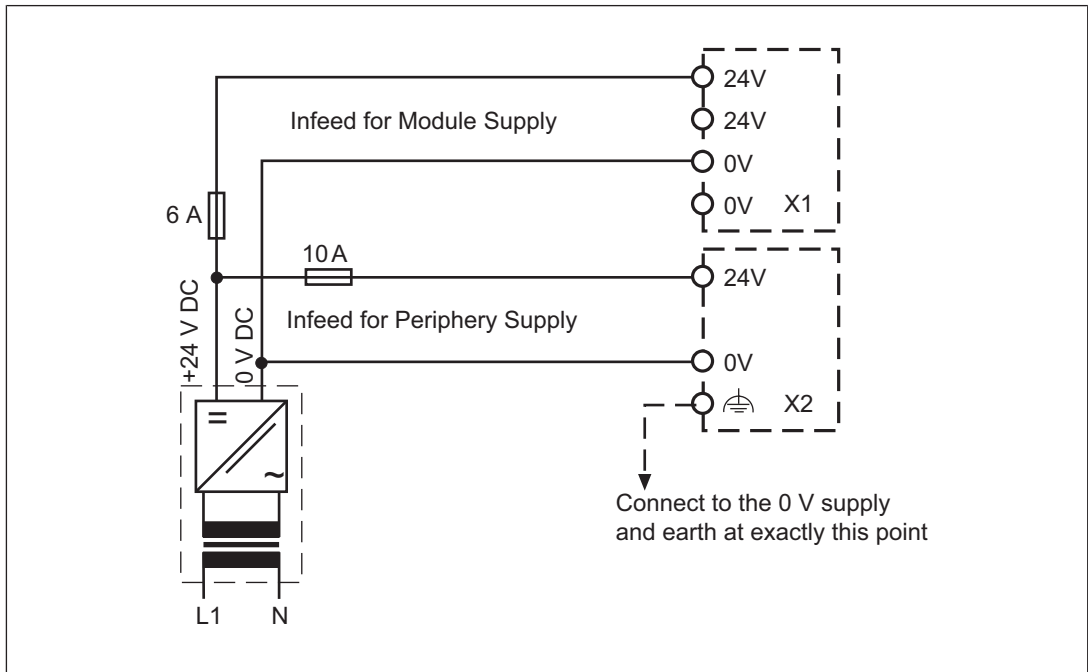
# 8 Operation

## 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 FS SN SD:
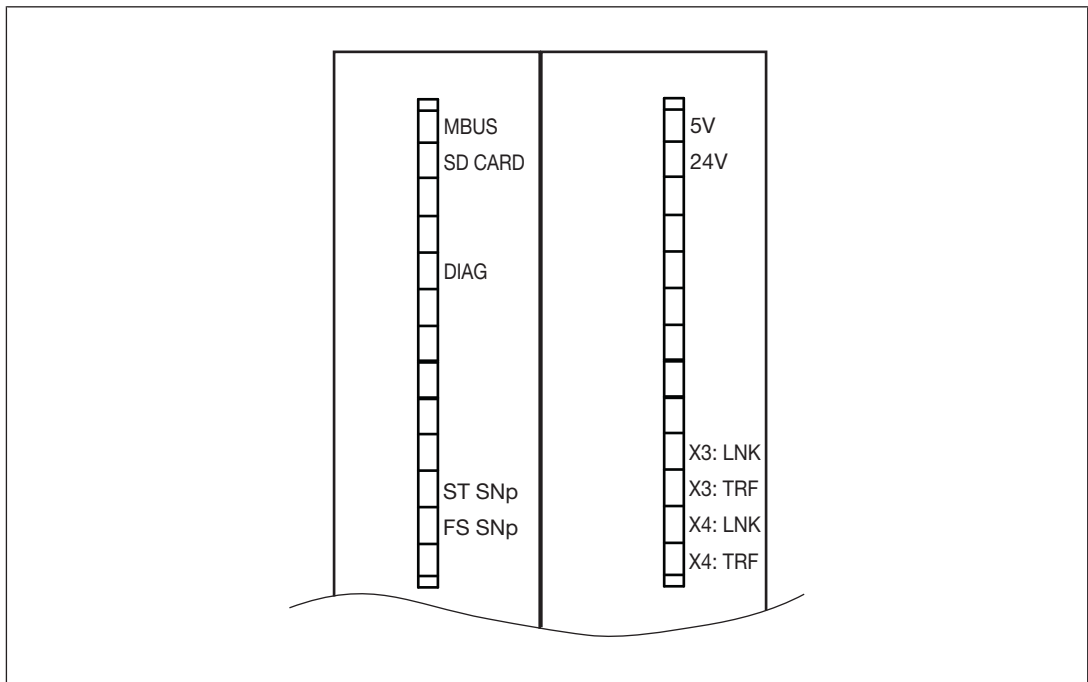


**Legend**

| | |
|---|---|
| ☼ | LED on |
| ◑ | LED flashes |
| ● | LED off |

## 8.2.1 MBUS

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

| Colour | Status | Meaning |
|--------|--------|---------|
| - - - | ● | No modules present |
| Green | ☼ | FS and ST module bus are operating without fault |
| Red | ☼ | Operating state "Safe condition of all FS outputs on the PSSu system" or<br><br>Unable to locate at least one module<br><br>(e.g. a module has been removed during operation, actual/registered hardware does not match) |
| | ◑ | Operating state "FS module bus in a STOP condition with error: Major FS error" |

## 8.2.2      SD CARD

The LED "SD CARD" shows the status of the removable data medium and is used for device identification.

| Colour | Status | Meaning |
|---|---|---|
| - - - | ● | Supply voltage for module supply is missing |
| red | ☀ | SD card is missing<br><br>or<br><br>SD card not recognised<br><br>or<br><br>SD card defective |
| | ◖ | ▸ "Bind device projects to devices" function:<br>    The device project needs a device with a certain device key, but this device key does not exist on the device.<br><br>and/or<br><br>▸ "Bind device projects to SD cards" function:<br>    The device project is bound to an SD card, but this SD card is not inserted in the device. |
| 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<br><br>or<br><br>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 |

### 8.2.3 DIAG

The "DIAG" LED indicates whether there is a fault on a system section of the PSSu system/ PSS67 device. Precise evaluation can be made via the diagnostic list.

| Colour | State | Meaning |
|---|---|---|
| - - - | ● | No system section is started, module supply is missing. |
