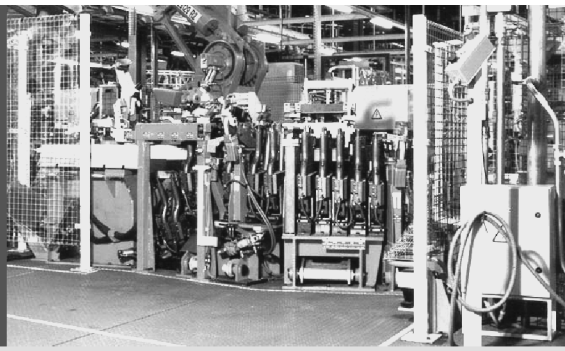
ADDENDUM OPERATING INSTRUCTIONS

S3000 PROFINET IO and S3000 PROFINET IO-OF



Safety laser scanner

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Sensor Intelligence.

Contents

1 About this document

These operating instructions are original operating instructions.

This addendum is applicable for the S3000 PROFINET IO and S3000 PROFINET IO-OF safety laser scanners, in the following summarized as S3000 PROFINET IO/IO-OF. As far as the connection variants differ, the respective product variant is named.

This addendum is applicable to the S3000 PROFINET IO/IO-OF safety laser scanner with one of the following entries on the type label in the field *Operating Instructions*:

- 8013289
- 8013289/TL59
- 8013289/US26

This document is part of SICK part number 8013289 (addendum operating instructions “Safety Laser Scanner S3000 PROFINET IO and S3000 PROFINET IO-OF” in all available languages).

Note **This addendum only applies in conjunction with the original operating instructions “S3000 Safety Laser Scanner” (SICK part number 8009791).**

If not otherwise revised in this document, the information in the original operating instructions applies, which relate to the S3000 Advanced or Professional safety laser scanner.

For the configuration and diagnostics of these devices you require CDS (Configuration & Diagnostic Software) version 3.6.4 or higher.

2 On safety

2.1 Applications of the device

The S3000 PROFINET IO/IO-0F safety laser scanner is used to protect persons and plant.

Stationary applications, e.g. for access or hazardous area protection, can be realised.

The safety level of the S3000 PROFINET IO/IO-0F corresponds to category 3 PL d according to EN ISO 13849-1 and SIL2 according to IEC 61508.

2.2 General safety notes and protective measures

WARNING

Safety notes

This addendum must be made available to the operator of the system, machine or the vehicle where the S3000 PROFINET IO/IO-0F safety laser scanner is used, together with the original operating instructions. The operator is to be instructed by qualified safety personnel and is to read and follow the addendum; the operating instructions must also be followed.

3 Product description

This chapter provides information on the special features and properties of the S3000 PROFINET IO/IO-OF safety laser scanner. It also describes the properties and functions that differ from the S3000 Advanced or Professional.

➢ Please read this chapter before mounting, installing and commissioning the device.

3.1 Special features

- Protective field range 4 m, 5.5 m or 7 m
- Warning field range 49 m (20 m at 20 % remission)
- S3000 PROFINET IO/IO-OF Advanced with 4 protective fields/warning fields (field sets)
- S3000 PROFINET IO/IO-OF Professional with 8 protective/warning fields (field sets)
- Simultaneous protective fields with separate output information and separate feature for resetting (see section 8.1 on page 28 or 8.1.2 on page 29)
- Direct fail-safe integration into PROFINET IO networks
- Supply connector with integrated configuration memory
- Connection types:
  - **S3000 PROFINET IO:** RJ-45 sockets for RJ-45 push-pull plug
  - **S3000 PROFINET IO-OF:** SCRJ sockets for VARIOSUB push-pull SCRJ-plug

The S3000 PROFINET IO/IO-OF does not have any local inputs or outputs except the interfaces for setting the parameters. All communication is via the PROFINET IO network.

3.2 Operating principle of the devices

PROFINET IO device

The PROFINET IO device is a remotely connected field device for installation in close proximity to the process. It expects the configuration from an IO controller/supervisor and cyclically transmits its process data to the IO controller.

PROFIsafe for PROFINET

PROFIsafe defines how fail-safe devices (e.g. S3000 PROFINET IO/IO-OF) communicate over a network with safety controllers (e.g. FPLC). It realises the safe communication via a profile, i.e. using a special data format and a special protocol.

Device role

The S3000 PROFINET IO/IO-OF is an IO device.

It expects the configuration from an IO controller and cyclically transmits its process data to the IO controller.

Device model

The S3000 PROFINET IO/IO-OF is available as a compact device.

Services supported

- PROFINET IO with Conformance Class B
- LLDP
- SNMP
- MIB II
- Cyclic IO communication
- Acyclic read/write services for communication via TCI interface
- Diagnostics alarms
- TCP/IP communication via port 9000

3.3 Input signals

3.3.1 Reset signals

If the safety laser scanner is operated using the “With restart interlock” function, then after a protective field interruption and the subsequent clearing of the protective field, the S3000 PROFINET IO/IO-OF requests a reset signal from the control system (Reset Required). The safety laser scanner reacts to an edge change on the reset signal from low to high (not to the level).

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The reset signal must be fail-safe (single failure proof)!

3.3.2 Control signals for switching monitoring cases

You can switch between protective fields by switching monitoring cases.

Note The related control inputs A, B, C, D on theS3000 PROFINET IO/IO-OF Professional or A, B on the S3000 PROFINET IO/IO-OF Advanced expect complementary signals.

Tab. 1: Logical state 0 of the control inputs in the process image

Control input	**A**		**B**		**C**		**D**	
Bits in output byte **0** in the process image (see Tab. 10 on page 32)	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Value of the bit	0	1	0	1	0	1	0	1
Logical state	0		0		0		0	

Tab. 2: Logical state 1 of the control inputs in the process image

Control input	**A**		**B**		**C**		**D**	
Bits of the output byte **0** in the process image (see Tab. 10 on page 32)	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Value of the bit	1	0	1	0	1	0	1	0
Logical state	1		1		1		1	

Examples:

01011010 = valid value: A = 0, B = 0, C = 1, D = 1

11011010 = invalid value, input A is not set complementarily

3.3.3 Stand-by

The protective field and warning field outputs are deactivated by operating the S3000 PROFINET IO/IO-OF in stand-by. The S3000 PROFINET IO/IO-OF remains in the stand-by mode as long as the related input information is present (active high) (see Tab. 10 on page 32).

3.3.4 Initialising

If the S3000 PROFINET IO/IO-OF is in the lock-out status, e.g. due to invalid values on the inputs, the safety laser scanner can be initialised. During initialisation the device runs through the boot sequence, similar to a warm start.

Once the cause of the error has been rectified, the device then starts to operate normally.

The safety laser scanner reacts to an edge change on the signal from low to high (not to the level).

4 Mounting

To calculate the safety distance and the size of the protective field when operated horizontally or vertically in stationary or mobile applications, read the chapter “Mounting” in the original operating instructions “S3000 Safety Laser Scanner” (SICK part number 8009791). Also pay attention to the dimensional drawings in section 8.7 on page 38.

5 Electrical installation

WARNING

Switch the power supply off!

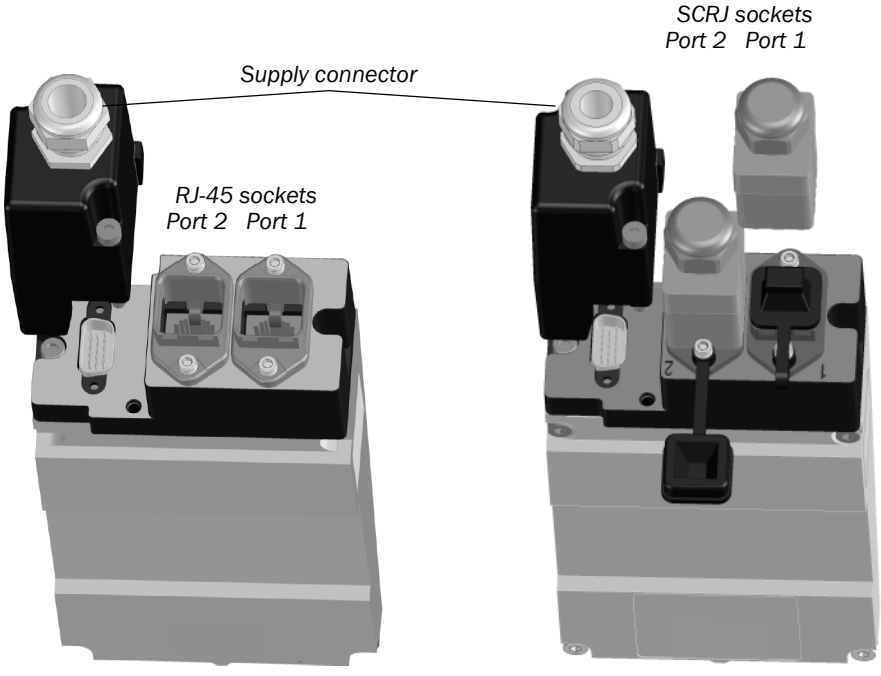
The machine/system could inadvertently start up while you are connecting the devices.

