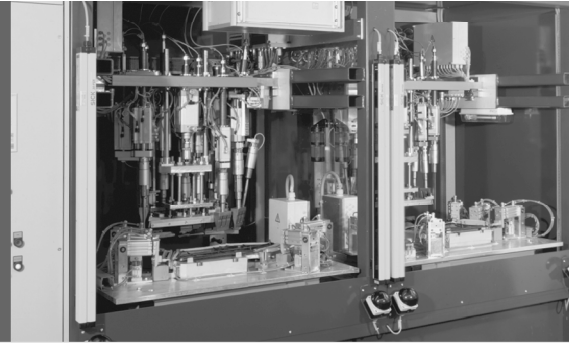# UE4140 PROFIBUS PROFIsafe
UE4740 PROFINET IO PROFIsafe
UE1140 PROFIBUS
UE1840 Ethernet TCP/IP
UE1940 CANopen

EFI gateways

GB

SICK
Sensor Intelligence.

Contents

1   About this document

Please read this chapter carefully before working with this documentation and the EFI gateway.

Note   If not otherwise stated, the product designation EFI gateway is used synonymously for the UE4140 PROFIBUS PROFIsafe, UE4740 PROFINET IO PROFIsafe, UE1140 PROFIBUS, UE1840 Ethernet TCP/IP and UE1940 CANopen gateways in this document.

1.1   Function of this document

These operating instructions are intended for *the technical personnel of the machine manufacturer* or *the machine operator* in regards to safe mounting, parameter configuration electrical installation, commissioning as well as operation and maintenance of the EFI gateway sensor.

These operating instructions do *not* provide instructions for operating machines on which the EFI gateway is, or will be, integrated. Information of this kind will be found in the operating instructions for the machine.

1.2   Target group

These operating instructions are addressed to *planning engineers*, *machine designers* and the *operators* of machines or systems which are to be protected by one or more protective devices in connection with the EFI gateway. It also addresses people who integrate the EFI gateway into a machine or system, initialise its use or operate it.

1.3   Depth of information

These operating instructions contain the following information on the UE4140, UE4740, UE1140, UE1840 and UE1940 EFI gateways:

- mounting
- electrical installation
- putting into operation and configuration
- integration into other protective devices (connection examples)

- care and maintenance
- error diagnostics and remedying
- part numbers
- conformity and approval

Planning and using protective devices such as the EFI gateway also require specific technical skills which are not detailed in this documentation.

When operating the EFI gateway, the national, local and statutory rules and regulations must be observed.

Note   We also refer you to the SICK homepage on the Internet at

www.sick.com

Here you will find:

- sample applications
- these operating instructions in different languages for viewing and printing

1.4   Scope

These operating instructions are the original operating instructions.

Note   These operating instructions apply for the EFI gateways with the following entry on the type label in the field *Operating Instructions*:

- UE4140, UE1140, UE1840 and UE1940: 8011499/TD46
- UE4740: 8013333

This document is part of SICK part number 8011499 (operating instructions "EFI gateways" in all available languages).

You will require a CDS (Configuration & Diagnostic Software) version 3.4.0 or greater for the configuration and diagnostics of the UE4140, UE1140, UE1840 and UE1940 EFI gateways.

You will require a CDS (Configuration & Diagnostic Software) version 3.6.1 or greater for the configuration and diagnostics of the UE4740 EFI gateway.

To check the software version, select the **Module info** item from the **?** menu in the menu bar.

1.5   Abbreviations used

CANopen	Open protocol standard for CAN in automation technology. The protocol uses the CAN bus as a transmission medium and establishes the basic structures for network management.
CDS	SICK Configuration & Diagnostic Software = software for the configuration of the EFI gateway
EFI	Enhanced function interface = safe SICK device communication (see technical description "EFI", SICK part number 8012622)
EFI gateway	All the gateways of the EFI gateway family. In these operating instructions these are the UE4140, UE4740, UE1140, UE1840 and UE1940 EFI gateways.
ESPE	Electro-sensitive protective equipment, for example SICK C4000 safety light curtain
FPLC	Fail-safe programmable logic controller
GSD	General station description. Is required for the configuration of the PROFIBUS network for each PROFIBUS station. Is included in the scope of delivery of the EFI gateway.
GSDML	General station description based on XML
GSG	General station description German
OSSD	Output signal switching device = switching output which operates the safety circuit
PROFIBUS	Process field bus = an open communication protocol conforming to IEC 61158 for use in the entire field section
PROFINET IO	Process field bus = an open communication protocol conforming to IEC 61158 and IEC 61784 for use in the entire field section
PROFIsafe	Profile for safe data transfer via the PROFIBUS or PROFINET network
TCP/IP	Transmission Control Protocol/Internet Protocol

1.6   Symbols used

Recommendation   Recommendations are designed to give you some assistance in your decision-making process with respect to a certain function or a technical measure.

Note   Notes provide special information on the device.

○, ● **Red**, 🔆 **Red**,   The EFI gateway has multi-coloured LEDs. LED symbols describe the state of an LED at the
🔆 ⁄ **Red**, 🔆 ⁄ ⁄ **Red**   EFI gateway:

○	The LED is off.
● **Red**	The LED is illuminated red.
🔆 **Red**	The LED is flashing red.
🔆 ⁄ **Red**	The LED flashes red at short intervals.
🔆 ⁄ ⁄ **Red**	The LED flashes red twice at short intervals.

➢ Action   Instructions for taking action are shown by an arrow. Read carefully and follow the instructions for action.

⚠
Warning!

A warning indicates concrete or potential dangers. They save you from harm.

ATTENTION   Read warnings carefully and abide by them!

💻   Software notes show the location in the CDS (Configuration & Diagnostic Software) where you can make the appropriate settings and adjustments.

2   On safety

This chapter deals with your own safety and the safety of the equipment operators.

➢ Please read this chapter carefully before working with the EFI gateway or with the machine protected by the EFI gateway in combination with other safety components.

2.1   Qualified safety personnel

The EFI gateway and the other components connected to it must be installed, commissioned and serviced only by specialist personnel. Specialist personnel are defined as persons who …

• have undergone the appropriate technical training,

• are familiar with the relevant national industrial safety regulations, work safety regulations, directives and the generally recognised code of practice of the industry (for example, DIN standards, VDE specifications, technical codes of other EC member states) **and**

• have access to and have read these operating instructions.

2.2   Applications of the device

The EFI gateway allows access to SICK sensors via Ethernet, PROFIBUS/PROFINET IO or PROFIsafe or CANopen. The EFI gateway is a module for the integration of safety components in IP 20 connection technology. It is certified as SIL3 according to IEC 61508 and category 4 according to EN 954-1[1]/category 4 according to EN ISO 13849-1 (see also section 9.1 "Data sheet" on page 46).

2.3   Correct use

The EFI gateway may be used only as defined in section 2.2 "Applications of the device". It may be used only by qualified safety personnel and only on the system where it has been installed and initialised by qualified safety personnel.

SICK AG accepts no claims for liability if the equipment is used in any other way or if modifications are made to the device, even in the context of mounting and installation.

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[1]   Only valid for the assumption of conformity until 28.12.2009. From then on it will only be allowed to use the successor EN ISO 13849-1.

2.4   General protective notes and protective measures

⚠

ATTENTION

Observe the protective notes!

Please observe the following points in order to ensure the correct and safe use of the EFI gateways.

- The national/international rules and regulations apply to the installation, commissioning and periodic technical inspections of the EFI gateway and the safety components connected to it, in particular:

  – Machinery Directive 98/37/EC
    (from 29.12.2009 Machinery Directive 2006/42/EC)

  – Provision and use of Work Equipment Directive 89/655/EC

  – The work safety regulations/safety rules

  – Other relevant health and safety regulations

  – EMC directive 2004/108/EC

  Manufacturers and operators of the machine on which the EFI gateway is used are responsible for obtaining and observing all applicable safety regulations and rules.

- The notices of these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.

- The test regulations in the operating instructions of all the connected components are to be observed.

- Changes to the configuration of the devices can impair the protective function. After every change to the configuration you must therefore check the effectiveness of the protective device.

  The person carrying out the changes is also responsible for maintaining the protective function of the device. When making configuration changes, please always use the password hierarchy provided by SICK to ensure that only authorised persons make changes to the configuration. The SICK service team is available to provide assistance if required.

- The system must be tested by qualified safety personnel or specially qualified and authorised personnel and the test must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.

- The operating instructions must be made available to the operator of the machine where the EFI gateway is fitted.

- To meet the requirements of the relevant product standards, the external voltage supply for the device (SELV) must be able to withstand the brief mains failure of 20 ms allowed in EN 60 204-1.

- If the EFI gateway is used in accordance with the requirements of UL 508, the voltage supply must be approved "for use in class 2 circuits". Currents > 4 A may not flow.

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2.5   Environmental protection

The EFI gateway has been designed to minimise environmental impact. It uses only a minimum of power and natural resources.

➢ At work, always act in an environmentally responsible manner.

Disposal

Disposal of unusable or irreparable devices should always occur in accordance with the applicable country-specific waste-disposal regulations (e.g. European Waste Code 16 02 14).

Before you can turn over the devices for environmentally friendly recycling, you must separate the different materials of the EFI gateway from one another.

➢ Separate the housing from the remaining components (especially the PCB).

➢ Send the separated components to the corresponding recycling centres (see Tab. 1).

Tab. 1: Overview of disposal by component

Component	Disposal
Product	
Housing	Plastic recycling
PCBs, cables, plugs and electrical connection pieces	Electronics recycling
Packaging	
Cardboard, paper	Paper/cardboard recycling
Polyethylene packaging	Plastic recycling

Note   We would be pleased to be of assistance in disposing of the EFI gateway. Contact your local SICK representative.

⚠
ATTENTION

Material separation may only be performed by qualified safety personnel!

Exercise care when disassembling the devices. The danger of injury is present.

3 Product description

This chapter provides information on the special features and properties of the EFI gateway and describes the structure and operating principle of the device.

➤ It is imperative that you read this chapter before you mount, install and commission the device.