| green | ☼ | No message of "Error" or "Warning" severity is present for the device. |
| | ◖ | Device diagnostic list and device diagnostic log are being prepared |
| 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 device (see diagnostic list). |
| Red - green | ◖ | Start of "deliberate operator action" (function of reset button) |

## 8.2.4 ST SNp

The "ST SNp" LED indicates the status of the non-safety-related system section ST-SafetyNET p RTFN.

| Colour | Status | Meaning |
|--------|--------|---------|
| - - - | ● | System section ST SafetyNET p RTFN has not been started |
| Green | ☼ | Operating state "ST SafetyNET p RTFN in RUN condition without error" |
|  | ◖ | Operating state "ST SafetyNET p RTFN in RUN condition with minor error" |
| Red | ☼ | Operating state "ST SafetyNET p RTFN in STOP condition with error: Major FS+ST error" |
|  | ◖ |  |

## 8.2.5 FS SNp

The "FS SNp" LED indicates the status of the safety-related system section FS-SafetyNET p RTFN.

| Colour | Status | Meaning |
|---|---|---|
| - - - | ● | System section FS SafetyNET p RTFN has not been started |
| Green | ☼ | Operating state "FS SafetyNET p RTFN in RUN condition without error" |
| | ◖ | Operating status "FS SafetyNET p RTFN in RUN condition with minor error" |
| Red | ☼ | Operating state "FS SafetyNET p RTFN in STOP condition with error: Major FS error" |
| | ◖ | Operating state "FS SafetyNET p RTFN in STOP condition with error: Major FS+ST error |

### 8.2.6      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 |

### 8.2.7 X3: LNK, X3: TRF, X4: LNK, X4: TRF

A PSSu system can have either one Ethernet interface (X3) or two Ethernet interfaces (X3 and X4) (see Ethernet interface). An Ethernet interface is assigned two status LEDs on the head module as display elements. The status LEDs indicate various connection and communication states.