➢ Ensure that the entire machine/system is disconnected during the electrical installation.

5.1 System connection

The S3000 PROFINET IO/IO-OF is installed electrically using the supply connector and using the two RJ-45 ord SCRJ sockets.

Fig. 1: System connection



System connection for RJ-45 *System connection for SCRJ (Optical Fiber)*

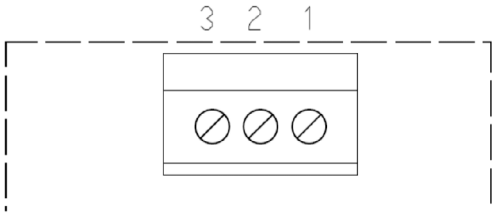
Note

- With the push-pull plug connected the SCRJ connection complies with enclosure rating IP 65 (e.g. Phoenix VS-PPC-C1-PC67-MNNA, material no. 1608142).
- With the provided cover the SCRJ connection complies with enclosure rating IP 54.

5.1.1 Voltage supply

The power is supplied via the supply connector. Lay the connecting cables through the cable entry into the connector housing.

Fig. 2: Terminals on the supply connector



Tab. 3: Terminal assignments on the supply connector

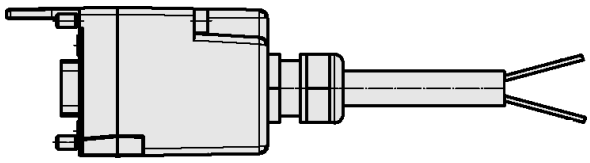
Terminal	Signal	Function	Wire colour (for the flying leads)
1	+24 V DC	Supply voltage	Brown
2	–	Do not use	–
3	0 V DC	Supply voltage	Blue

Note

- The external 24 V supply voltage may not exceed 40 V (SELV or PELV). This must be ensured during the electrical installation.

As an option a pre-assembled supply connector with flying leads is available.

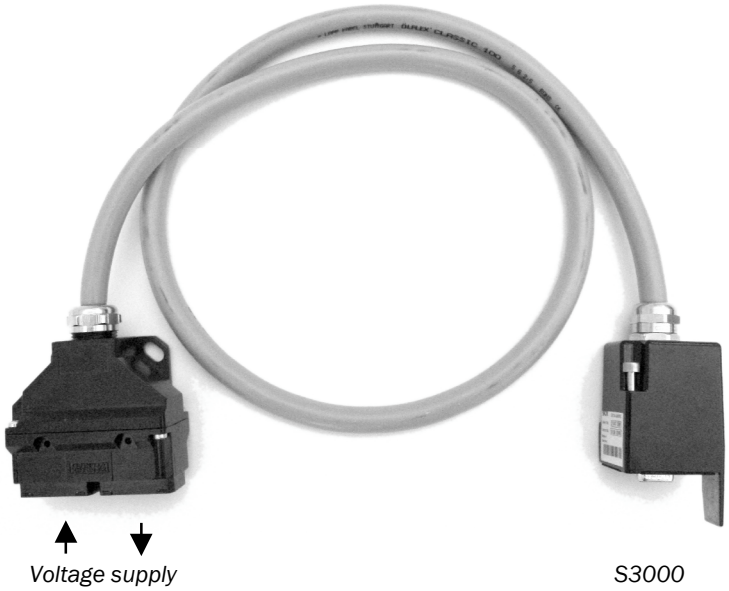
Fig. 3: Pre-assembled supply connector



Part no.: 2049575

Additionally a pre-assembled supply connector with cable and external Y-piece is available. This corresponds to a standardized push-pull power connector (industry standard).

Fig. 4: Pre-assembled cable with Y-piece



Part No.: 2049857 (on request)

5.1.2 Network connection with RJ-45-push-pull plug

Notes

- For the connection to the network you must use the push-pull plugs with a metal housing.
- If the network is not connected to a following bus device, then a connection using a plug is sufficient. It does not matter which of the two sockets is used. The unused socket must always be protected with a cover or a dummy connector.

Fig. 5: RJ-45-push-pull plug (not included)

Tab. 4: Pin assignment on the RJ-45 sockets

Pin	Signal	PROFINET IO colours
1	TX+	Yellow
2	TX–	Orange
3	RX+	White
4	–	Do not use
5	–	Do not use
6	RX–	Blue
7	–	Do not use
8	–	Do not use

5.1.3 Network connection with SCRJ-push-pull plug (optical fiber)

Notes

- For the connection to the network you must use the push-pull plugs with a metal housing. With the push-pull plug connected the SCRJ connection complies with enclosure rating IP 65 (e.g. Phoenix VS-PPC-C1-PC67-MNNA, material no. 1608142).
- If the network is not connected to a following bus device, then a connection using a single plug is sufficient. It does not matter which of the two sockets is used. The unused socket must always be protected with the provided cover (see Fig. 1). With the provided cover the SCRJ connection complies with enclosure rating IP 54.

Fig. 6: SCRJ-push-pull plug (not included)

Notes

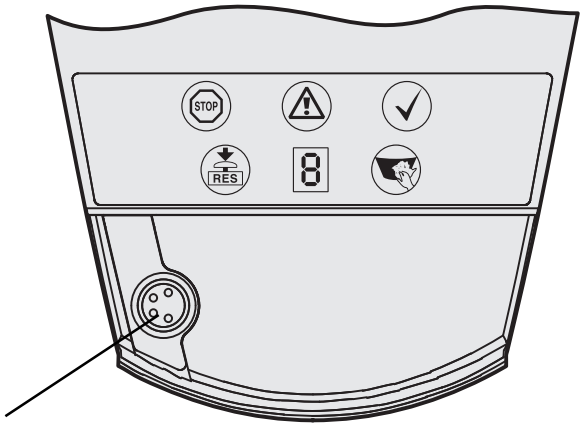
- ➢ Without the usage of optical adapter plugs the maximum allowed cable length to the next device is 50 m.
- ➢ The maximum allowed line attenuation for the transmission link is 12 dB.
- ➢ Pay attention to the mounting and wiring instructions of the manufacturer of the connectors and cables, in particular with regard to the number of bending radiuses.
- ➢ Minimize the number of connectors in a connection cable, ideally to only two: one at the S3000 PROFINET IO/IO-OF and another one at the PLC.

- ➢ Once the electrical installation is completed, determine the signal reserve of the connection cable using the CDS diagnostic function.
- ➢ Use cables and connectors with low attenuation in order to obtain a signal reserve of > 4 dB.

5.1.4 Local configuration connection

As a rule configuration is performed via PROFINET IO. A local RS-232 configuration connection is available on the S3000 PROFINET IO/IO-OF for configuration and diagnostics directly at the device.