3.1 Special features of the EFI gateway

Common properties of the UE1840, UE1140, UE4140, UE4740, UE1940

- easy configuration and diagnostics by means of the Windows software CDS (Configuration & Diagnostic Software)
- 2 EFI connections for connecting active SICK safety components

Properties of the UE1840

- configuration and diagnostics of all components connected to the EFI connection by means of the configuration connection of the UE1840 via Ethernet (TCP/IP)

Fig. 1: Operating principle of the UE1840 EFI gateway

e.g. server

e.g. laptop/PC

e.g. C4000 safety light curtain

e.g. S3000 safety laser scanner
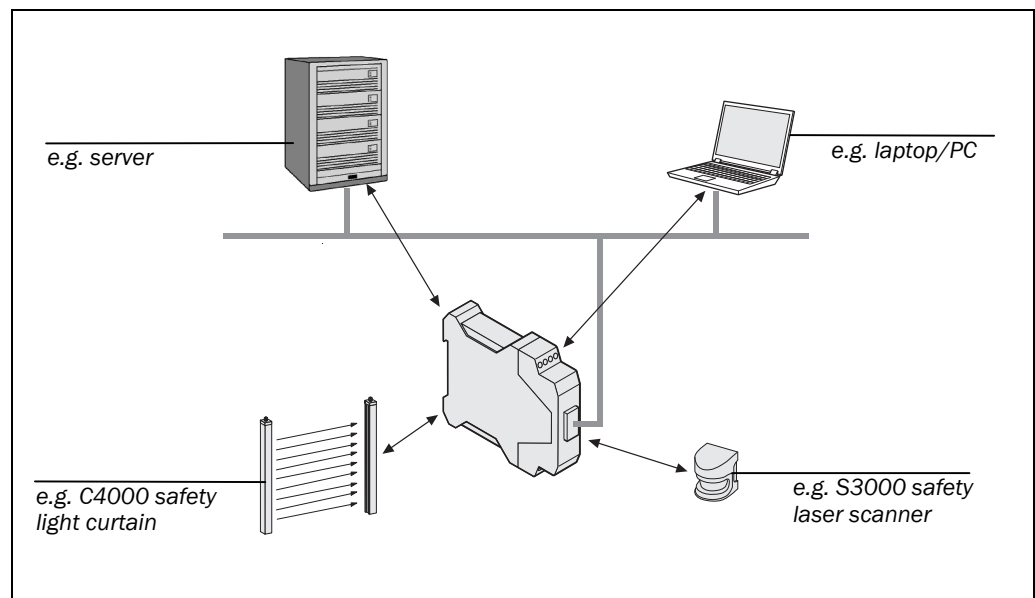
Properties of the UE1140/UE4140

- configurable process image with information from the connected EFI sensors to the controller and with information from the controller to the sensors (input and output)
- offline configuration of the system without PLC or FPLC possible
- support of PROFIBUS DP V1:
  - cyclic communication to the DP master Class 1 (central control system)
  - acyclic communication to the DP master Class 2 (configuration and diagnostics tool)
- support of PROFIsafe V2.00 (only UE4140)

Properties of the UE4740

- configurable process image with information from the EFI sensors connected to the control and with information from the control to the EFI sensors (input and output)

- offline configuration of the system without PLC or FPLC is possible

- support for:
    - PROFINET IO with Conformance Class A (prepared for B)
    - LLDP
    - SNMP
    - MIB II
    - cyclic I/O communication
    - acyclic read/write services for communication via TCI interface
    - diagnostics alarms
    - TCP/IP communication via port 9000

- support for PROFIsafe V2.00

The UE4740 is equipped with a switch for the flexible configuration of the network structure. Two RJ-45 sockets are available. The integrated switch makes it possible to connect the UE4740 to other PROFINET IO components.

A UE4740 system comprises the following modules:

- a FX3-MPL1 system plug

- a UE4740 PROFINET IO EFI gateway

Properties of the UE1940

- configurable process image with information from the connected EFI sensors to the controller and with information from the controller to the sensors (input and output)

- offline configuration of the system without PLC possible.

- support for CANopen in accordance with the CIA standards DS 301 and DS 401 with the following properties:
    - Process Data Object: (RxPDO and TxPDO) with static mapping
    - Heartbeat
    - Node guarding
    - SDO transfer
    - Emergency messages

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Fig. 2: Operating principle of the UE1140, UE4140, UE4740 and UE1940 EFI gateways

SPS (= PLC)

Message transports process image of the Slave

e.g. C4000 safety light curtain

e.g. S3000 safety laser scanner
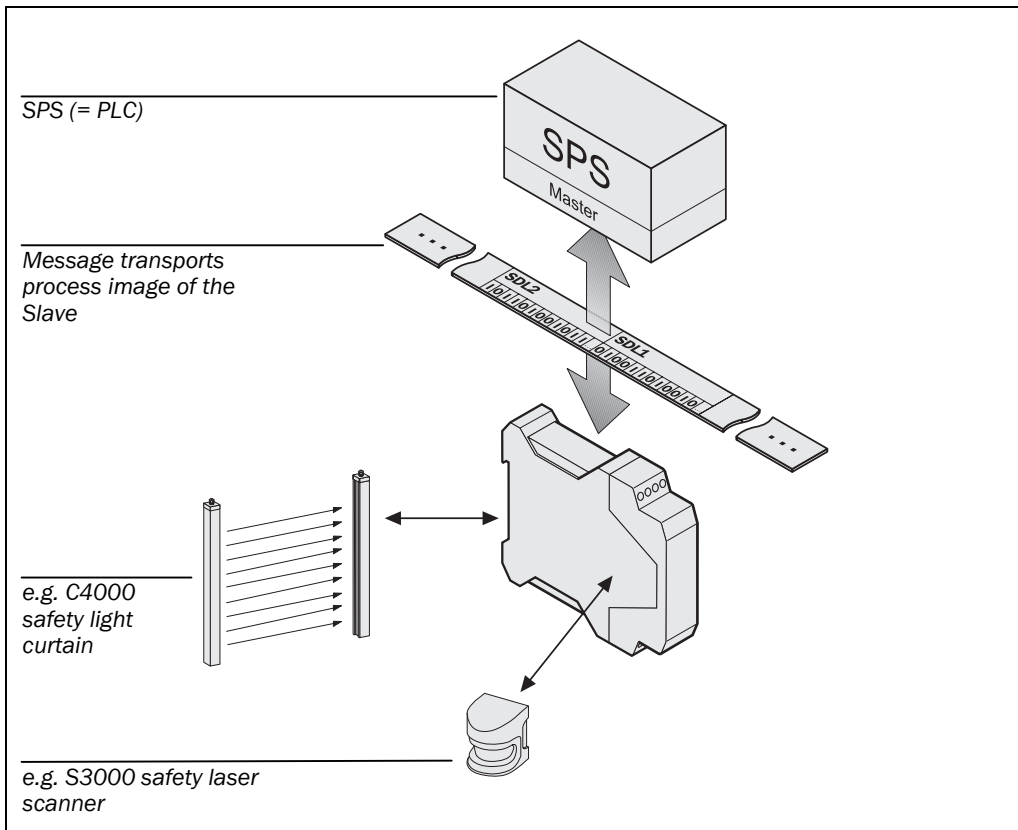
3.2 Display elements

The EFI gateway has multi-coloured status indicators, one each for the field bus or the communication interface, the diagnostics and each EFI connection. Observe the indicators of the connected devices during operation.

Fig. 3: Status indicators of the UE1140, UE4140, UE1840 and UE1940 EFI gateways

Status of the EFI2 connection

Device voltage supply (PWR)

Device diagnostics (DIA)

Field bus/communication interface (BUS)

Status of the EFI1 connection
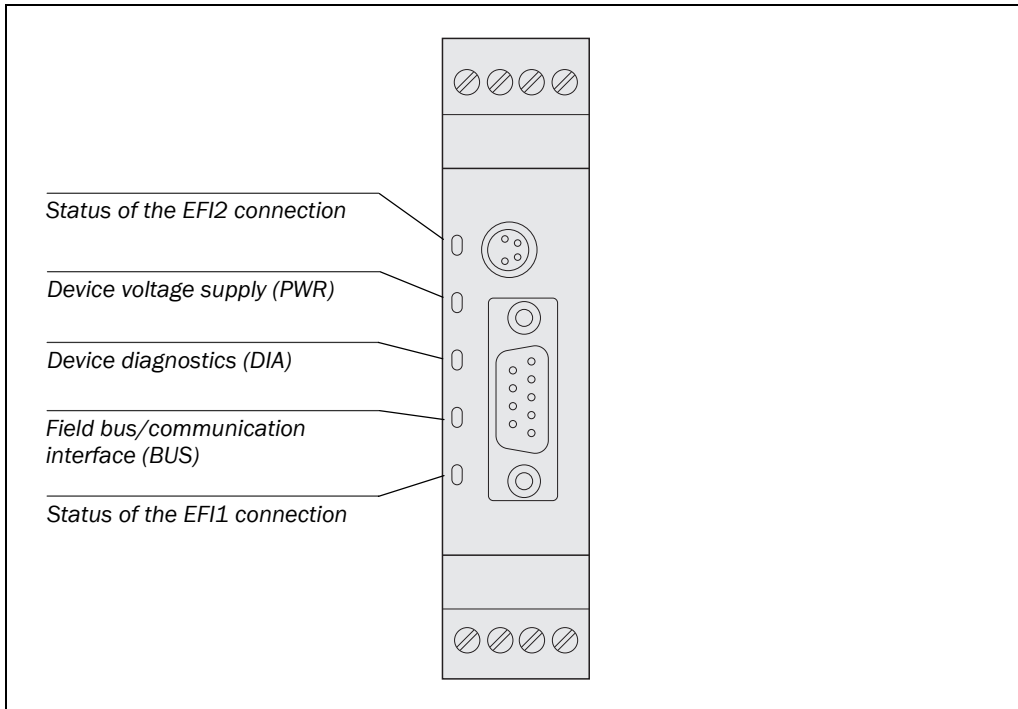
EFI gateway