**X3: LNK, X3: LNK**

| Colour | Status | Meaning |
|--------|--------|---------|
| --- | ● | No network connection |
| Green | ☼ | Network connection is error-free |

The designation "LNK" stands for "LINK".

**X3: TRF, X4: TRF**

| Colour | Status | Meaning |
|--------|--------|---------|
| --- | ● | No data traffic |
| Yellow | ◐ | Data traffic is error-free |

The designation "TRF" stands for "TRAFFIC".

# 9    Technical details

| General | 312085 | 314085 | 314086 |
|---|---|---|---|
| Certifications | CE, EAC (Eurasian), KOSHA, TÜV, cULus Listed | CE, EAC (Eurasian), TÜV, cULus Listed | CE, TÜV |
| Application range | Standard/failsafe | Standard/failsafe | Standard/failsafe |
| **System sections** | **312085** | **314085** | **314086** |
| ST resource | No | No | No |
| FS resource | No | No | No |
| ST module bus | yes | yes | yes |
| FS module bus | yes | yes | yes |
| ST SNp interface | yes | yes | yes |
| FS SNp interface | yes | yes | yes |
| PROFIBUS-DP Slave | No | No | No |
| PROFINET IO DEVICE | No | No | No |
| IP connections | No | No | No |
| Diagnostic Server | No | No | No |
| OPC Server | No | No | No |
| **Programming** | **312085** | **314085** | **314086** |
| IEC 61131 programming | No | No | No |
| Multi programming | No | No | No |
| Non-volatile variables | No | No | No |
| **Electrical data** | **312085** | **314085** | **314086** |
| Supply voltage | | | |
| for | Module supply | Module supply | Module supply |
| Voltage | 24 V | 24 V | 24 V |
| Kind | DC | DC | DC |
| Voltage tolerance | -30 %/+25 % | -30 %/+25 % | -30 %/+25 % |
| Max. continuous current that the external power supply must provide | 1 A | 1 A | 1 A |
| Output of external power supply (DC) | 16 W | 16 W | 16 W |
| Supply voltage | | | |
| for | Periphery supply | Periphery supply | Periphery supply |
| Voltage | 24 V | 24 V | 24 V |
| Kind | DC | DC | DC |
| Voltage tolerance | -30 %/+25 % | -30 %/+25 % | -30 %/+25 % |
| Max. continuous current that the external power supply must provide | 10 A | 10 A | 10 A |

| Electrical data | 312085 | 314085 | 314086 |
|---|---|---|---|
| Internal supply voltage (module supply) | | | |
|    Output voltage | int. system | int. system | int. system |
|    Voltage | 5 V | 5 V | 5 V |
|    Kind | DC | DC | DC |
|    Voltage tolerance | -2 %/+3 % | -2 %/+3 % | -2 %/+3 % |
|    Current load capacity | 2 A | 2 A | 2 A |
|    Buffer in the case of supply interruptions in accordance with | EN 61131-2, EN 61496-1 | EN 61131-2, EN 61496-1 | EN 61131-2, EN 61496-1 |
|    Short circuit-proof | yes | yes | yes |
| CPU | 312085 | 314085 | 314086 |
| Real-time clock for time and date functions | | | |
|    Resolution | 1 s | 1 s | 1 s |
|    Deviation | +/- 10s/day | +/- 10s/day | +/- 10s/day |
|    Buffer time | 10 days | 10 days | 10 days |
| Working memory (RAM) | 64 MB | 64 MB | 64 MB |
| Removable data medium | 312085 | 314085 | 314086 |
| Type | SD card | SD card | SD card |
| SafetyNET p interface | 312085 | 314085 | 314086 |
| Number | 2 | 2 | 2 |
| IP address (automatically off) | 169.254.X.Y | 169.254.X.Y | 169.254.X.Y |
| Connection | RJ45 | RJ45 | M12 |
| Transmission rates | 100 MBit/s | 100 MBit/s | 100 MBit/s |
| Set via | Automatic | Automatic | Automatic |
| Max. number of ST-Tx and ST-Rx connections | 64 | 64 | 64 |
| Max. number of FS-Tx and FS-Rx connections | 64 | 64 | 64 |
| Cycle time (t_SNp RTFN) | 2 ... 60 000 ms | 2 ... 60 000 ms | 2 ... 60 000 ms |
| Max. number of variables with elementary ST data types | 5000 | 5000 | 5000 |
| Max. number of variables with elementary FS data types | 4000 | 4000 | 4000 |
| Environmental data | 312085 | 314085 | 314086 |
| Climatic suitability | EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78 | EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78 | EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78 |
| Ambient temperature | | | |
|    Temperature range | 0 - 60 °C | -40 - 70 °C | -40 - 70 °C |