Fig. 7: Local configuration connection



Local configuration connection

6 Configuration

The configuration is performed in 3 steps:

1. Configuration PROFINET IO
2. Configuration PROFIsafe
3. Configuration of the S3000 PROFINET IO/IO-OF

6.1 Configuration PROFINET IO

6.1.1 Reading the generic station description (GSDML)

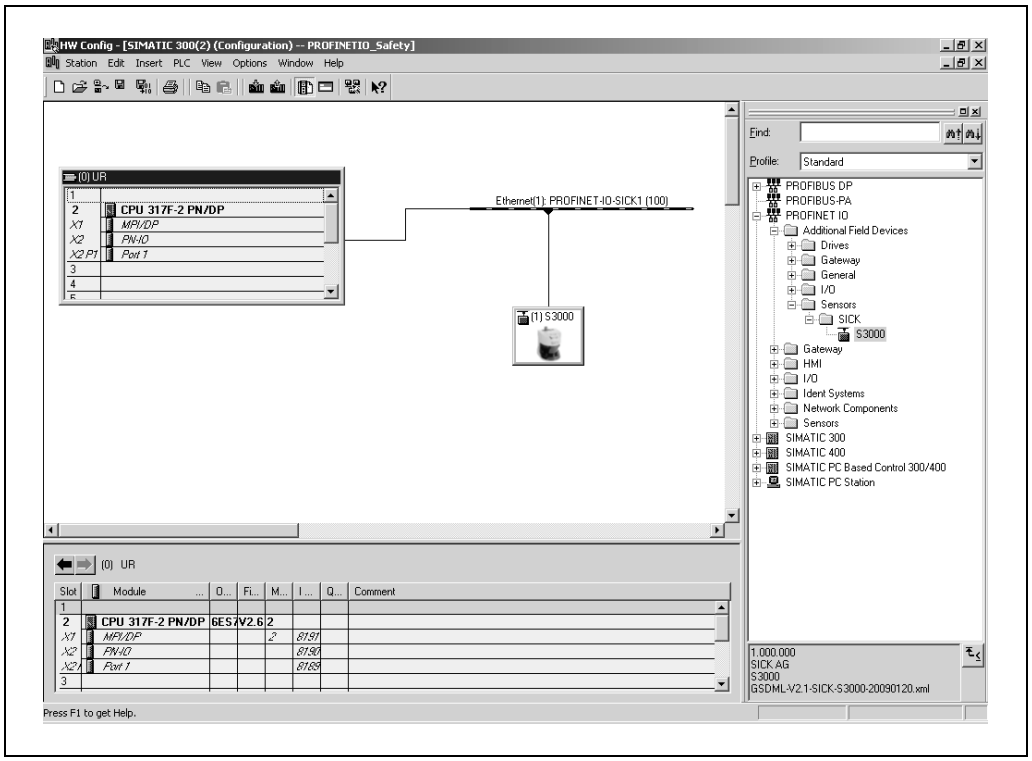
Before you can configure PROFINET IO for the first time for the S3000 PROFINET IO/IO-OF, you must add the generic station description (GSDML[1)]) for the S3000 PROFINET IO/IO-OF to the hardware catalogue in the network engineering tool, e.g. the SIMATIC Manager (Siemens) for PROFINET IO.

- Insert the CD-ROM “CDS — Configuration & Diagnostic Software” contained in the package into the CD-ROM drive of the Notebook/PC, on which you have installed the network engineering tool of your FPLC.

  The generic station description for the S3000 PROFINET IO/IO-OF can be found on the CD-ROM in the S3000 directory.
- Follow the instructions of the online help or in the user manual of the network engineering tool for loading the generic station description.

Then the S3000 PROFINET IO/IO-OF appears in the hardware catalogue in the network engineering tool under **PROFINET IO** > **Additional Field Devices** > **Sensors** > **SICK**.

Fig. 8:
S3000 PROFINET IO/IO-OF in the hardware catalogue



[1)] GSDML = Generic station description based on XML

6.1.2 Configuring users

Every PROFINET IO field device, e.g. the S3000 PROFINET IO/IO-OF has a dedicated MAC address. You will find the MAC address for the S3000 PROFINET IO/IO-OF on the sticker on the rear of the I/O module (e.g. 00:06:77:02:00:A7).

In addition a PROFINET IO field device requires a unique system-specific device name. The device name is used by the IO controller to define the IP address for the field device. The IP address is defined in two steps:

1. You use the device name assigned to the S3000 PROFINET IO/IO-OF by the network engineering tool, or you configure a unique system-specific device name with the aid of the network engineering tool (e.g. SIEMENS SIMATIC Manager).
2. The IO controller assigns the IP address based on the device name.

How to define the name of the S3000 PROFINET IO/IO-OF if necessary:

- Double-click the symbol for S3000 PROFINET IO/IO-OF in the network engineering tool. The **Properties** dialog box will open.
- Select the **General tab**.
- Enter the the device name for the S3000 PROFINET IO/IO-OF there.
- Assign a new IP address.

Note Device name and IP address must match the settings in the CDS.

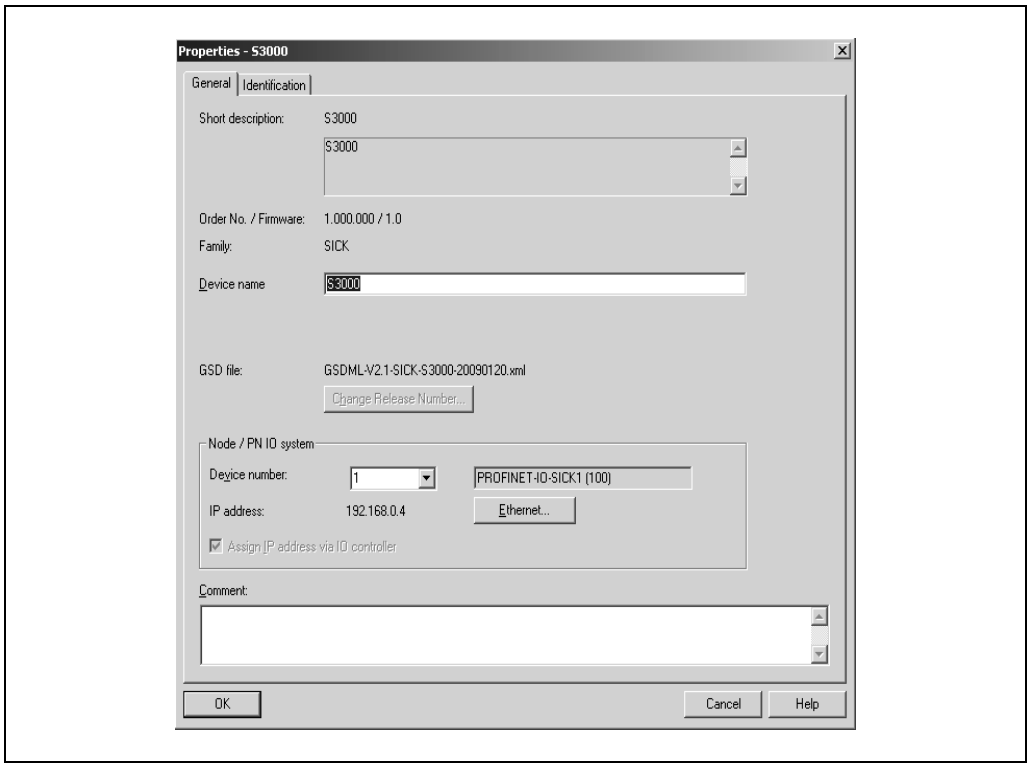
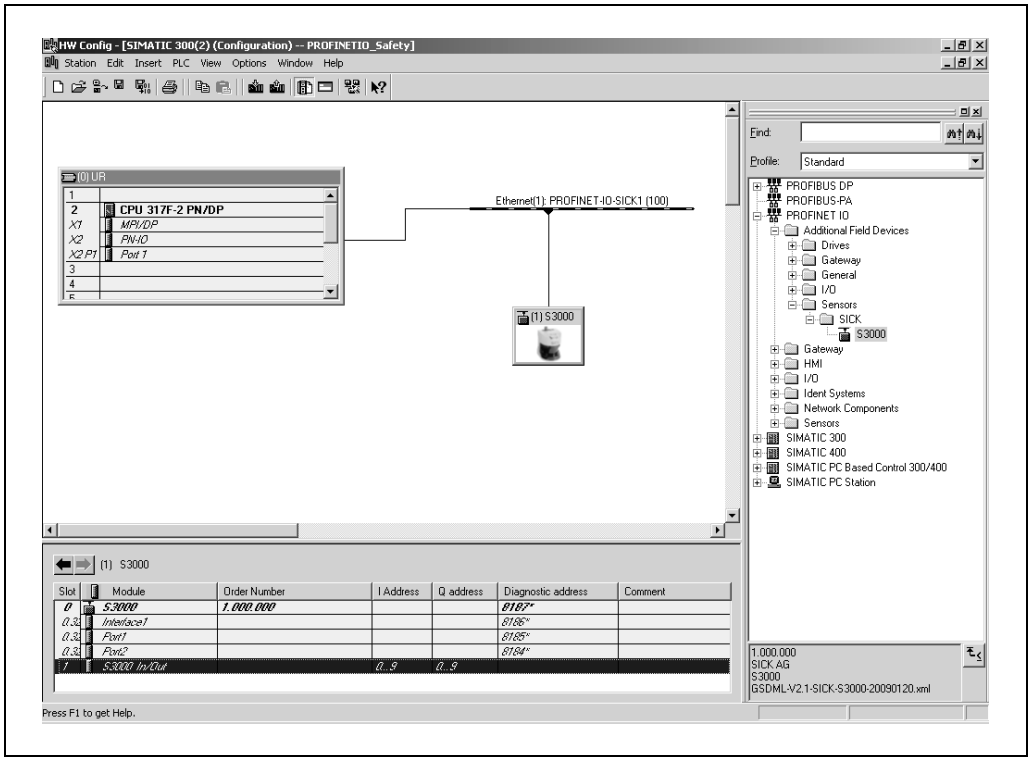