Fig. 4: Status indicators of the Ethernet connection (RJ-45) at the UE1840
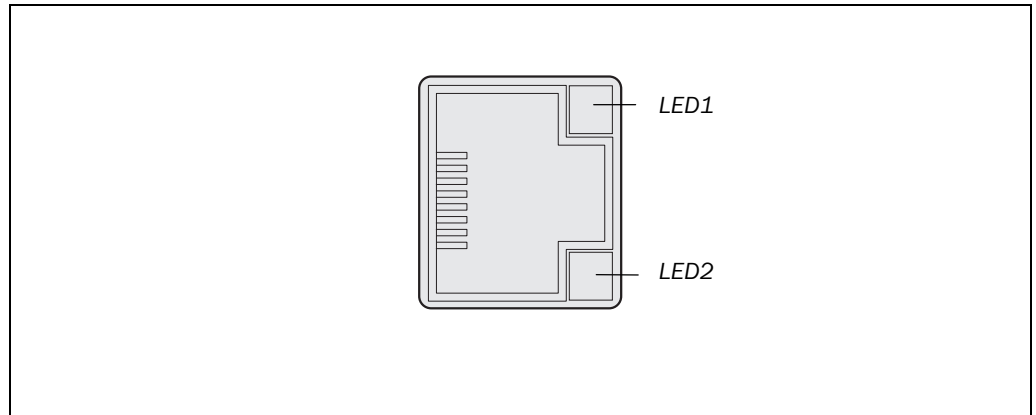
Fig. 5: Status indicators of the UE4740 EFI gateway
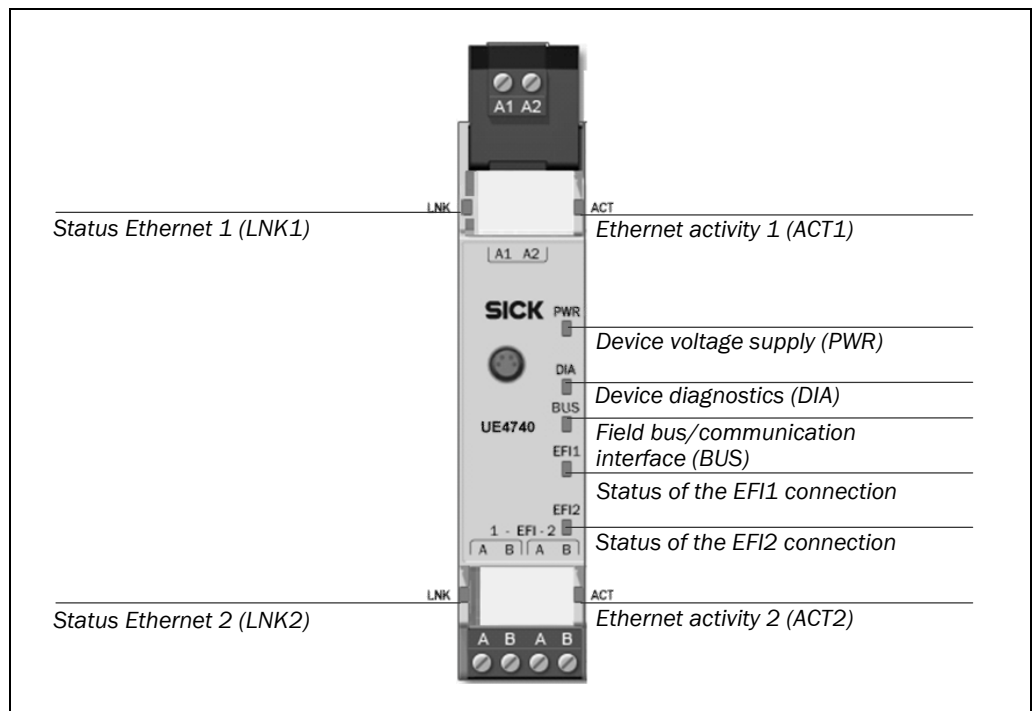
The following table describes the meaning of the status indicators of the EFI-Gateway. For a detailed description of the error displays of the LEDs please refer to section 8.3.1 "Error displays of the EFI gateway" on page 41.

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Tab. 2: Meaning of the status indicators

Display		UE4140	UE4740	UE1140	UE1840	UE1940
PWR	○	No supply voltage				
	● Red	Internal supply voltage too low or firmware is being updated				
	● Green	Voltage supply OK				
BUS	○	PROFIBUS or PROFINET IO is running, but safety communication inactive. No PROFIsafe master was recognised			No com-munication	
	● Green	PROFIBUS or PROFINET IO is running with PROFIsafe, safety communication active		PROFIBUS is running	Communi-cation via Ethernet connection	Node started (Status "Operation-al")
	☀ Green	Acknowledgement by the user required				Gateway in "Preopera-tional" status
	☀ ⁄ Green					Gateway in "Node Stopped" status
	● Red	General error of the PROFIBUS or PROFINET IO, no communication possible				CAN bus off
	☀ Red	No valid PROFIBUS or PROFINET IO configuration				
	☀ ⁄ Red					Bus error
	☀ ⁄ ⁄ Red					Guard message has failed ("Node guarding fails")
	☀ Red/ Green (2 Hz), at the same time as the PWR LED		PROFINET identifi-cation			
DIA	○	Device ready for operation				
	● Red	Configuration is being transferred or has not been completed				
	☀ Red	1 Hz: System error (lock-out)				
		UE4140 only: ½ Hz (75 % on, 25 % off): PROFIsafe passivation				

	Display	UE4140	UE4740	UE1140	UE1840	UE1940
EFI1 and EFI2	○	Device communication at connection EFI1 or EFI2 is OK				
	☀ Red	Device communication error at the EFI connection				
	● Red	Waiting for devices configured on the EFI connection to start				
LED1	○				No Ethernet activity	
	☀ Yellow				Ethernet activity half duplex	
	☀ Green				Ethernet activity full duplex	
LED2	○				No Ethernet connection	
	☀ Yellow				Ethernet connection with 10 Mbit/s	
	☀ Green				Ethernet connection with 100 Mbit/s	
Link1/ Link2	○		No Ethernet connection			
	● Green		Ethernet connection active			
Act1/ Act2	○		No data transmission			
	☀ Yellow		Data transmission active			

3.3 Configurable functions

This section provides a general description of the functions of the EFI gateway which can be set via software.

Note   Detailed information on the configurable functions is provided in the online help of the CDS (Configuration & Diagnostic Software).

⚠

ATTENTION

Test the protective device after any changes!

Changes to the configuration of the devices can impair the protective function. After every change to the configuration you must therefore check the effectiveness of the protective device. Observe the notes in section 6.2.4 "Full approval of the EFI gateway" from page 31 on here.

The person carrying out the changes is also responsible for maintaining the protective function of the device. When making configuration changes, please always use the password hierarchy provided by SICK to ensure that only authorised persons make changes to the configuration. The SICK service team is available to provide assistance if required.

3.3.1 Changing the EFI device address

In its state of delivery the EFI gateway is configured for operation with a SICK sensor.

If the EFI gateway is operated in combination with another control component, e.g. UE403, the EFI device address is to be changed on the EFI gateway's context menu using **Service/Operate gateway with controller**.

3.3.2 Functions of the EFI connections

The connections are suitable, for example, for senders and receivers of a SICK safety light curtain.

If you connect devices with safe SICK device communication to the EFI connections, the device information can be made available for the PLC via PROFIBUS (UE1140), via CANopen (UE1940) or in the FPLC via PROFIsafe on PROFIBUS (UE4140) or via PROFIsafe on PROFINET IO (UE4740).

3.3.3   Configuration in the device window

The following functions can be configured in the device window of the respective EFI gateway using the CDS.

I/O configuration

You can connect the process image (UE1140/UE4140/UE4740/UE1940) or the e-mail function (UE1840) with signals of the EFI devices. Selection is carried out by connecting the signals by dragging-and-dropping. The selection of the signals available from and to the EFI devices and of the process image appears by double-clicking on the EFI devices or process images shown.

General

You can save an application name with max. 22 characters in the device. Use this function as a "memory jog", for example to describe the application of the current device configuration and to avoid access to an incorrect system.

PROFIsafe (UE4140/UE4740)

You can operate the EFI gateway as a PROFIsafe station. To this purpose the EFI gateway must have a PROFIsafe address. The PROFIsafe address must agree with the corresponding setting in the hardware configuration program of the FPLC.

EFI

You can set whether the serial number, configuration date or type code are to be tested at the connected EFI stations when the EFI gateway is commissioned. If one of the selected parameters is activated, and if the value stored in the EFI gateway does not match the value in the connected device, the EFI gateway will not go into operation.

Note   If the EFI gateway is used in combination with a SICK controller, it is advisable to exclude the configuration date from the test.

Ethernet (UE1840)

You can set the TCP/IP addresses and the e-mail function of the EFI gateway.

The IP, subnet mask and the gateway addresses can be configured. The gateway address refers to the TCP/IP address of the EFI gateway in the network.

The EFI gateway can send an e-mail to up to 2 persons for 3 events. The address of the e-mail server and its SMTP port has to be entered to activate the e-mail function. The entered text is displayed in the subject line of the mail. The mail itself does not have any contents. The time stamp of the mail is that of the mail server and can differ from that of the triggering event.

Information and maintenance

You can store information on the function, installation site, installation date, description and person commissioning. The data correspond to the IM data of the PROFIBUS/PROFINET IO specification.

Alarms (UE4740)

Alarms can be output acyclically. As soon as an error occurs in the UE4740 PROFINET IO, the EFI gateway passes it on to the network.

The device-specific help text (stored in the GSDML for the UE4740 PROFINET IO) can be read using the I/O controller.

The alarms can be masked from the customer/user.

4   Mounting

This chapter describes the preparation and completion of the mounting of the EFI gateway. Mounting requires the 2 steps:

• selection of a suitable mounting site

• mounting on a 35-mm DIN rail (not included in the scope of delivery)

4.1   Selection of the mounting site

Select a suitable mounting site on the basis of the following criteria:

• Earthed DIN rail for earthing the shields (e.g. PROFIBUS, PROFINET, EFI)

• Diagnostics LEDs and configuration connection of the device can be viewed, easy device replacement

• Protected in order to prevent the connecting wires being torn out by the personnel or device

• Suitable with regard to the vibration and shock exposure, temperature and humidity in accordance with the specifications in section 9.1 "Data sheet" on page 46

• The installation site must at least comply with enclosure rating IP 54

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4.2   Mounting of the device

Note   Set the PROFIBUS/CANopen address of the EFI gateway in accordance with the configuration. Setting of the address is described in section 6.2.1 "Setting the address UE1140/UE4140/UE1940" from page 30 on.

⚠
ATTENTION

Protect the device against manipulations!

➢ Take suitable measures to ensure that the device cannot be manipulated and that passing objects or persons cannot damage connections.

Fig. 6: Mounting of the EFI gateway
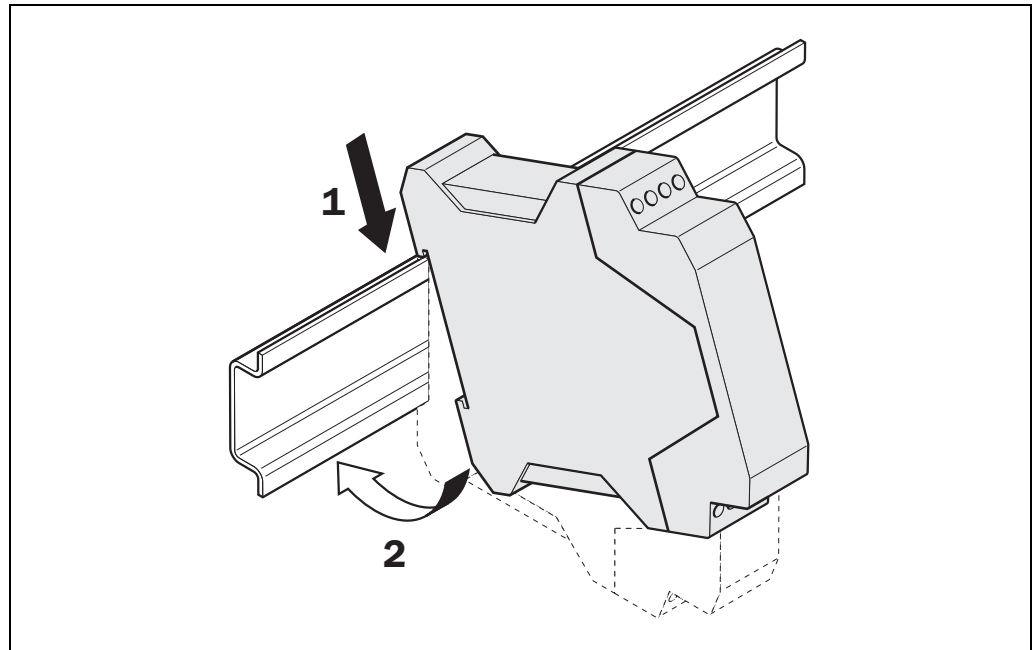
The EFI gateway is designed for mounting on a 35 mm mounting rail in accordance with EN 50 022.