| Environmental data | 312085 | 314085 | 314086 |
|---|---|---|---|
| Storage temperature | | | |
| Temperature range | **-25 - 70 °C** | **-40 - 70 °C** | **-40 - 70 °C** |
| Climatic suitability | | | |
| In accordance with the standard | **EN 60068-2-78** | **EN 60068-2-78** | **EN 60068-2-78** |
| Humidity | **93 % r. h. at 40 °C** | **93 % r. h. at 40 °C** | **93 % r. h. at 40 °C** |
| Condensation during operation | **Not permitted** | **Short-term** | **Short-term** |
| Max. operating height above sea level | **2000 m** | **5000 m** | **5000 m** |
| EMC | **EN 61131-2** | **EN 61131-2** | **EN 61131-2 (Zone B)** |
| Vibration | | | |
| In accordance with the standard | **EN 60068-2-6** | **EN 60068-2-6** | **EN 60068-2-6** |
| Frequency | **8,4 - 150 Hz** | **8,4 - 150 Hz** | **8,4 - 150 Hz** |
| Acceleration | **1g** | **1g** | **1g** |
| Broadband noise | | | |
| In accordance with the standard | **–** | **EN 60068-2-64** | **EN 60068-2-64** |
| Frequency | **–** | **5 - 500 Hz** | **5 - 500 Hz** |
| Acceleration | **–** | **1,9grms** | **1,9grms** |
| Shock stress | | | |
| In accordance with the standard | **EN 60068-2-27** | **EN 60068-2-27** | **EN 60068-2-27** |
| Number of shocks | **6** | **6** | **6** |
| Acceleration | **15g** | **15g** | **15g** |
| Duration | **11 ms** | **11 ms** | **11 ms** |
| In accordance with the standard | **EN 60068-2-27** | **EN 60068-2-27** | **EN 60068-2-27** |
| Number of shocks | **1000** | **1000** | **1000** |
| Acceleration | **10g** | **10g** | **10g** |
| Duration | **16 ms** | **16 ms** | **16 ms** |
| Airgap creepage | | | |
| In accordance with the standard | **EN 60664-1, EN 61131-2** | **EN 60664-1, EN 61131-2** | **EN 61131-2, IEC 60664-1** |
| Overvoltage category | **II** | **II** | **II** |
| Pollution degree | **2** | **2** | **2** |
| Protection type | | | |
| Housing | **IP20** | **IP20** | **IP20** |
| Mounting area (e.g. control cabinet) | **IP54** | **IP54** | **IP54** |
| **Potential isolation** | 312085 | 314085 | 314086 |
| Potential isolation between | **Periphery supply and module supply** | **Periphery supply and module supply** | **Periphery supply and module supply** |
| Type of potential isolation | **Functional insulation** | **Functional insulation** | **Functional insulation** |
| Rated surge voltage | **2500 V** | **2500 V** | **2500 V** |