Fig. 9: Properties of the S3000 PROFINET IO/IO-OF

6.2 Configuration PROFIsafe

➢ In slots in the network engineering tool, choose the command **Object properties** on the context menu.

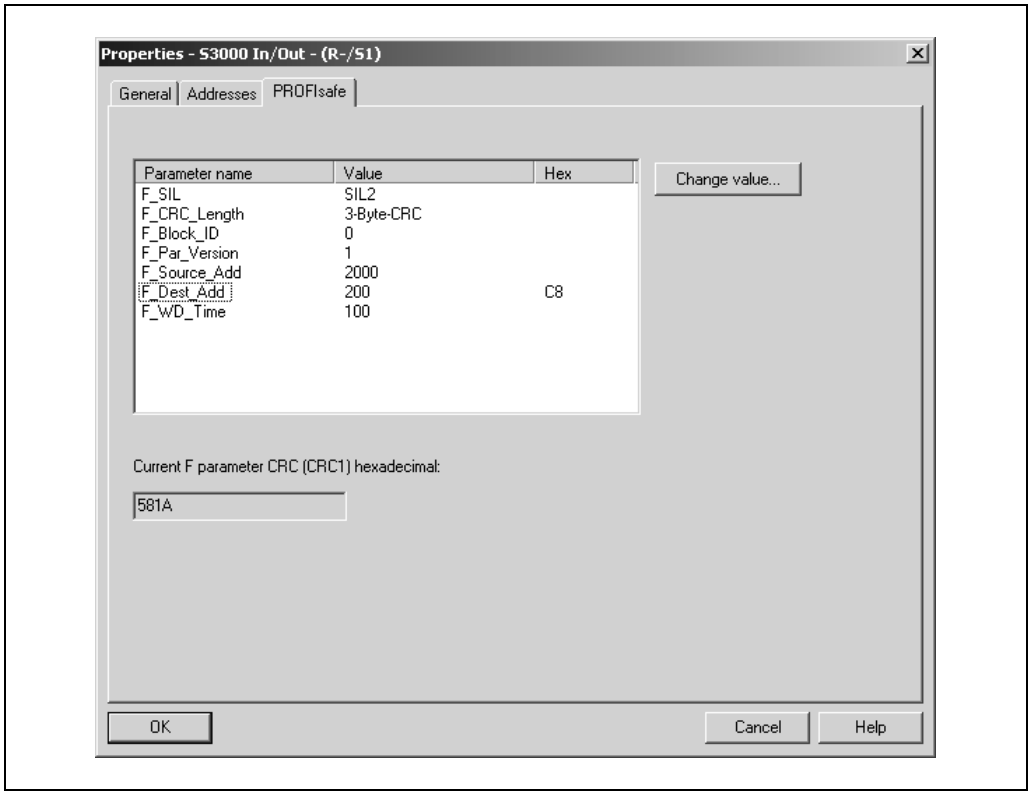
Fig. 10: Configuration PROFIsafe, step 1



➢ On the **PROFIsafe** tab configure the parameters for the S3000 PROFINET IO/IO-OF.

Note See Tab. 5 for the parameters to be entered.

Fig. 11: Configuration PROFIsafe, step 2



Tab. 5: PROFIsafe parameters for the S3000 PROFINET IO/IO-OF

Parameter	Meaning	Setting
F_SIL	Safety integrity level (NoSIL, SIL1 or SIL2) of the S3000 PROFINET IO/IO-OF	Depending on application
F_CRC_Length	Anticipated length of the CRC checksum in the PROFIsafe telegram	3 Byte CRC[2)]
F_Block_ID	The value 1 in the parameter indicates that the data set for the value of F_iPar_CRC is extended by 4 bytes. You are not allowed to change the parameter.	0
F_Par_Version	Implemented PROFIsafe version. You cannot change this parameter.	1
F_Source_Add	PROFIsafe source address. Must be unique in combination with the PROFIsafe destination address and is assigned automatically	1 to 65534
F_Dest_Add	PROFIsafe destination address. Must be unique in combination with the PROFIsafe source address and is assigned automatically. Notes: • The PROFIsafe address for the S3000 PROFINET IO/IO-OF must match this value (see section 6.2.1 on page 20). ➢ You must enter the default value for the parameter **F_Dest_Add** using CDS (see Fig. 12 on page 20).	1 to 65534
F_WD_Time	Monitoring time (“Watchdog time”) for the cyclic service. If no valid PROFIsafe telegram is exchanged between the S3000 PROFINET IO/IO-OF and the FPLC within the set monitoring time, both will proceed to the safe status, i.e. they assign themselves failsafe values. The monitoring time should be sufficiently long to tolerate minor delays in communication. In the event of an error however, it must not unnecessarily delay the system response of the S3000 PROFINET IO/IO-OF or that of the FPLC.	Depending on the application from 1 to 65535 ms

[2)] Cannot be changed.

6.2.1 Setting the PROFIsafe address on the S3000 PROFINET IO/IO-0F

In order for you to operate the S3000 PROFINET IO/IO-0F as a PROFIsafe user, this must have a PROFIsafe address. The PROFIsafe address must correspond to the appropriate setting in the FPLC network engineering tool.

For this purpose, in the network engineering tool in the PROFIBUS configuration for the bus node, read the value of the parameter **F_Dest_Add** and use the value read as the PROFIsafe address in the configuration for the S3000 with the aid of the CDS.

CDS, device symbol **S3000 PROFINET IO**, context menu **Configuration draft**, **Edit**, file card **General**, option **PROFIsafe address(F_Dest_Add)**.

Fig. 12: Corresponding parameter in the CDS

6.2.2 Passivation and reintegration of the S3000 PROFINET IO/IO-0F

Passivation

After establishing the communication link from the S3000 PROFINET IO/IO-0F to the fail-safe control, the S3000 PROFINET IO/IO-0F is in the passive state. The safety laser scanner is also placed in this state after the following events:

- in case of errors in the safety-related communication (communication error) between F-CPU and S3000 PROFINET IO/IO-0F via the safety protocol as per PROFIsafe
- in case of F peripheral/channel errors (e.g. wire break, short-circuit)
- if the F peripheral has been rendered passive in the fail-safe control

If the S3000 PROFINET IO/IO-0F is in the passive state, it must be reintegrated.

Reintegration of the S3000 PROFINET IO/IO-0F

The reintegration of a S3000PN into the fail-safe control system, i.e. the provision of process values, is generally automatic. Depending on the cycle time for the F process group and the PROFINET IO, the reintegration may take a few cycles of the F process group in certain circumstances.

If the establishment of the communication between F-CPU and F peripheral takes longer than the monitoring time set, automatic reintegration is not performed.