➢ Hang the device onto the DIN rail (①).

➢ Latch the module onto the DIN rail by pressing it lightly in the direction of the arrow (②).

⚠
WARNING

Ensure the UE4740 is mounted in a protected position!

➢ For UE4740: Install end clips on the left and right to provide adequate thermal convection!

➢ For UE4740: Take suitable measures so that foreign bodies cannot enter openings, in particular for the system plug.

The following steps are necessary after mounting:

• completing the electrical connections (chapter 5 on page 22)

• commissioning (chapter 6 on page 29)

• configuration (chapter 7 on page 32)

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5 Electrical installation

⚠

ATTENTION

Switch the entire machine/system off line!

The system could start up unexpectedly while you are connecting the EFI gateway or establishing the connections with other devices.

➢ Ensure that the entire system is de-energised during the electrical installation.

SICK industrial safety devices are designed for local DC supplies only!

If the device is used differently in DC power supply networks, additional protection measures have to be taken, e.g. according to IEC 61326-3-1.

Machines where safety devices are used must be installed and designed according to the lightning protection zone (LPZ) according to EN 62305-1. Required Immunity levels can be achieved through the use of external protective devices. The installed surge protective devices (SPD) should meet the requirements of EN 61643-11.

The installation must prevent disturbances according to IEC 61000-4-16 (common mode disturbances in the frequency range of 0 Hz to 150 kHz).

Check the cabling whenever work has been carried out on the EFI gateway!

➢ Check the cabling again whenever maintenance or work has been carried out on the EFI gateway!

Notes
- The EFI gateway meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause interference.

- The supply GNDs of the connected EFI devices have to be interconnected.

- The EFI gateway must be connected using a twisted wire pair. The twisted pair must be shielded and the shield must be connected at both ends for the connection to the EFI gateway.

- All shields must also be connected to the earthed mounting rail in the control cabinet.

- All the devices, also the EFI gateway, have to be connected to a frame potential.

- The device is designed for Protection class III. The voltage supply must therefore be realised with a safety extra-low voltage.

- The electrical installation must be made as per EN 60204-1. To meet the requirements of the relevant product standards, the external voltage supply for the device (SELV) must be able to withstand the brief mains failure of 20 ms allowed in EN 60204-1.

- If the EFI gateway is used in accordance with the requirements of UL 508, the voltage supply must be approved "for use in class 2 circuits". Currents > 4 A may not flow.

- All the devices may only be connected in a de-energised state. The configuration connection, on the other hand, may also be connected/disconnected with the power supply connected.

- The EFI gateway and the sensors connected to the EFI gateway must be supplied with the same power supply unit.

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5.1 Supply and EFI connections (UE1140, UE4140, UE1840, UE1940)

The UE1140, UE4140, UE1840, UE1940 EFI gateways have two removable screw type terminal strips with four pins each. The individual removable terminals are encoded to prevent mix-ups. The EFI connections are designed for connecting SICK safety components.

Fig. 7: Terminal assignment of the UE1140, UE4140, UE1840 and UE1940 EFI gateways
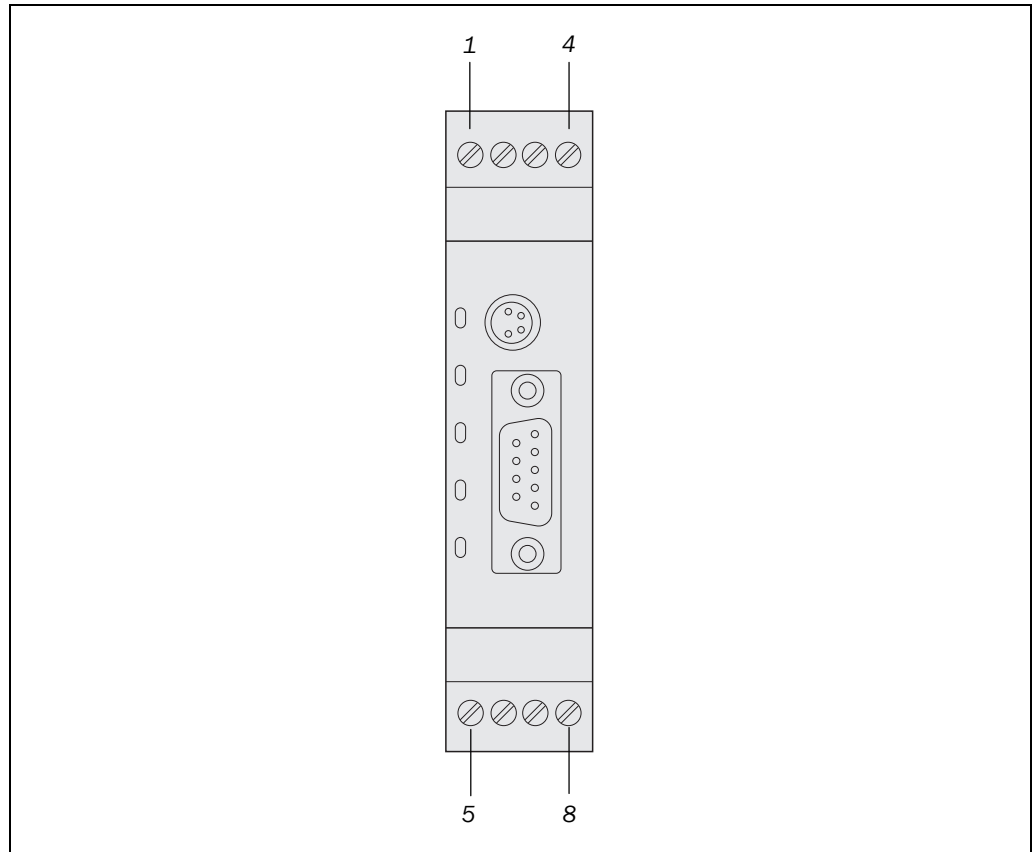
Tab. 3: Terminal assignment of the UE1140, UE4140, UE1840 and UE1940 EFI gateways

Terminal	Signal	Description
1	V_S	24 V DC (voltage supply)
2	FE	Functional earthing for shielded EFI2 cable
3	$EFI2_A$	EFI2 device communication
4	$EFI2_B$	EFI2 device communication
5	$EFI1_B$	EFI1 device communication
6	$EFI1_A$	EFI1 device communication
7	FE	Functional earthing for shielded EFI1 cable
8	GND	0 V DC (voltage supply)

5.2   Power supply and EFI connections UE4740

The UE4740 EFI gateway is only supplied electrically via the system plug FX3-MPL1. It has a plug-in screw terminal with four pins. The EFI connections are intended to be used for the connection of SICK safety components.

Fig. 8: Terminal assignment of the UE4740 EFI gateway

System plug with integrated configuration memory (for gateway replacement)

2× RJ-45 for PROFINET IO

M8 socket for RS-232 (CDS)

Screw type terminals for 2× EFI (shield if necessary via mounting rail terminal)
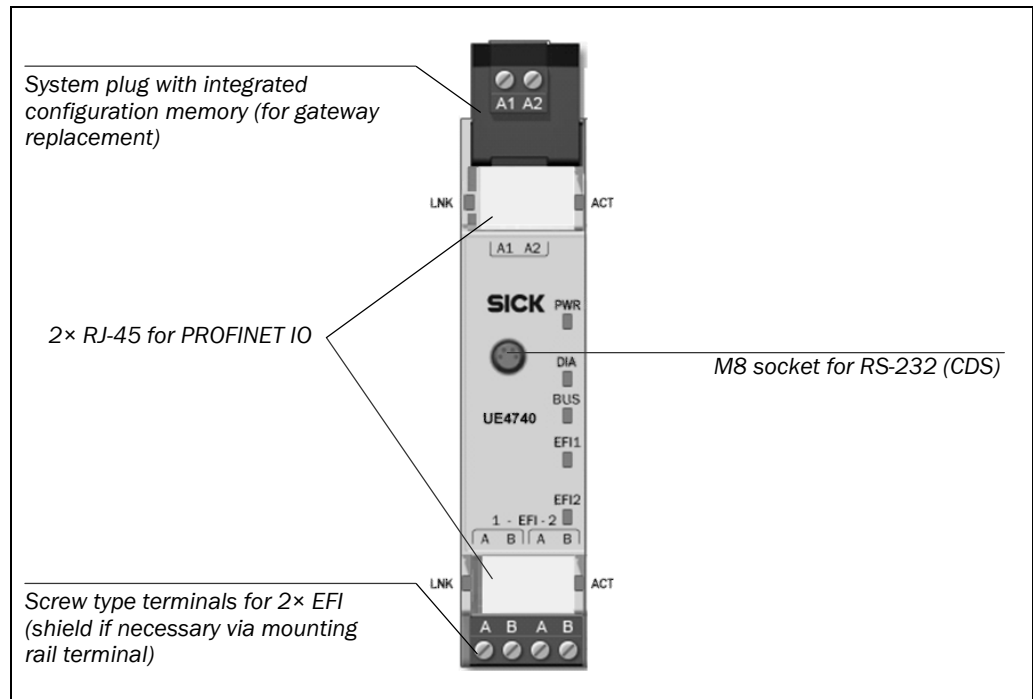
Tab. 4: Terminal assignment of the UE4740 EFI gateway

Terminal	Signal	Description
EFI1_A	$EFI1_A$	EFI1 device communication
EFI1_B	$EFI1_B$	EFI1 device communication
EFI2_A	$EFI2_A$	EFI2 device communication
EFI2_B	$EFI2_B$	EFI2 device communication

FX3-MPL1 system plug:

The system configuration for the entire UE4740 systems is only saved in the system plug. On the replacement of the PROFINET IO gateway UE4740 this situation has the advantage that it is not necessary to re-configure the system.

Note   Connected EFI-compatible devices must be re-configured as per CDS parameter settings, if necessary, when they are replaced.

The data saved in the system plug are also retained on an interruption in the supply of power.

Tab. 5: Terminal assignment of the FX3-MPL1 system plug

Terminal	Description
A1	24 V DC voltage supply
A2	GND of the voltage supply

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5.3 PROFIBUS connection UE1140/UE4140 (D-Sub 9-pin)

Observe the "Installation Guideline for PROFIBUS-FMS/DP" when carrying out the electrical connection of the EFI gateway to the PROFIBUS. The document is available under Order-No. 2112 from PROFIBUS International or from the regional PROFIBUS organisation of your country.