| Potential isolation | 312085 | 314085 | 314086 |
|---|---|---|---|
| Potential isolation between | **Periphery supply and system voltage** | **Periphery supply and system voltage** | **Periphery supply and system voltage** |
| Type of potential isolation | **Functional insulation** | **Functional insulation** | **Functional insulation** |
| Rated surge voltage | **2500 V** | **2500 V** | **2500 V** |
| **Mechanical data** | **312085** | **314085** | **314086** |
| Material | | | |
|   Bottom | **PC** | **PC** | **PC** |
| Connection type | **Spring-loaded terminal, screw terminal** | **Spring-loaded terminal, screw terminal** | **Spring-loaded terminal, screw terminal** |
| Mounting type | **plug-in** | **plug-in** | **plug-in** |
| Conductor cross section with screw terminals | | | |
|   1 core flexible | **0,25 - 2,5 mm², 24 - 12 AWG** | **0,25 - 2,5 mm², 24 - 12 AWG** | **0,25 - 2,5 mm², 24 - 12 AWG** |
|   2 core with the same cross section, flexible with crimp connectors, no plastic sleeve | **0,25 - 1 mm², 24 - 16 AWG** | **0,25 - 1 mm², 24 - 16 AWG** | **0,25 - 1 mm², 24 - 16 AWG** |
|   2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors | **0,2 - 1,5 mm², 24 - 16 AWG** | **0,2 - 1,5 mm², 24 - 16 AWG** | **0,2 - 1,5 mm², 24 - 16 AWG** |
| Torque setting with screw terminals | **0,5 Nm** | **0,5 Nm** | **0,5 Nm** |
| Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector | **0,2 - 2,5 mm², 24 - 12 AWG** | **0,2 - 2,5 mm², 24 - 12 AWG** | **0,2 - 2,5 mm², 24 - 12 AWG** |
| Stripping length with spring-loaded terminals | **9 mm** | **9 mm** | **9 mm** |
| Dimensions | | | |
|   Height | **125,6 mm** | **125,6 mm** | **125,6 mm** |
|   Width | **130 mm** | **130 mm** | **130 mm** |
|   Depth | **83,7 mm** | **83,7 mm** | **83,7 mm** |
| Weight | **365 g** | **378 g** | **370 g** |

**Technical details 315085 315086**

| General | 315085 | 315086 |
|---|---|---|
| Certifications | **CE, TÜV** | **CE, TÜV** |
| Application range | **Standard/failsafe** | **Standard/failsafe** |
| **System sections** | **315085** | **315086** |
| ST resource | **No** | **No** |
| FS resource | **No** | **No** |
| ST module bus | **yes** | **yes** |
| FS module bus | **yes** | **yes** |
| ST SNp interface | **yes** | **yes** |
| FS SNp interface | **yes** | **yes** |

| System sections | 315085 | 315086 |
|---|---|---|
| PROFIBUS-DP Slave | No | No |
| IP connections | No | No |
| Diagnostic Server | No | No |
| OPC Server | No | No |
| **Programming** | **315085** | **315086** |
| IEC 61131 programming | No | No |
| Multi programming | No | No |
| Non-volatile variables | No | No |
| **Electrical data** | **315085** | **315086** |
| Supply voltage | | |
| for | Module supply | Module supply |
| Voltage | 24 V | 24 V |
| Kind | DC | DC |
| Voltage tolerance | -30 %/+25 % | -30 %/+25 % |
| Max. continuous current that the external power supply must provide | 1 A | 1 A |
| Output of external power supply (DC) | 16 W | 16 W |
| Supply voltage | | |
| for | Periphery supply | Periphery supply |
| Voltage | 24 V | 24 V |
| Kind | DC | DC |
| Voltage tolerance | -30 %/+25 % | -30 %/+25 % |
| Max. continuous current that the external power supply must provide | 10 A | 10 A |
| Internal supply voltage (module supply) | | |
| Output voltage | int. system | int. system |
| Voltage | 5 V | 5 V |
| Kind | DC | DC |
| Voltage tolerance | -2 %/+3 % | -2 %/+3 % |
| Current load capacity | 2 A | 2 A |
| Short circuit-proof | yes | yes |
| **CPU** | **315085** | **315086** |
| Real-time clock for time and date functions | | |
| Resolution | 1 s | 1 s |
| Deviation | +/- 10s/day | +/- 10s/day |
| Buffer time | 10 days | 10 days |
| Working memory (RAM) | 64 MB | 64 MB |
| **Removable data medium** | **315085** | **315086** |
| Type | SD card | SD card |
| **SafetyNET p interface** | **315085** | **315086** |
| Number | 2 | 2 |