In this case the reintegration must be undertaken in the F program in accordance with the information from the manufacturer of the control. For this purpose refer to the operating instructions for the fail-safe control system.

6.3 Configuration of the S3000 PROFINET IO/IO-OF

For information on the configuration of the basic functions, refer to the original operating instructions “S3000 safety laser scanner” (SICK part number 8009791). Using the CDS (Configuration & Diagnostic Software) you can configure all available parameters and define the field geometries for the protective fields and warning fields.

The connection is made to the device via ...

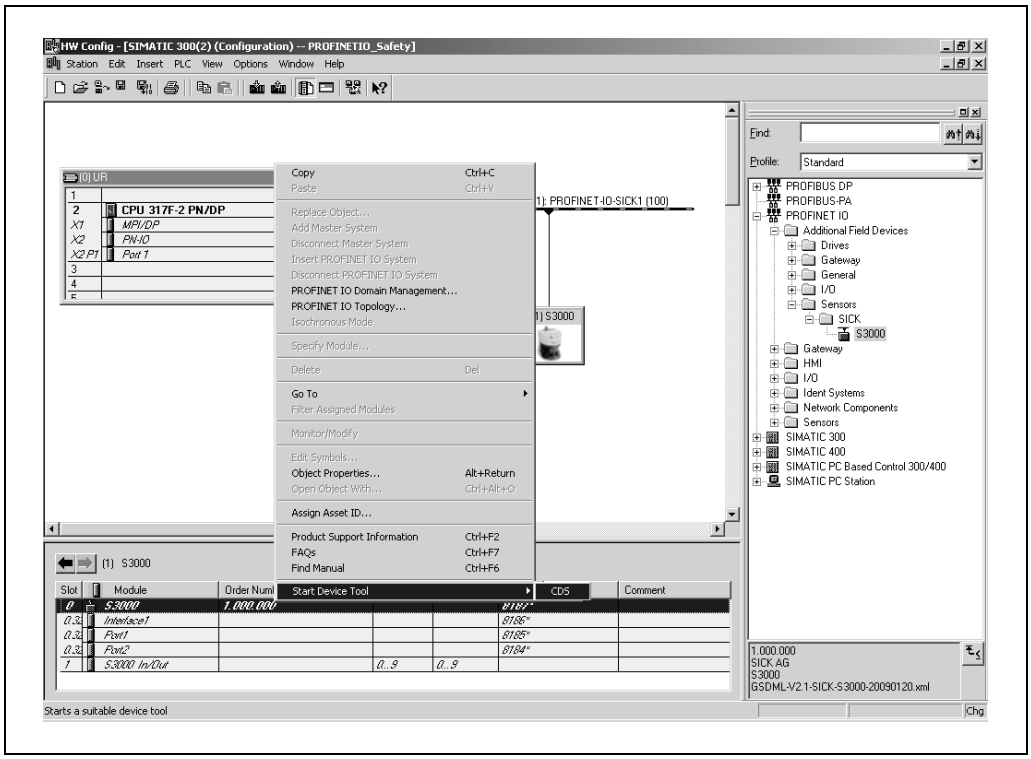
- the local device connection.

  The connection to the local configuration and diagnostics connection is made using an RS-232 cable available as an accessory.

- the network.

  Configuration via the network is only possible after the PROFINET configuration. The CDS is opened using TCI in the hardware configuration in the network engineering tool.

Fig. 13: Example of opening the CDS using TCI



7 Diagnostics

The diagnostics are undertaken using ...

- the messages on the 7-segment display and LED displays.
- the CDS (Configuration & Diagnostic Software).
- alarms (PROFINET diagnostics messages).

7.1 Meaning of the status indicators

In normal, fault-free operation, the green LED illuminates and the dot on the 7-segment display flashes.

7.1.1 Meaning of the LEDs

Contrary to the meaning of the status indicators described in the original operating instructions “S3000 safety laser scanner”, the LEDs have the following function:

LED illuminated = PROFIsafe communication active, no fault
LED flashing at 0.5 Hertz = Operator acknowledge requested by the FPLC

LED illuminated = Device passive or has a fault

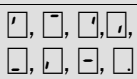
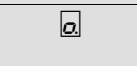
Reset required

LED off = Warning field(s) unoccupied
LED illuminated = Warning field(s) infringed

LED illuminated = Contamination

7.1.2 Meaning of the 7-segment display

Tab. 6: Error displays of the 7-segment display

Display	Possible cause	Remedying the error
	Power-up cycle — all segments are activated sequentially	No error
	PROFINET IO communication in progress	No error
	Stand-by mode active, the laser is switched off	No error
	Object in protective field	No error. Status indication eases system testing on the use of simultaneous protective fields
	Object in the simultaneous protective field or the contour as reference function has triggered	

Display	Possible cause	Remedying the error
3	Initialisation of the device	➢ The display goes out automatically when the S3000 PROFINET IO/IO-OF is initialised. If the display 3 does not go out: ➢ Check the system configuration with the aid of the CDS. Transfer the corrected configuration to the S3000 PROFINET IO/IO-OF again.
4	Waiting for valid input signals	➢ The display goes out automatically when an input signal is present that corresponds to a configured monitoring case. If the display 4 does not go out: ➢ Check the system configuration.
6	Waiting for configuration or configuration not completed	➢ The display goes out automatically once the configuration has been successfully transferred. If the display 6 does not go out: ➢ Check the configuration of the system using the CDS (Configuration & Diagnostic Software). Transfer the corrected configuration to the S3000 PROFINET IO/IO-OF again.
E ↻ 1	Sensor head faulty	➢ Send the sensor head to the manufacturer for repair.
E ↻ 2	I/O module faulty	➢ Send the I/O module to the manufacturer for repair.
E ↻ 3	Configuration memory in the system plug faulty	➢ Send the system plug to the manufacturer for repair.
1 ↻ 1	The S3000 PROFINET IO/IO-OF is receiving no measured values within a range of at least 90° (measuring range maximum 49 m), it thus is not detecting any obstacles such as e.g. building walls.	➢ For the correct function of the safety laser scanner, always ensure that measured values are received within a range of 90°; this range can be moved as required within the scan range.
H	PROFINET IO module identification (is initiated by the FPLC)	No error

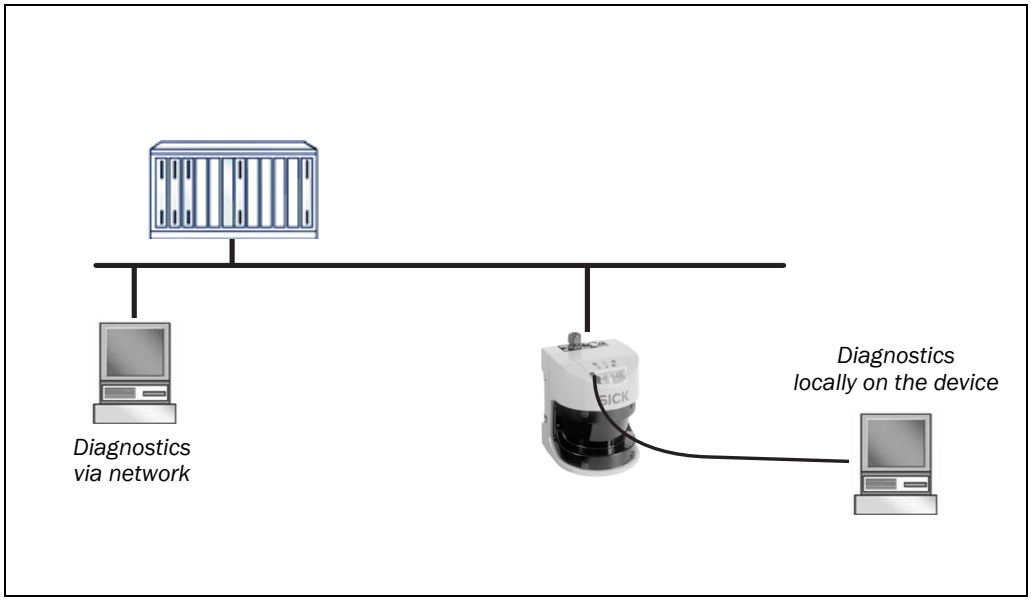
Display	Possible cause	Remedying the error
1. ↻ 2.	Device is dazzled	➢ Check whether the S3000 PROFINET IO/IO-OF is being dazzled by an external light source, e.g. headlight, infrared light sources, stroboscopic light, sun etc. If necessary, re-mount the device.
1. ↻ 3.	Temperature error. The operating temperature of the S 3000 has exceeded the permissible range.	➢ Check whether the S3000 is operated as per the permissible ambient conditions.
n. ↻ 1.	Input signal for an undefined monitoring case	➢ Check the operating process of the monitored machine or system. ➢ If necessary, check the configuration of the monitoring cases with the aid of the CDS.
n. ↻ 2.	Incorrect sequence on switching the monitoring cases	
n. ↻ 3.	Incorrect operation of the control inputs	➢ Check the operation of the control inputs.
P. with illuminated point	No PROFINET IO communication, no PROFIsafe active	➢ Check the configuration of the PROFINET IO (see section 6.1 on page 16) and the configuration of the safety laser scanner (see operating instructions “S3000 safety laser scanner” (SICK part number 8009791)).
P. with flashing point	PROFINET IO communication active, no PROFIsafe active	➢ Check the PROFIsafe configuration (see section **Fehler! Verweisquelle konnte nicht gefunden werden.** on page **Fehler! Textmarke nicht definiert.**) . ➢ Read the device diagnostics in the safety laser scanner using the network engineering tool or using the CDS. Typical PROFIsafe configuration errors are indicated. ➢ If there are no more diagnostics messages, the S3000 PROFINET IO/IO-OF is waiting for reintegration by the fail-safe control (see section 6.2.2 on page 21). If this action cannot be performed, check the monitoring time (F_WD_Time) for the S3000 PROFINET IO/IO-OF and the cycle with which the fail-safe program is started (see table 5 F_WD_Time e.g. on SIMATIC).
u. ↻ 1. ... 6.	Channel 1 to 6 of the contamination measurement contaminated	➢ Clean the front screen.