Fig. 9: Pin assignment PROFIBUS connection (D-Sub 9-pin)
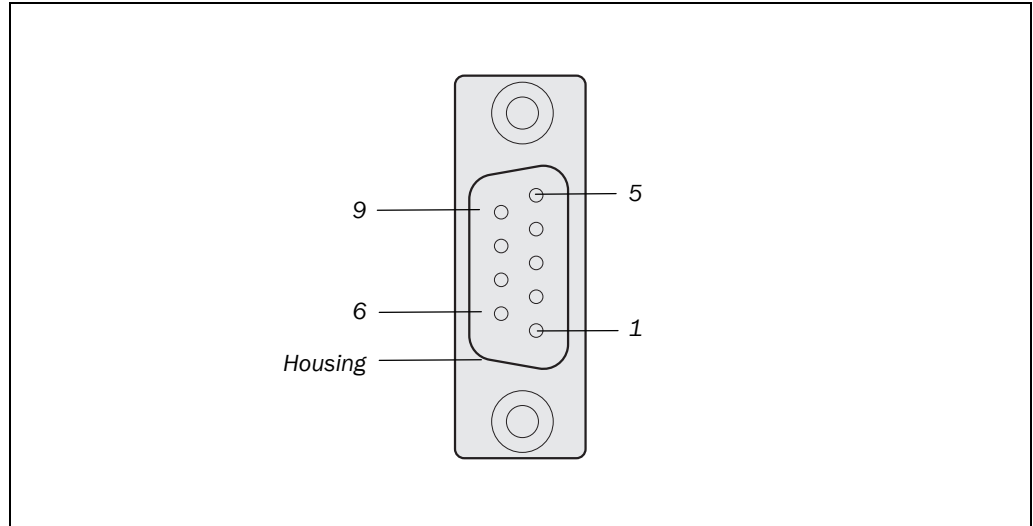
Tab. 6: Pin assignment PROFIBUS connection (D-Sub 9-pin)

Pin	Wire colour	Description
1		PROFIBUS shield
2		Not assigned
3	Red	Line B (RxD/TxD-P)
4		Not assigned
5		0 V (voltage supply for termination network)
6		5 V DC (voltage supply for termination network)
7		Not assigned
8	Green	Line A (RxD/TxD-N)
9		Not assigned
Housing		PROFIBUS shield

Note The PROFIBUS requires a unique PROFIBUS address from each bus station. It is not sufficient to only establish the electrical connections. Setting of the device address is described in section 6.2.1 "Setting the address UE1140/UE4140/UE1940" from page 30 on.

5.4 Ethernet connection UE1840 (RJ-45 connector)

Fig. 10: Pin assignment Ethernet connection (RJ-45)
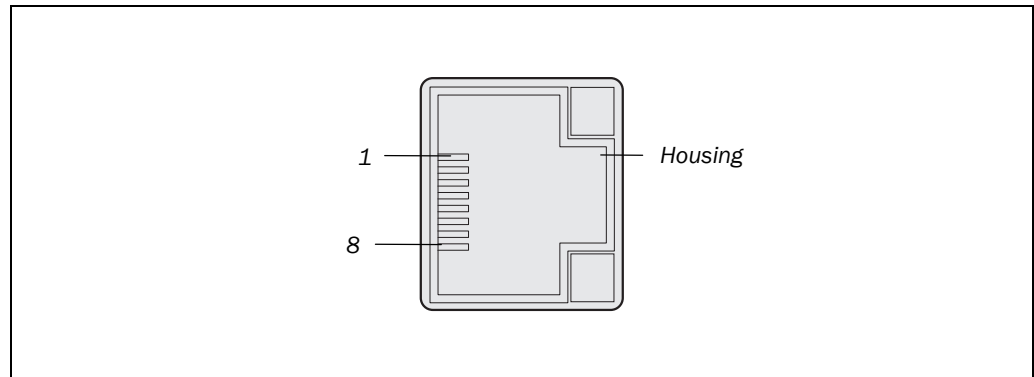
Tab. 7: Pin assignment Ethernet connection (RJ-45)

Pin	Signal	Description
1	TX+	Send data +
2	TX–	Send data –
3	RX+	Receive data +
4	Not assigned	
5	Not assigned	
6	RX–	Receive data –
7	Not assigned	
8	Not assigned	
Housing	FE	Functional earthing

Notes
- The Ethernet connection uses the 10/100Base-T transfer technology with a transfer speed of up to 100 Mbit/s.
- The Ethernet connection requires a unique IP address. It is not sufficient to only establish the electrical connections. Setting of the IP address is described in section 7.6.5 "Setting the Ethernet TCP/IP address (UE1840)" from page 38 on.

5.5 Ethernet connection UE4740 (RJ-45 plug)

Note For the connection to the network you must use RJ-45 plugs. If the network is not connected to a following bus device, then a connection using a RJ-45 plug is sufficient.

The UE4740 PROFINET IO EFI gateway is equipped with a 3-port layer-2 managed switch with Auto-MDI-X for the automatic detection of crossed Ethernet cables.

Tab. 8: Pin assignment Ethernet connection UE4740 (RJ-45 plug)

Pin	Signal	PROFINET IO color	Description
1	TX+	Yellow	Send data +
2	TX–	Orange	Send data –
3	RX+	White	Receive data +
4	–	Not assigned	–
5	–	Not assigned	–
6	RX–	Blue	Receive data –
7	–	Not assigned	–
8	–	Not assigned	–
Housing	FE	–	Functional earth

5.6   CANopen connection UE1940 (D-Sub 9-pin)
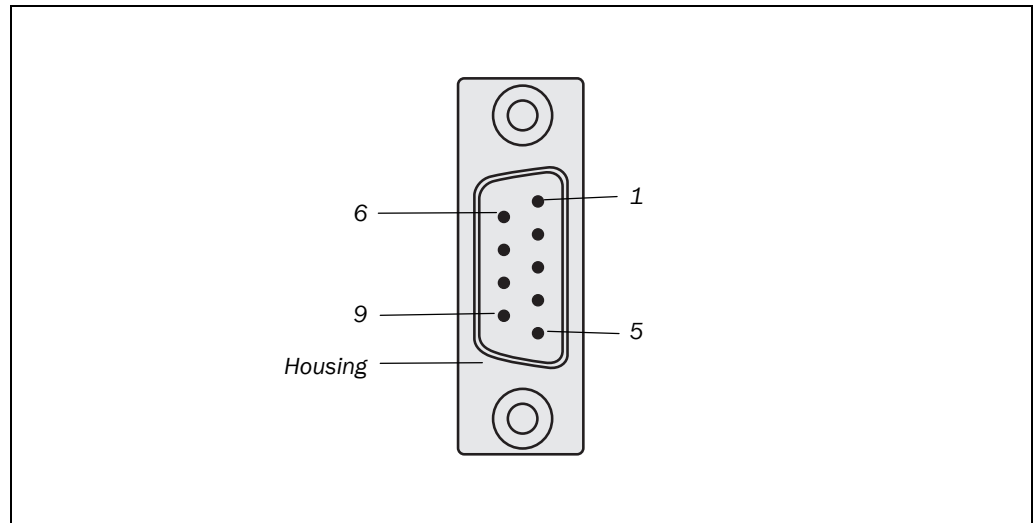
Pin	Description
1	Not assigned
2	CAN L
3	CAN GND
4	Not assigned
5	CAN SHLD
6	CAN GND
7	CAN H
8	Not assigned
9	Not assigned
Housing	Not assigned

Note   CANopen requires a unique CANopen address from each bus station. It is not sufficient to only establish the electrical connections. Setting of the device address is described in section 6.2.1 "Setting the address UE1140/UE4140/UE1940" from page 30 on. The baud rate of the network must be set for the CANopen EFI gateway.

5.7   Configuration connection (M8 × 4)

The configuration connection is positioned on the front of the EFI gateway.

Fig. 12: Pin assignment configuration connection (M8 × 4)
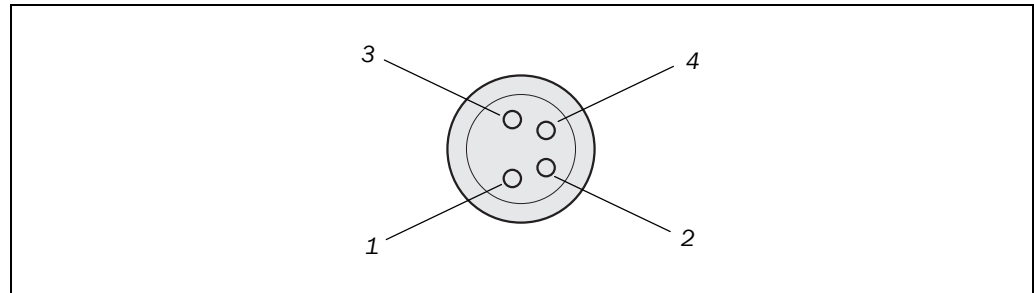
Tab. 10: Pin assignment configuration connection (M8 × 4)

Pin	EFI gateway	RS-232 D-Sub (9-pin) at PC end
1	Reserved	Not assigned
2	RxD	Pin 3
3	0 V	Pin 5
4	TxD	Pin 2

➢ Touch an earthed metal part, for example the DIN rail, in order to discharge any electrostatic charges before you plug the configuration cable into the configuration connection. Electrostatic discharging can damage the electronic equipment of the EFI gateway.

⚠

Always remove the plug from the configuration connection once you have completed the configuration!

ATTENTION

6 Commissioning

⚠

ATTENTION

Do not commission without a check by qualified safety personnel!

The system using the EFI gateway must be checked and released by qualified safety personnel before being commissioned. This applies for the initial commissioning, re-commissioning and after changes. Please read the notes in chapter 2 "On safety" on page 9.

Commissioning requires the following steps:

- configuration (see section 6.1 "Configuration")
- technical starting-up with full approval of the application (see section 6.2 "Technical commissioning" on page 30)

6.1 Configuration

All the available functions of your application can be interlinked within the FPLC program. Therefore you must already decide during the configuration which concrete safety components you want to use in your application.

For example, it is not sufficient to specify that a safety light curtain is required. You have to decide which type is to be used and which functions you want to use.

➤ Derive the concrete devices that you want to use at the EFI gateway from your specifications. Begin with the devices at the EFI connections. First carry out a configuration of the subsystem for these devices.

➤ On the basis of the previous decision specify the concrete field devices required to control the EFI devices, for example a specific reset button or a suitable type of the operating mode selector switch.

➤ Determine the concrete types of all the further field devices and their functional behaviour for your application.

In as far as you use devices from SICK at the EFI connections, it may be useful to already create a corresponding "project" in the CDS during the configuration stage. There you can specify the available functions and the required parameters of the corresponding devices with dialog support and have a configuration design printed out.

6.2 Technical commissioning

6.2.1 Setting the address UE1140/UE4140/UE1940

You must first set the address of the EFI gateway at the device in accordance with the configuration so that the (F)PLC can recognise and address the EFI gateway for the first time.