| SafetyNET p interface | 315085 | 315086 |
|---|---|---|
| IP address (automatically off) | 169.254.X.Y | 169.254.X.Y |
| Connection | RJ45 | M12 |
| Transmission rates | 100 MBit/s | 100 MBit/s |
| Set via | Automatic | Automatic |
| Max. number of ST-Tx and ST-Rx connections | 64 | 64 |
| Max. number of FS-Tx and FS-Rx connections | 64 | 64 |
| Cycle time (t_SNp RTFN) | 2 ... 60 000 ms | 2 ... 60 000 ms |
| Max. number of variables with elementary ST data types | 5000 | 5000 |
| Max. number of variables with elementary FS data types | 4000 | 4000 |
| **Environmental data** | **315085** | **315086** |
| Application site | | |
|    In accordance with the standard | EN 50125-3 | EN 50125-3 |
|    Application site | Track area (1 m - 3 m) | Track area (1 m - 3 m) |
|    In accordance with the standard | EN 61373 | EN 61373 |
|    Application site | Category 1, Class A + B | Category 1, Class A + B |
| Climatic suitability | EN 50155, EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78 | EN 50155, EN 60068-2-1, EN 60068-2-14, EN 60068-2-2, EN 60068-2-30, EN 60068-2-78 |
| Ambient temperature | | |
|    In accordance with the standard | EN 50155 | EN 50155 |
|    Temperature range | -40 - 70 °C | -40 - 70 °C |
|    In accordance with the standard | EN 50125-1 | EN 50125-1 |
|    Temperature range | -40 ... +70 °C | -40 ... +70 °C |
|    In accordance with the standard | EN 50125-3 | EN 50125-3 |
|    Temperature range | -40 ... +70 °C | -40 ... +70 °C |
| Storage temperature | | |
|    Temperature range | -40 - 70 °C | -40 - 70 °C |
| Condensation during operation | Short-term | Short-term |
| Max. operating height above sea level | 2000 m | 2000 m |
| EMC | EN 50121-3-2, EN 50121-4 | EN 50121-3-2, EN 50121-4 |
| Broadband noise | | |
|    In accordance with the standard | EN 61373 | EN 61373 |
|    Frequency | 5 ... 150 Hz | 5 ... 150 Hz |
|    Acceleration | 0,572 g RMS | 0,572 g RMS |
|    In accordance with the standard | EN 50125-3 | EN 50125-3 |
|    Frequency | 5 - 2.000 Hz | 5 - 2.000 Hz |
|    Acceleration | 0,23g RMS | 0,23g RMS |

| Environmental data | 315085 | 315086 |
|---|---|---|
| Shock stress | | |
|   In accordance with the standard | **EN 50125-3** | **EN 50125-3** |
|   Number of shocks | **6** | **6** |
|   Acceleration | **2 g** | **2 g** |
|   Duration | **11 ms** | **11 ms** |
|   In accordance with the standard | **EN 61373** | **EN 61373** |
|   Number of shocks | **6** | **6** |
|   Acceleration | **5 g** | **5 g** |
|   Duration | **30 ms** | **30 ms** |
| Supply interruptions | | |
|   In accordance with the standard | **EN 50155** | **EN 50155** |
|   Class | **S2, C1, C2** | **S2, C1, C2** |
| Airgap creepage | | |
|   In accordance with the standard | **EN 50124-1** | **EN 50124-1** |
|   Overvoltage category | **OV2** | **OV2** |
|   Pollution degree | **PD2** | **PD2** |
| Protection type | | |
|   In accordance with the standard | **EN 60529** | **EN 60529** |
|   Housing | **IP20** | **IP20** |
|   Mounting area (e.g. control cabinet) | **IP54** | **IP54** |

| Potential isolation | 315085 | 315086 |
|---|---|---|
| Potential isolation between | **Periphery supply and module supply** | **Periphery supply and module supply** |
| Type of potential isolation | **Functional insulation** | **Functional insulation** |
| Rated surge voltage | **2500 V** | **2500 V** |
| Potential isolation between | **Periphery supply and system voltage** | **Periphery supply and system voltage** |
| Type of potential isolation | **Functional insulation** | **Functional insulation** |
| Rated surge voltage | **2500 V** | **2500 V** |