Display	Possible cause	Remedying the error
u. ↻ 7.	No front screen fitted or dazzling of the contamination measurement	➢ Re-fit the new front screen (then perform front screen calibration). If at the time of the error a front screen was fitted: ➢ Check whether the S3000 PROFINET IO/IO-OF is being dazzled by an external light source, e.g. headlight, infrared light source, stroboscopic light, sun etc.
u. ↻ 8. u. ↻ 9.	Traceability data incorrect or front screen calibration failed	➢ Carry out a front screen calibration or replace the S3000 PROFINET IO/IO-OF, if necessary.
4. ↻ 1.	Internal error of the sensor head	➢ Replace the sensor head of the S3000 PROFINET IO/IO-OF.
4. ↻ 2.	Internal error on the I/O module	➢ Replace the I/O module of the S3000 PROFINET IO/IO-OF.
4. ↻ 3.	I/O module/sensor head device combination invalid	➢ Check whether the correct I/O module has been used and replace if necessary.

7.2 CDS (Configuration & Diagnostic Software)

Detailled diagnostics can be undertaken using CDS locally (RS-232 on the front) as well as via the network or the higher level FPLC (TCI integration of the diagnostic device in the FPLC).

Fig. 14: Diagnostics via network or locally on the device



7.3 Alarms

Alarms can be output acyclically. As soon as an error occurs in the S3000 PROFINET IO/IO-OF, the safety laser scanner passes it on to the network.

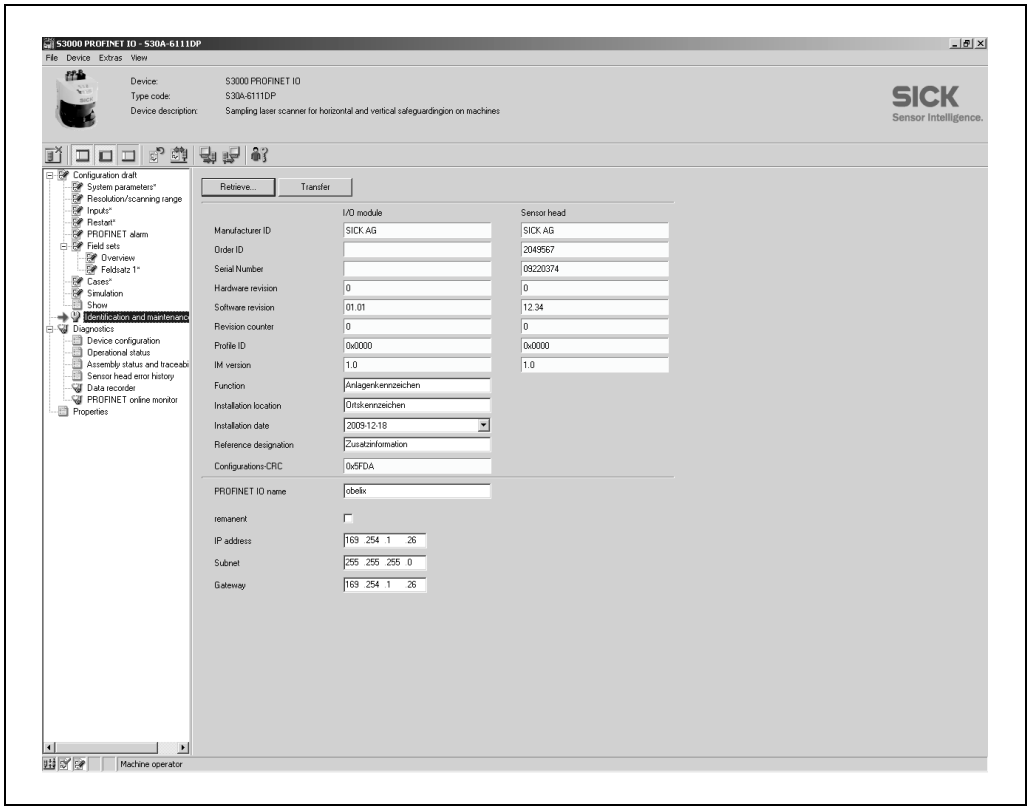
The device-specific help can be read using the IO controller. The help is saved in the GSDML[3)] for the S3000 PROFINET IO/IO-OF.

7.3.1 I&M function (Identification & Maintenance function)

The following data are loaded and displayed during the online device diagnostics from e.g. Step 7.

- IM0 = device identification (serial number, version number, order no., manufacturer etc.)
- IM1 = user can enter system code and location code
- IM2 = Installation date
- IM3 = Description of the function
- IM4 = Signature (Config CRC)

Fig. 15: I&M function in the CDS



See “PROFIBUS Profile Guidelines Part1: I&M Functions V1.1.1”.

3) GSDML = Generic station description based on XML

8 Technical specifications

8.1 Process image S3000 PROFINET IO/IO-0F Advanced

The process contains data on four monitoring cases and four field sets.

8.1.1 INPUT

Tab. 7: Process image S3000 PROFINET IO/IO-0F Advanced INPUT

	Bit	Description
Byte 0	0.0	Protective field unoccupied
	0.1	Warning field unoccupied
	0.2	Simultaneous protective field unoccupied
	0.3	Simultaneous warning field unoccupied
	0.4	Reset required (protective field)
	0.5	Reserved
	0.6	Reset required (simultaneous protective field)
	0.7	Reserved
Byte 1	1.0	Contamination
	1.1	Monitoring case valid
	1.2	Monitoring case number – Bit 0
	1.3	Monitoring case number – Bit 1
	1.4	Reserved
	1.5	Reserved
	1.6	Reserved
	1.7	Reserved
Byte 2	2.0	Reserved
	2.1	Reserved
	2.2	Reserved
	2.3	Reserved
	2.4	Reserved
	2.5	Reserved
	2.6	Reserved
	2.7	Reserved
Byte 3	3.0	Reserved
	3.1	Reserved
	3.2	Reserved
	3.3	Reserved
	3.4	Reserved
	3.5	Reserved
	3.6	Reserved
	3.7	Reserved