Fig. 13: Setting the address at the EFI gateway
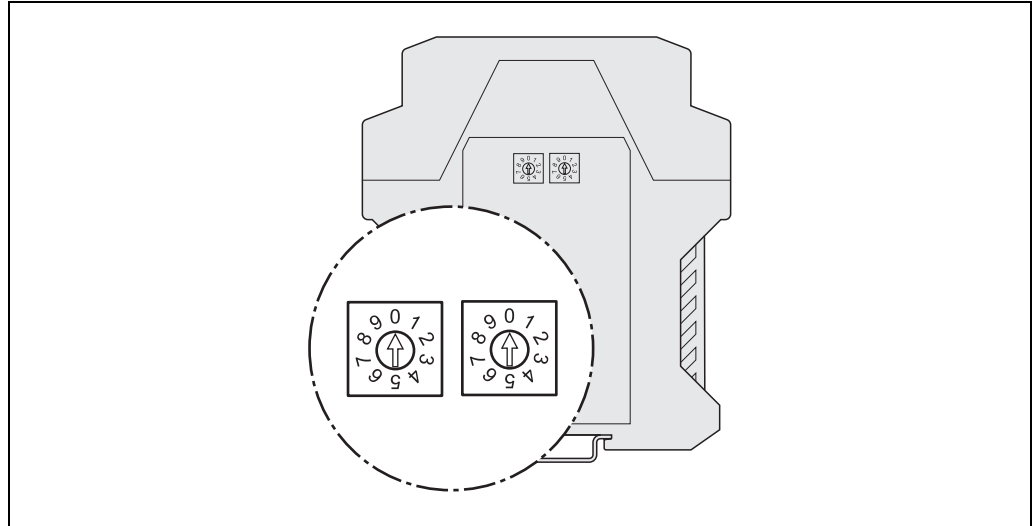
The left-hand switch determines the tens digit of the address, the right-hand switch the units digit.

Example

PROFIBUS address: 75 ⇨   Left-hand switch (×10): 7   Right-hand switch (×1): 5

Notes
• You can only set addresses from 0 to 99 by using the address switch. The EFI gateway is set to the address 0 at the factory.

• As an alternative you can configure the address with the aid of the CDS. To do this, set the two address switches of the EFI gateway to 0. Only with this hardware setting is it possible to assign PROFIBUS addresses from 3 to 125 or CANopen addresses from 1 to 127 with the aid of the CDS.

Only for UE1140/UE4140:

• If the address switch is set to 01, the EFI gateway uses the address 126.

• The address 02 is reserved and should not be used.

6.2.2 Sequence for commissioning sub-systems

When commissioning the entire system, you must prevent faults in the sub-systems by following a specialised sequence for commissioning.

➢ First commission the devices at the EFI connections and test their system behaviour.

➢ Do not commission the EFI gateway until the behaviour of the sub-systems is safe and as required.

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6.2.3   System self-check after switching on

The EFI gateway carries out the following steps automatically immediately after the power supply is switched on:

• Internal self-test

• Loading of the saved configuration

• Check whether the loaded configuration is suitable for the connected devices

Note   The system does not start up if the steps described above could not be carried out successfully. In the event of a fault or error, one or more displays of the EFI gateway display ● **Red** and the EFI gateway transfers only fail-safe values (see chapter 8 "Fault diagnosis" from page 40 on).

6.2.4   Full approval of the EFI gateway

You may only commission the system if full approval of the EFI gateway was successful. Full approval of the EFI gateway may only be performed by professionals trained accordingly.

The full approval includes the following items to be checked:

➢ Check the devices connected to the EFI connections in accordance with the test notes from the accompanying operating instructions.

➢ Clearly mark all connection cables and connectors at the EFI gateway. Since the EFI gateway has several connections of the same design, you must ensure that loosened connection cables are not connected back to the wrong connection.

➢ Check the configuration of the EFI gateway. Test the signal paths and the correct inclusion in the safety program of the FPLC.

➢ UE4140/UE4740: Check the correct data transfer from the devices at the EFI connections to the (F)PLC and vice versa.

➢ UE4140/UE4740: Check the FPLC program.

➢ Carry out a complete verification of the safety functions of the system.

➢ Completely document the configuration of the system, the individual devices, the (F)PLC program and the result of the safety check.

7 Configuration

This chapter schematically describes the steps required to configure the EFI gateway and its integration in the application.

7.1 Default delivery status

In the default delivery status the EFI gateway has the following configuration:

- EFI connections:
  - no devices expected
- PROFINET IO
  - PROFINET IO name: [without]
  - IP address: 0.0.0.0
  - PROFIsafe address: **1**
- PROFIBUS:
  - PROFIBUS address: **0** (at the PROFIBUS address switch of the EFI gateway)
  - PROFIsafe address: **1**
- CANopen:
  - CANopen address: **0** (at the CANopen address switch of the EFI gateway)
- Ethernet TCP/IP:
  - IP address: 0.0.0.0

7.2 Prerequisites for the configuration

Take sufficient time to plan the integration and the configuration of the EFI gateway. Take into account that errors in the planning and configuration can endanger persons.

The following prerequisites must be fulfilled before you configure the EFI gateway:

- The application must already have been planned completely. The planning must include among other things:
  - a detailed safety analysis of the planned application (UE4140/UE4740)
  - a complete list of all the required devices, their connections and the signals provided by or required by these devices
- The EFI gateway must be connected to the power supply (see section 5.1 "Supply and EFI connections (UE1140, UE4140, UE1840, UE1940)" on page 23 or section 5.2 "Power supply and EFI connections UE4740" on page 24).
- The safety components must be connected electrically to the EFI gateway. To this purpose read chapter 5 "Electrical installation" from page 22 on, as well as the corresponding chapters of the operating instructions of the devices that you want to connect to the EFI gateway.

Note   If you use the CDS to change configurations via remote access, take into account that your local time is set as the configuration time in the configuration. In the case of a time difference between the locations this can cause short-term problems.

7.3 PROFIBUS configuration of the UE1140/UE4140 EFI gateway

7.3.1 Reading in the general station description (GSD)

Before you can configure the PROFIBUS for the first time for the EFI gateway, you have to read the GSD file of the EFI gateway into the hardware catalogue of the hardware configuration program for the PROFIBUS.

➢ Insert the supplied CD-ROM "CDS — Configuration & Diagnostic Software" into the CD-ROM drive of the notebook/PC on which you have also installed the PROFIBUS manager of your PLC.

The GSD files (German: GSG file, English: GSD file) for the various EFI gateways can be found on the CD-ROM in the directory "\EFI-Gateway\GSD".

➢ Follow the instructions in the online help or in the user manual of the PROFIBUS manager in order to read in the GSD file.

The EFI gateway is subsequently displayed, for example if the SIMATIC Manager (Siemens) is used in the hardware catalogue under **PROFIBUS DP** in the subgroup **I/O**.

7.3.2 Adding the EFI gateway to the hardware configuration

In order to evaluate the data of the EFI gateway in the (F)PLC you must …

➢ add the EFI gateway of the hardware configuration,

➢ set the PROFIBUS address in the PROFIBUS manager and at the EFI gateway to identical values (see section 6.2.1 "Setting the address UE1140/UE4140/UE1940" from page 30 on).

The corresponding procedure depends on the hardware configuration program of the used (F)PLC. Please read the documentation of the corresponding program.

7.3.3 Specifying the start address in the process image

The start address determines at which point of the PROFIBUS process image the data supplied by the EFI gateway are supplied at the (F)PLC. The process input and process output images of the UE4140 and UE1140 EFI gateways are 6 bytes long each.

The process images are put together using the CDS.

7.4   PROFINET IO configuration of the UE4740 EFI gateway

7.4.1   Reading the general station description

Before you can configure for the first time the PROFINET IO for the UE4740 PROFINET IO EFI gateway, you must read the general station description for the UE4740 EFI gateway into the hardware catalogue for the hardware configuration program 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 PROFIBUS manager of your FPLC.

The general station description for the UE4740 EFI gateway is on the CD-ROM in the folder „\EFI gateway\GSDML".

➢ Follow the instructions in the online help or in the user manual of your PROFINET configuration tool for installing GSDML files.

Then the UE4740 PROFINET IO EFI gateway will appear, e.g. in the SIMATIC-Manager (Siemens) in the hardware catalogue in PROFINET IO.

7.4.2   Adding the EFI gateway to the hardware configuration

Each PROFINET IO field device , e.g. the UE4740 PROFINET IO EFI gateway, has a dedicated MAC address, a variable device name, a variable IP address and a fixed device type. The device type designation for the UE4740 PROFINET IO is **SICK-UE4740**.

The variable device name is used by the I/O controller to define the IP address for the field device. The address is defined in two steps:

1. Assign a unique system-specific name to the UE4740 PROFINET IO EFI gateway with the aid of the network configuration program (e.g. SIEMENS SIMATIC Manager).

2. Assign the IP address by means of the I/O controller based on the unique system-specific name.

You will find the MAC address on the type label on the UE4740 PROFINET IO EFI gateway (e.g.: 00:06:77:02:00:A7).

Notes
• The PROFIsafe address and the PROFINET device name in the hardware configuration program must match the settings in the device. The PROFIsafe address must be set via the CDS, the name can be set using either the CDS or the network configuration program (e.g. SIEMENS SIMATIC Manager). The procedure for planning this data depends on the hardware configuration of the (F)PLC used. On this topic, please also read the documentation for the corresponding program.

• The IP address, which can be assigned to the device via the CDS, is not relevant for establishing PROFINET communication with an I/O controller. On establishing communication with an I/O controller the IP address set there will be overwritten by the planned IP address and the Remanent flag will be removed. The use of this IP address assignment via the CDS is optional and is intended for diagnostics and configuration purposes.

7.5 CANopen configuration of the UE1940 EFI gateway

7.5.1 Reading in "Electronic Data Sheet"

Before you can configure the CANopen for the EFI gateway for the first time, you must read the Electronic Data Sheet of the EFI gateway into the hardware catalogue of the hardware configuration program for the CANopen bus.

➢ Insert the supplied CD-ROM "CDS — Configuration & Diagnostic Software" into the CD-ROM drive of the notebook/PC on which you have also installed the CANopen manager of your PLC.

The Electronic Data Sheet (EDS) for the EFI gateway is located on the CD-ROM in the directory "\EFI-Gateway\EDS\UE1940".

➢ Follow the instructions in the online help or in the user manual of the CANopen Manager to read in the Electronic Data Sheet.

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7.6 Connection of the Configuration & Diagnostic Software

You can connect the Configuration & Diagnostic Software (CDS) by various means to the EFI gateway or to the devices with safe SICK device communication that are connected to it.

⚠ **WARNING**

Only ever establish one configuration connection to the EFI gateway!

The EFI gateway can only communicate with one instance of the CDS at a time. If you connect to the EFI gateway using several instances of the CDS from one or several locations, there may be communication problems or data display errors in the diagnostics.

This situation applies independent of the interface or the network protocol used (RS-232, Ethernet, PROFIBUS or PROFINET IO).