| Mechanical data | 315085 | 315086 |
|---|---|---|
| Material | | |
|   Bottom | **PC** | **PC** |
| Connection type | **Spring-loaded terminal, screw terminal** | **Spring-loaded terminal, screw terminal** |
| Mounting type | **plug-in** | **plug-in** |
| Conductor cross section with screw terminals | | |
|   1 core flexible | **0,25 - 2,5 mm², 24 - 12 AWG** | **0,25 - 2,5 mm², 24 - 12 AWG** |
|   2 core with the same cross section, flexible with crimp connectors, no plastic sleeve | **0,25 - 1 mm², 24 - 16 AWG** | **0,25 - 1 mm², 24 - 16 AWG** |
|   2 core with the same cross section, flexible without crimp connectors or with TWIN crimp connectors | **0,2 - 1,5 mm², 24 - 16 AWG** | **0,2 - 1,5 mm², 24 - 16 AWG** |
| Torque setting with screw terminals | **0,5 Nm** | **0,5 Nm** |

| Mechanical data | 315085 | 315086 |
|---|---|---|
| Conductor cross section with spring-loaded terminals: Flexible with/without crimp connector | 0,2 - 2,5 mm², 24 - 12 AWG | 0,2 - 2,5 mm², 24 - 12 AWG |
| Stripping length with spring-loaded terminals | 9 mm | 9 mm |
| Dimensions | | |
|    Height | 125,6 mm | 125,6 mm |
|    Width | 130 mm | 130 mm |
|    Depth | 83,7 mm | 83,7 mm |
| Weight | 350 g | 370 g |

## 9.1 Safety characteristic data

**NOTICE**

You must comply with the safety characteristic data in order to achieve the required safety level for your plant/machine.

| Order no. | EN ISO 13849-1: 2015 PL | EN ISO 13849-1: 2015 Category | EN 62061 SIL CL | EN 62061 $PFH_D$ [1/h] | IEC 61511 SIL | IEC 61511 PFD | EN ISO 13849-1: 2015 $T_M$ [year] |
|---|---|---|---|---|---|---|---|
| 312 085, 314 085, 315 085 | PL e | Cat. 4 | SIL CL 3 | 4,14E-09 | SIL 3 | 3,51E-05 | 20 |
| 314 086, 315 086 | PL e | Cat. 4 | SIL CL 3 | 4,18E-09 | SIL 3 | 3,54E-05 | 20 |

If the module is operated at an ambient temperature above 60° C, the values stated in the table for $PFH_D$ and PFD will need to be doubled when a safety function is calculated.

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

**INFORMATION**

A safety function's SIL/PL values are **not** identical to the SIL/PL values of the units that are used and may be different. We recommend that you use the PAScal software tool to calculate the safety function's SIL/PL values.

# 10 Order reference

## 10.1 Product

| Product type | Features | Order no. |
|---|---|---|
| PSSu H FS SN SD | Head module with SafetyNET p interface, base type | 312 085 |
| PSSu H FS SN SD-T | Head module with SafetyNET p interface, T-type | 314 085 |
| PSSu H FS SN SD M12-T | Head module with SafetyNET p interface, M12 female connector, T-type | 314 086 |
| PSSu H FS SN SD-R | Head module with SafetyNET p interface, R-type | 315 085 |
| PSSu H FS SN SD M12-R | Head module with SafetyNET p interface, M12 female connector, R-type | 315 086 |

## 10.2 Accessories

### Cable

| Product type | Features | Order no. |
|---|---|---|
| SafetyNET p Cable | SafetyNET p cable, standard, 4-core, sold by the metre, minimum purchase 10 m | 380 000 |
| M12 con., straight, male, 4-pin, D | Connector, M12, 4-pin, D-coded | 380 316 |
| Stripping tool | Assembly tool for SafetyNET p cable | 380 070 |

### Terminals

| Product type | Features | Order no. |
|---|---|---|
| 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 |