	Bit	Description
Byte 4	4.0	Reserved
	4.1	Reserved
	4.2	Reserved
	4.3	Reserved
	4.4	Reserved
	4.5	Reserved
	4.6	Reserved
	4.7	Reserved
Byte 5	5.0	Reserved
	5.1	Reserved
	5.2	Reserved
	5.3	Reserved
	5.4	Reserved
	5.5	Reserved
	5.6	Reserved
	5.7	Reserved

8.1.2 OUTPUT

Tab. 8: Process image S3000 PROFINET IO/IO-OF Advanced OUTPUT

	Bit	Description
Byte 0	0.0	Monitoring case switching A1
	0.1	Monitoring case switching A2
	0.2	Monitoring case switching B1
	0.3	Monitoring case switching B2
	0.4	Reserved
	0.5	Reserved
	0.6	Reserved
	0.7	Reserved
Byte 1	1.0	Reset the protective field
	1.1	Reserved
	1.2	Reset the simultaneous protective field
	1.3	Reserved
	1.4	Stand-by
	1.5	Initialising
	1.6	Reserved
	1.7	Reserved

	Bit	Description
Byte 2	2.0	Reserved
	2.1	Reserved
	2.2	Reserved
	2.3	Reserved
	2.4	Reserved
	2.5	Reserved
	2.6	Reserved
	2.7	Reserved
Byte 3	3.0	Reserved
	3.1	Reserved
	3.2	Reserved
	3.3	Reserved
	3.4	Reserved
	3.5	Reserved
	3.6	Reserved
	3.7	Reserved
Byte 4	4.0	Reserved
	4.1	Reserved
	4.2	Reserved
	4.3	Reserved
	4.4	Reserved
	4.5	Reserved
	4.6	Reserved
	4.7	Reserved
Byte 5	5.0	Reserved
	5.1	Reserved
	5.2	Reserved
	5.3	Reserved
	5.4	Reserved
	5.5	Reserved
	5.6	Reserved
	5.7	Reserved

8.2 Process image S3000 PROFINET IO/IO-OF Professional

The process contains data on eight monitoring cases and eight field sets.

8.2.1 INPUT

Tab. 9: Process image S3000 PROFINET IO/IO-OF Professional INPUT

	Bit	Description
Byte 0	0.0	Protective field unoccupied
	0.1	Warning field unoccupied
	0.2	Simultaneous protective field unoccupied
	0.3	Simultaneous warning field unoccupied
	0.4	Reset required (protective field)
	0.5	Reserved
	0.6	Reset required (simultaneous protective field)
	0.7	Reserved
Byte 1	1.0	Contamination
	1.1	Monitoring case valid
	1.2	Monitoring case number – Bit 0
	1.3	Monitoring case number – Bit 1
	1.4	Monitoring case number – Bit 2
	1.5	Monitoring case number – Bit 3
	1.6	Reserved
	1.7	Reserved
Byte 2	2.0	Reserved
	2.1	Reserved
	2.2	Reserved
	2.3	Reserved
	2.4	Reserved
	2.5	Reserved
	2.6	Reserved
	2.7	Reserved
Byte 3	3.0	Reserved
	3.1	Reserved
	3.2	Reserved
	3.3	Reserved
	3.4	Reserved
	3.5	Reserved
	3.6	Reserved
	3.7	Reserved

	Bit	Description
Byte 4	4.0	Reserved
	4.1	Reserved
	4.2	Reserved
	4.3	Reserved
	4.4	Reserved
	4.5	Reserved
	4.6	Reserved
	4.7	Reserved
Byte 5	5.0	Reserved
	5.1	Reserved
	5.2	Reserved
	5.3	Reserved
	5.4	Reserved
	5.5	Reserved
	5.6	Reserved
	5.7	Reserved

8.2.2 OUTPUT

Tab. 10: Process image S3000 PROFINET IO/IO-OF Professional OUTPUT

	Bit	Description
Byte 0	0.0	Monitoring case switching A1
	0.1	Monitoring case switching A2
	0.2	Monitoring case switching B1
	0.3	Monitoring case switching B2
	0.4	Monitoring case switching C1
	0.5	Monitoring case switching C2
	0.6	Monitoring case switching D1
	0.7	Monitoring case switching D2
Byte 1	1.0	Reset the protective field
	1.1	Reserved
	1.2	Reset the simultaneous protective field
	1.3	Reserved
	1.4	Stand-by
	1.5	Initialising
	1.6	Reserved
	1.7	Reserved

	Bit	Description
Byte 2	2.0	Reserved
	2.1	Reserved
	2.2	Reserved
	2.3	Reserved
	2.4	Reserved
	2.5	Reserved
	2.6	Reserved
	2.7	Reserved
Byte 3	3.0	Reserved
	3.1	Reserved
	3.2	Reserved
	3.3	Reserved
	3.4	Reserved
	3.5	Reserved
	3.6	Reserved
	3.7	Reserved
Byte 4	4.0	Reserved
	4.1	Reserved
	4.2	Reserved
	4.3	Reserved
	4.4	Reserved
	4.5	Reserved
	4.6	Reserved
	4.7	Reserved
Byte 5	5.0	Reserved
	5.1	Reserved
	5.2	Reserved
	5.3	Reserved
	5.4	Reserved
	5.5	Reserved
	5.6	Reserved
	5.7	Reserved

8.3 PROFINET diagnostic messages

Operating states:

- Waiting for configuration
- Lock-out
- Device error
- Error in the sensor head
- Error in the I/O module
- Error in the system plug
- Measured value error in a 90° segment
- Dazzle
- Temperature error
- Undefined monitoring case
- Sequence error field set switching
- Invalid input state
- Contamination error or contamination measurement
- PROFIsafe communication error

8.4 Response times

The total response time of your application is dependent on ...

- the basic response time of the S3000 for the related resolution (0.5°/0.25°), please refer to the original operating instructions “S3000 safety laser scanner” for this information.
- the supplement for the response time for the multiple sampling set.
- the response time of the I/O module.
- the transfer and cycle time for the bus information.
- the response time of the control system and actuators.

Response time on protective field or warning field infringement:

S3000 basic response time

+ resulting response time supplement due to multiple sampling

+ response time of the I/O module (8 ms)

+ response time of the FPLC

Example:

	60	ms	Basic response time (resolution = 0.5°)
+	90	ms	(multiple sampling = 5)
+	8	ms	
=	158	ms	(+ response time of the FPLC)

Reaction to input information:

In the case of monitoring case switching pay attention to the advancement of the timing of the switching. The response time of the safety laser scanner to input information comprises:

S3000 basic response time

+ configured input delay

+ response time of the I/O module (2 × 8 ms = 16 ms)

+ response time of the FPLC

Example:

	60	ms	Basic response time (resolution = 0.5°)
+	30	ms	(configured input delay)
+	16	ms	
=	106	ms	(+ response time of the FPLC)

8.5 Data sheet

Contrary to the technical data described in the original operating instructions “S3000 safety laser scanner”, described in the following are the technical data that are different or additional to the technical data for the safety laser scanners in the S3000 family.

Tab. 11: Data sheet S3000 PROFINET IO/IO-0F

	Minimum	Typical	Maximum
General data			
PFHd (mean probability of a dangerous failure per hour)	40×10^{-9}		
Protective field range			
Short Range			4.00 m
Medium Range			5.50 m
Long Range			7.00 m
Range of performance			
Advanced	4 protective and warning fields (field sets)		
Professional	8 protective and warning fields (field sets)		
Electrical data			
Electrical protection class	III (VDE 0106, EN 60950)		
Bus connection	2 standard PROFINET IO sockets for push-pull plug connectors with metal housing (RJ-45 or SCRJ)		
Supply connection	Plug-in device connection plug with ... • cable gland for cable diameter of 5–10 mm • screw type terminal connection for max. wire cross-section 1.5 mm^2 • integrated configuration memory		
Levels for input information:			
Restart[4)]	Activated on low-high transition		
Initialising	Activated on low-high transition		
Stand-by	Activated on permanently high		
Monitoring case switching[4)]	Static (complementary)		
Optical fiber			
Wave length of the transmitter (EN 72471)		650 nm	
Diameter of the fiber-optic cable of the POF cables	980 µm	1000 µm	
Cable length			50 m
Line attenuation[5)]			12 dB