Tab. 11: Connection possibilities for the Configuration & Diagnostic Software (CDS)

Connection of the CDS	Limitation	Suitable for
Directly to the configuration connection (RS-232) of the EFI gateway	Access to the EFI gateway and to devices at the EFI connection that have a safe SICK device communication	Offline commissioning or when configuration is to be carried out near the system. Configuration of the addressing.
To the configuration connection of a device with safe SICK device communication that is connected to the EFI connection	Access to the configuration of the gateway and to the EFI connection through which the CDS is connected to the EFI gateway as well as to all the devices connected to this connection[2]	If a local start-up on site is required for the configuration and the device cannot be viewed from the EFI gateway, e.g. when teaching in the protective field of a safety laser scanner.
Via the acyclic channel of the PROFIBUS or PROFINET IO as a master class 2 tool	Access to EFI gateway and devices with safe SICK device communication at the EFI connection. No configuration of the PROFIBUS address or of the IP settings	Remote configuration and monitoring of the EFI gateway. Configuration of replacement devices.
Via the Ethernet connection	Access to EFI gateway and devices with safe SICK device communication at the EFI connection	Remote configuration and monitoring of the EFI gateway. Configuration of replacement devices

⚠ **ATTENTION**

Take organisational measures to ensure safety during configuration!

Ensure that dangerous states cannot arise during the configuration in the system or in the part of the system that is monitored by devices connected to the EFI gateway.

During the configuration the EFI gateway only transfers fail-safe values, meaning that it set all the bits to 0 in the process image.

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[2] Access to the EFI gateway via the EFI interface is not possible if the CDS is connected to a C4000 or M4000.

7.6.1   Configuration via the configuration connection of the EFI gateway

In order to configure the EFI gateway via the configuration connection you require:

• CDS (Configuration & Diagnostic Software) on CD-ROM or from www.sick.com

• PC/notebook/programming device with Windows NT 4/2000 Professional/XP and a serial interface (RS-232). PC/notebook/programming device not included in the scope of delivery

• serial connecting cable to connect the PC and configuration connection at the EFI gateway (see "Accessories" on page 53)

While configuring please use the online help of the program.

To connect the CDS via the configuration connection to the EFI gateway:

➢Connect the configuration connection at the EFI gateway to the serial interface of the PC/notebook/programming device.

➢Start the CDS.

The connected devices can be recognised and displayed using the CDS.

7.6.2   Configuration via the PROFIBUS (UE1140/UE4140)

In order to configure the EFI gateway via the PROFIBUS you require:

• a communication processor, for example Siemens CP with the function master class 2

• a PROFIBUS cable for the hardware connection to the PROFIBUS (see "Accessories" on page 53)

To connect the CDS via the PROFIBUS to the EFI gateway:

➢Set the PROFIBUS address at the EFI gateway to the address that you have also assigned for the EFI gateway in the hardware configuration program.

➢Install the communication processor.

➢Assign the "PROFIBUS communication processor" interface to the access point of the "CP_L2_1" application.

➢Connect the PROFIBUS connection at the EFI gateway to the communication processor.

➢Start the CDS.

The connected devices can be recognised and displayed using the CDS.

7.6.3   Configuration via PROFINET IO (UE4740)

You need the following to configure the EFI gateway via PROFINET IO:

• an Ethernet connection

How to connect the CDS to the EFI gateway via Ethernet:

➢Connect the Ethernet connection on the EFI gateway to your Ethernet.

➢Start the CDS.

You can enter the Ethernet address manually You can also start an automatic scan.

How to connect the CDS to the EFI gateway via the TCI interface:

➢Set the PROFINET name and the IP settings using your network planning tool.

➢Open the CDS from the device context menu e.g. for the hardware configurator for the SIEMENS SIMATIC Manager.

7.6.4   Setting the PROFIsafe address (UE4140/UE4740)

The EFI gateway must have a PROFIsafe address so that it can be operated as a PROFIsafe station. The PROFIsafe address must agree with the corresponding setting in the hardware configuration program of the FPLC.

To set the PROFIsafe address in the EFI gateway:

➢Start the hardware configuration program.

➢There read the value of the parameter **F_Dest_Add** in the PROFIBUS configuration of the EFI gateway.

➢Enter the read value as the PROFIsafe address in the CDS.

The PROFIsafe address is transferred to the configuration of the EFI gateway.

Device symbol, pop-up menu **Configuration draft, Edit**, **General** tab, **PROFIsafe address (F_Dest_Add)** option.

7.6.5   Setting the Ethernet TCP/IP address (UE1840)

The UE1840 EFI gateway must have a TCP/IP address so that it can be operated as an Ethernet station. The TCP/IP address has to be an address that can be reached in the existing network.

To set the TCP/IP address in the EFI gateway:

➢Connect the configuration connection at the EFI gateway to the serial interface of the PC/notebook/programming device.

➢Start the CDS.

The connected devices can be recognised and displayed using the CDS.

➢Open the configuration dialog box.

➢Change to the **Ethernet** dialog page.

➢Set the IP address, the subnet mask and, if it exists, the gateway of the network.

➢Transfer the Ethernet configuration to the device.

After the transfer the new parameters are active.

Device symbol **UE1840**

7.6.6   Configuration via Ethernet (UE1840)

In order to configure the EFI gateway via the Ethernet you require:

• a 10/100-Mbit Ethernet connection

• a RJ-45 cable for the hardware connection to the Ethernet

To connect the CDS via Ethernet to the EFI gateway:

➢Connect the Ethernet connection at the EFI gateway to your Ethernet.

➢Start the CDS.

You can enter the Ethernet address manually. You can also initiate an automated scan.

7.6.7 Setting CAN network baud rate (UE1940)

So that you can operate the EFI gateway as a CANopen device, not only the address, but also the baud rate of the network must be set. The baud rate must match the corresponding setting in the network configuration program.

To set the baud rate in the EFI gateway:

➢ Connect the configuration connection at the EFI gateway to the serial interface of the PC/notebook/programming device.

➢ Start the CDS.

The connected devices can be recognised and displayed using the CDS.

➢ Open the configuration dialogue box.

➢ Apply the set baud rate in the CDS.

Device icon, context menu **Open device window**, **Configuration draft**, **CANopen**

7.7 Configuration of the devices connected to the EFI gateway

Adding devices with safe SICK device communication: Device symbol, **EFI1** or **EFI2**, **Add device...** pop-up menu. Follow the configuration wizard.

➢ First configure the devices connected to the EFI connections. To this purpose follow the instructions in the operating instructions of the respective device.

Recommendation

If you have connected devices that have a safe SICK device communication to the EFI connection of the EFI gateway, configure these from the EFI gateway. Establish a connection of the CDS to the EFI gateway to this purpose. You can import an existing configuration of the connected device into the gateway project or read it in directly from the device by using the CDS.

➢ Check individually whether each connected device functions before you test the gateway configuration. Otherwise it is more difficult to determine whether a fault is caused by a device or the EFI gateway.

Notes

• If the device at the EFI connection requires data from the EFI gateway or from the FPLC, but the EFI gateway has not been configured completely, the device can signal faults at the EFI connection. You may have to give priority to the configuration of the EFI gateway or the programming of the (F)PLC so that you can test the configuration of the device at the EFI connection.

• The EFI gateway monitors the configuration of the devices on the EFI connection if one of the system integrity tests (testing during running up for serial number, type code, configuration date) has been activated. During a new configuration or when replacing the EFI devices, you must do the following depending on the activated parameter:

– adapt the configuration of the EFI gateway if necessary and

– be sure to transfer the configuration again to the EFI gateway.

If errors or faults of a device are indicated at the EFI connection, always also read out the diagnostic data of the EFI gateway. This provides additional information for error elimination.

8 Fault diagnosis

This chapter describes how to identify and remedy errors and malfunctions of the EFI gateway.

8.1 In the event of faults or errors

⚠
ATTENTION

Cease operation if the cause of the malfunction has not been clearly identified!

Stop the machine if you cannot clearly identify or allocate the error and if you cannot safely remedy the malfunction.

Note   Some error displays of the EFI gateway are caused by connected devices.

➢ Use the CDS to carry out diagnostics of the EFI gateway.

➢ If errors occur, always check whether one or more connected devices show an error.

➢ To eliminate the error consult the documentation of the connected device that shows the error.

8.2 SICK support

If you cannot correct an error using the information in this section, please contact your local SICK branch.

Write the branch's telephone number in the box below so it is readily accessible to you or anyone else. The telephone number is given on the last page of these operating instructions.

Telephone number of your SICK branch

Notes   Following repair work by SICK you will find that the configuration of your EFI gateway will have been reset to its original state.

➢ **Back your configuration up to a separate data medium first.**

Fault diagnosis

8.3 Error displays of the LEDs

This section explains what the LED error displays mean and how you can respond. Please refer to the description in the section 3.2 "Display elements" on page 14ff.

8.3.1 Error displays of the EFI gateway

Tab. 12: Error displays of the LEDs at the EFI gateway

Display		Possible cause	How to remedy the error
PWR	○	No power supply	➢ Check the voltage supply and activate, if necessary.
	● **Red**	Internal voltage supply too low or firmware is being updated	➢ If necessary, check the voltage supply.
DIA	● **Red**	Configuration has not been completed or is being transferred	➢ The display goes off automatically once the configuration has been successfully transferred. If the display does not go off: ➢ Check the configuration of the system using the CDS (Configuration & Diagnostic Software). ➢ Re-transfer the corrected configuration to the system.
	☀ **Red**	1 Hz: System error (lock-out)	➢ Check the device state by means of the CDS diagnostics. ➢ Eliminate any errors. ➢ Disconnect the EFI gateway briefly from the supply voltage. ➢ If the problem persists, replace the EFI gateway.
EFI1 and EFI2	☀ **Red**	Device communication error at the EFI connection	➢ Device not connected. Check the connecting cable. ➢ Device is not configured for the EFI connection. Configure it using the CDS (Configuration & Diagnostic Software).

8.3.2   Special aspects of the PROFIsafe error displays

Tab. 13: Special aspects of the LED error displays of the PROFIsafe

Display		Possible cause	How to remedy the error
BUS	○	PROFIBUS or PROFINET IO communication with the FPLC is established, but the safety communication is still inactive. The FPLC safety program has not been started yet	➢ Ensure that a PROFIsafe master has been used. ➢ Check the state of the safety program.
	☀ Green	Acknowledgement by the user required. The FPLC has recognised an error at the EFI gateway and has passivated the EFI gateway	➢ Check the PROFIBUS or PROFINET IO diagnostic data of the EFI gateway. ➢ Eliminate any errors. ➢ Then acknowledge the error elimination.
	● Red	General error of the PROFIBUS or PROFINET IO, no communication possible	➢ Check the PROFIBUS or PROFINET IO connecting cable. ➢ Check that the PROFIBUS address or PROFINET IO settings in the FPLC and at the EFI gateway agree.
	☀ Red	No valid PROFIBUS or PROFINET IO configuration	➢ Check that the PROFIsafe address in the FPLC and at the EFI gateway agree.
DIA	☀ Red	UE4140 only: ½ Hz (75 % on, 25 % off) passivation by FPLC	➢ Check the communication with the FPLC. If there is no PROFIsafe connection, the EFI gateway is passivated. ➢ Check the PROFIBUS diagnostics data (see section 11.3 on page 56). ➢ Eliminate the error, actuate the corresponding sensors to eliminate the error and the status of the EFI gateway in the FPLC.