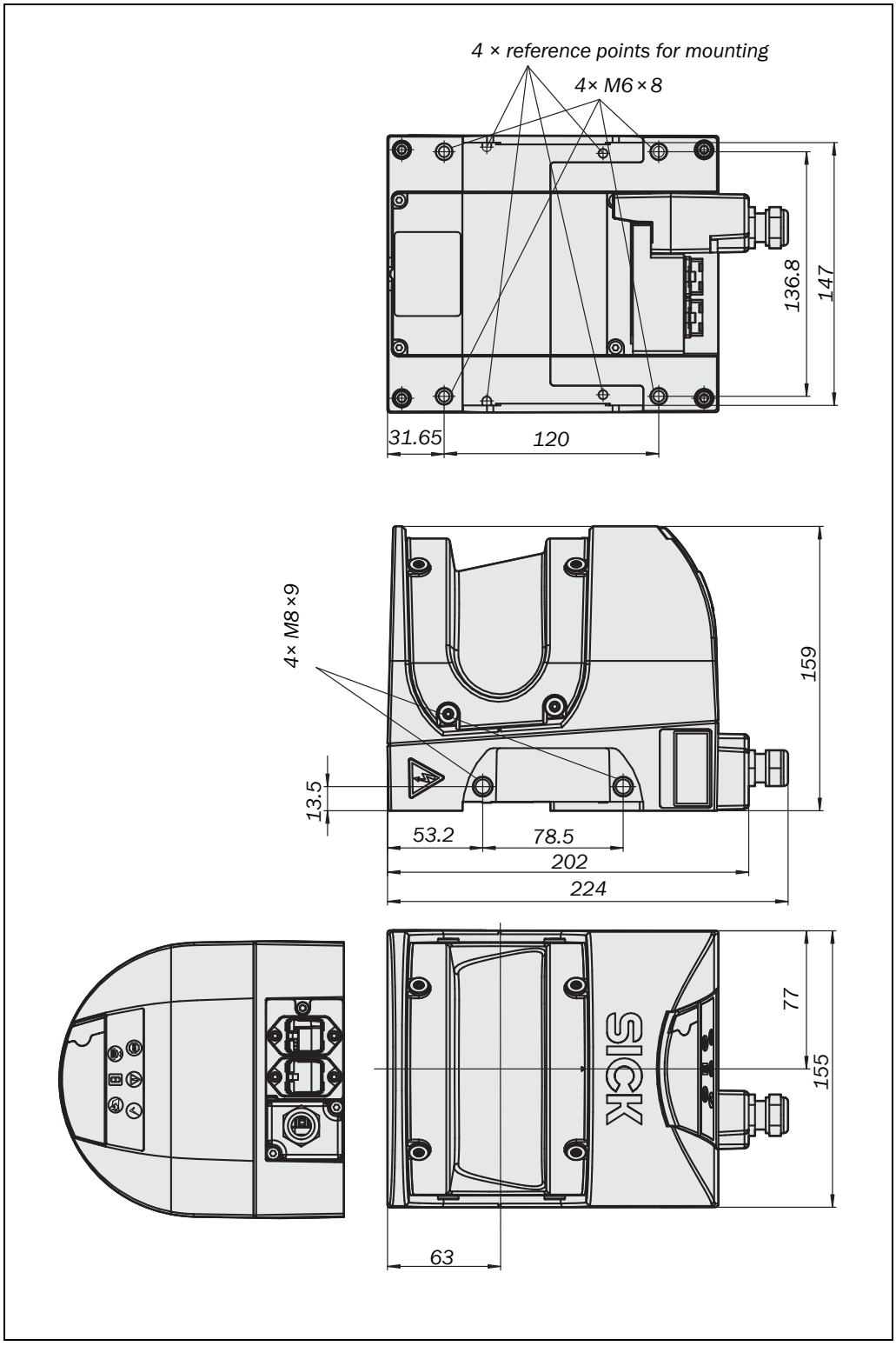
[4)] Fail-safe input signals are required.
[5)] Pay attention to the mounting and wiring instructions of the manufacturer of the connectors and cables, in particular with regard to the number of bending radiuses.

8.6 Services supported

- PROFINET IO with Conformance Class B
- LLDP
- SNMP
- MIB II
- Cyclic IO communication
- Acyclic read/write services for communication via TCI interface
- Diagnostics alarms
- TCP/IP communication via port 9000

8.7 Dimensional drawing S3000 PROFINET IO/IO-OF

Fig. 16: Dimensional drawing S3000 PROFINET IO/IO-OF (mm)



9 Ordering information

9.1 Items supplied

- S3000 PROFINET IO/IO-OF
- Operating instructions and CDS (Configuration & Diagnostic Software) on CD-ROM
- Adhesive label “Important information”

9.2 Systems available

9.2.1 S3000 PROFINET IO with RJ45 sockets

Tab. 12: Part numbers, S3000 PROFINET IO with RJ45 sockets

Device type	Part	Part number
S30A-4111CP	S3000 PROFINET IO Advanced with short-range sensor head (4 m)	1045650
S30A-4111DP	S3000 PROFINET IO Professional with short-range sensor head (4 m)	1045651
S30A-6111CP	S3000 PROFINET IO Advanced with medium-range sensor head (5.5 m)	1045652
S30A-6111DP	S3000 PROFINET IO Professional with medium-range sensor head (5.5 m)	1045653
S30A-7111CP	S3000 PROFINET IO Advanced with long-range sensor head (7 m)	1045654
S30A-7111DP	S3000 PROFINET IO Professional with long-range sensor head (7 m)	1045655

9.2.2 S3000 PROFINET IO-OF with SCRJ sockets (optical fiber)

Tab. 13: Part numbers, S3000 PROFINET IO-OF with SCRL sockets (optical fiber)

Device type	Part	Part number
S30A-4111CL	S3000 PROFINET IO-OF Advanced with short-range sensor head (4 m)	1052591
S30A-4111DL	S3000 PROFINET IO-OF Professional with short-range sensor head (4 m)	1052592
S30A-6111CL	S3000 PROFINET IO-OF Advanced with medium-range sensor head (5.5 m)	1052593
S30A-6111DL	S3000 PROFINET IO-OF Professional with medium-range sensor head (5.5 m)	1052594
S30A-7111CL	S3000 PROFINET IO-OF Advanced with long-range sensor head (7 m)	1052595
S30A-7111DL	S3000 PROFINET IO-OF Professional with long-range sensor head (7 m)	1052596

9.3 Accessories/spare parts

Tab. 14: Part numbers accessories/spare parts

Device type	Part	Part number
S30A-xxxxCP	I/O module S3000 PROFINET IO Advanced	2047737
S30A-xxxxDP	I/O module S3000 PROFINET IO Professional	2047169
S30A-xxxxCL	I/O module S3000 PROFINET IO-0F Advanced	2057800
S30A-xxxxDL	I/O module S3000 PROFINET IO-0F Professional	2057801
S30A-411	Sensor head 4 m	2049566
S30A-611	Sensor head 5,5 m	2049567
S30A-711	Sensor head 7 m	2049568
Sx1A-A0000L	Supply connector	2047286
Sx1A-B0201L	Supply connector with 1 m cable	2049575
SX1A-B0201M	Power Y-distribution with supply connector (available on request)	2049857

Notes For further device accessories, e.g. mounting kits, see operating instructions “S3000 safety laser scanner”.

Recommendation For further accessories related to PROFINET connector technology, e.g. RJ-45 push-pull connection plugs, see www.phoenixcontact.co.uk.

10 Annex

10.1 EC Declaration of Conformity

SICK

EC Declaration of conformity

en

Ident-No. : 9068273/O541

The undersigned, representing the following manufacturer

SICK AG
Industrial Safety Systems
Sebastian-Kneipp-Straße 1
79183 Waldkirch
Deutschland

herewith declares that the product

S3000

is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced overleaf have been applied.

Waldkirch, 9. Juni 2009

ppa. Dr. Plasberg
(Manager Research and Development)

i.V. Knobloch
(Manager Production)

Note You can obtain the complete EC declaration of conformity via the SICK homepage on the Internet at: www.sick.com

10.2 List of tables

10.3 List of illustrations

8013291/US26/2011-01-25 · RV/XX (2011-01) · A4 sw int35a

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