8.3.3   Special aspects of the PROFIBUS error displays

Tab. 14: Special aspects of the LED error displays of the PROFIBUS

Display		Possible cause	How to remedy the error
BUS	● Red	General error of the PROFIBUS, no communication possible	➢ Check the PROFIBUS connecting cable. ➢ Check that the PROFIBUS address in the PLC and at the EFI gateway agree.
	☀ Red	No valid PROFIBUS configuration	➢ Check that the PROFIBUS address in the PLC and at the EFI gateway agree.

8.3.4 Special error displays for PROFINET IO

Tab. 15: Special LED error displays for PROFINET IO

Display		Possible cause	Rectification of the error
BUS	● Red	No communication on PROFINET IO	➤ Check the PROFINET IO connecting cable. ➤ Verify that the PROFINET IO settings in the PLC and on the EFI gateway correspond.
	☀ Red	Not a valid PROFINET IO configuration	➤ Verify that the PROFINET IO settings in the PLC and on the EFI gateway correspond.

8.3.5 Special aspects of CANopen error displays

Tab. 16: Special aspects of the LED error displays of the CANopen

Display		Possible cause	How to remedy the error
BUS	● Red	CAN bus off: e.g. incorrect baud rate, bus address incorrect or used twice, faulty cabling, missing terminating resistor	➤ Check the connection to the CAN bus. ➤ Check the cabling and the terminating resistors in the CAN network. ➤ Check that set baud rate in the network and at the EFI gateway agree. ➤ Check that the CAN addresses in the PLC and at the EFI gateway agree. ➤ Check the bus devices for double use of the bus address
	☀ ⁄ Red	Bus error General error of CAN bus.	➤ Check that the configuration in the PLC and at the EFI gateway agree.
	☀ ⁄ ⁄ Red	Guard message has failed ("node guarding fails")	➤ Change to the "operational" state and record the guard message again.

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8.4 System behaviour in case of errors of connected devices (only for UE4140/UE4740)

8.4.1 Errors in safe communication to FPLC

If there is no safe communication to the higher-level FPLC, then the UE4140/UE4740 switches off all outputs controlled by the FPLC.

If the device connected to the EFI connection monitors the data coming from the EFI gateway or requires them for the configuration, then …

- the UE4140/UE4740 signals an I/O error to the device connected to the EFI connection.

- the error display $\boxed{P}$ appears on the 7-segment display of the connected EFI device (also see the operating instructions of the connected device). Otherwise the device ignores the I/O error or the lock-out of the EFI gateway.

After the communication error to the higher-level FPLC has been eliminated, the entire process image of the UE4140/UE4740 remains deactivated, as the error status bit has been set (the UE4140/UE4740 was passivated).

⚠️
ATTENTION

Program an error acknowledgement!

Make sure that the FPLC program contains an error acknowledgement. The FPLC program may not acknowledge the error until it has been eliminated.

The UE4140/UE4740 deletes the I/O error automatically as soon as the FPLC acknowledges the error. Afterwards valid I/O data are exchanged again with the device connected to the EFI connection.

8.4.2 Error in connected EFI devices

If the UE4140/UE4740 detects an error of a device on the EFI connection, then …

- the gateway remains ready for operation,

- fail-safe status information is transmitted to the FPLC, i.e. the bits in the process image corresponding to the input are logically set to "0",

- a PROFIBUS/PROFINET diagnostics message is generated.

The UE4140 or UE4740 deletes the error status information and the PROFIBUS or PROFINET diagnostics message automatically as soon as the error has been eliminated. Afterwards valid I/O data in the process image are transferred again to the FPLC.

8.5 PROFIBUS diagnostics (only for UE1140/UE4140)

The EFI gateway supports the sampling of diagnostic information in accordance with IEC 61 158. You can read out the diagnostics functions (slave diagnostics) by using the user program of the (F)PLC.

Detailed information on the process images of the EFI gateway is available in section 11.1 "Process images" from page 54 on. The process images of the devices connected to the EFI connection are documented in the operating instructions of the corresponding function package.

8.6 Extended diagnostics

The CDS software supplied with the device (Configuration & Diagnostic Software) includes extended diagnostics options. If you cannot identify what kind of error is occurring or if you have serviceability problems, the CDS allows you to locate the error more accurately. Detailed information can be found in the online help function of the CDS (Configuration & Diagnostic Software),

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9 Technical specifications

9.1 Data sheet

Tab. 17: EFI gateway data sheet

	Minimum	Typical	Maximum

General system data

Protection class[3]	III (IEC 61 140)
Enclosure rating	IP 20 (IEC 60 529)
Housing dimensions	See section 9.3 "Dimensional drawings" on page 50

Weight
    UE1140, UE1840, UE1940, UE4140
 	
    UE4740
	
	120 g
	
	147 g

Additional system data UE4140 and UE4740

Category	Category 4 (EN ISO 13 849-1)
Performance Level[4]	PL e (EN ISO 13 849-1)
Safety integrity level[4]	SIL3 (IEC 61 508) SILCL3 (EN 62 061)

PFHd (mean probability of a dangerous failure per hour)
    UE4140
    UE4740
	
	3.3×10^{-10}
	2.84×10^{-9}

PROFIBUS connection

	Minimum		Maximum
Baud rate	9.6 Kbit/s		12 Mbit/s
Address range	3		126

Manufacturer identifier
    UE4140
    UE1140
	
	0994 hex
	0995 hex		

CANopen connection

	Minimum		Maximum
Baud rate	10 Kbit/s		1 Mbit/s
Address range	1		127

Ethernet connection

	Minimum		Maximum
Baud rate	10 Mbit/s		100 Mbit/s

[3] Safety extra-low voltage SELV/PELV.
[4] For detailed information on the exact design of your machine/system, please contact your local SICK representative.

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	Minimum	Typical	Maximum

PROFINET IO connection

Connection technology	2 RJ-45 sockets		
Integrated switch	3-port layer-2 managed switch with auto-MDI-X for automatic detection of crossed Ethernet cable		
MAC address	See type label of the UE4740 PROFINET IO EFI gateway (e.g.: 00:06:77:02:00:A7).		
Baud rate	10 Mbit/s		100 Mbit/s

EFI — safe SICK device communication

Lead cross section of the cable to be connected	2×0.34 mm² and 2×0.25 mm²		
Cable length at 500 kBaud and 2×0.34 mm² and 2×0.25 mm² cables			50 m
Type of cable to be connected	Twisted pairs with copper shielding mesh, cable cross section: ≤ 6.8 mm		

Operating data

	Minimum	Typical	Maximum
Supply voltage V_S at device[5]			
UE4140, UE1140, UE1840 and UE1940	19.2 V	24 V	28.8 V
UE4740[6]	16.8 V	24 V	30 V
Residual ripple[7]			5 V_{ss}
Power consumption			
UE4140, UE1140, UE1840 and UE1940			4 W
UE4740			5 W
Power-up delay after connecting the voltage supply		2 … 10 s	
Operating temperature			
UE4140, UE1140, UE1840 and UE1940	0 °C		+50 °C
UE4740	–25 °C		+50 °C

[5] To meet the requirements of the relevant product standards, the external voltage supply for the device (SELV) must be able to withstand the brief mains failure of 20 ms allowed in EN 60 204-1.
[6] Supply voltage via FX3-MPL1 system plug.
[7] Within the limits of V_S.

	Minimum	Typical	Maximum
Storage temperature	–25 °C		+70 °C
Climatic conditions	According to EN 61131-2 (55 °C, 95 % r. h.)		
Air humidity (non-condensing)	15 %		95 %
Vibration fatigue limit	According to EN 61131-2		
Shock resistance	According to EN 61131-2		
Short circuit protection	4A gG (with tripping characteristic B or C)		

Power supply (A1, A2) via system plug FX3-MPL1 for UE4740

Supply voltage	16.8 V	24 V	30 V
Type of supply voltage[8]	PELV or SELV		

9.2 Response time (only for UE4140/UE4740)

The response time of the EFI gateway is not the same as the overall response time of the system. When considering the response time, you must instead calculate the response times for the individual signal paths (for example from an EFI connection to the FPLC). The individual signals can be of different importance when considering the safety of the entire system.

The response time of the entire system depends, for example, on …

- the device-specific transfer time if safe SICK device communication is used at the EFI connection,
- the processing time in the EFI gateway,
- the monitoring time for the cyclic service in the PROFIBUS or PROFINET IO,
- the processing time in the FPLC.

Using the following calculation scheme (see Tab. 19), you determine the response time on a signal path up to the provision of the information at the PROFIBUS or PROFINET IO output of the EFI gateway.

Information on calculating the overall response time is available in the documentation of the FPLC used by you. Information on calculating the (partial) response times of the devices connected to the EFI gateway is available in the corresponding operating instructions.

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[8]   The current from the power supply that supplies the EFI gateway must be limited externally to max. 4 A — either by the power supply itself or by a fuse.

Technical specifications

Information for users of a Siemens FPLC

If you use a Siemens FPLC, you require the following data to calculate the "maximum reaction time" of the entire system:

Tab. 18: Data for calculating the "maximum reaction time" of the entire system

Siemens term	SICK term	Description
Discrepancy times	Discrepancy times	Time in ms
Max. reaction time if no error exists	Response time	Refer to the following table
Max. reaction time if an error exists		
Max. acknowledgement time	Internal processing time	6 ms

To determine the response time from the EFI interface (safe SICK device communication) at the EFI connection to the PROFIBUS or PROFINET IO connection:

➢ Determine the response time of the device connected to the EFI connection using the respective operating instructions.

➢ Request the device-specific transfer time of the safe SICK device communication from SICK in as far as it is not already specified in Tab. 19, Line 2.

➢ Fill out the following table to determine the response time of this signal path:

Tab. 19: Determining the response time from the EFI interface to the PROFIBUS connection

Line	Required detail	Time
1	Response time of the connected device	+ _____ ms
2	If safe SICK device communication is used [9]: • C4000: 4 ms • M4000: 4 ms • S3000: 21 ms • S300: 21 ms	+ _____ ms
3	Internal processing time of the EFI gateway	+ 6 ms
4	**Response time of the EFI connection**	= _____ ms

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[9] Data correct at the time the document went to print. Data for further SICK devices available directly from SICK.

9.3   Dimensional drawings

9.3.1   Dimensional drawing UE1840 EFI gateway

Fig. 14: Dimensional drawing UE1840 EFI gateway (mm)
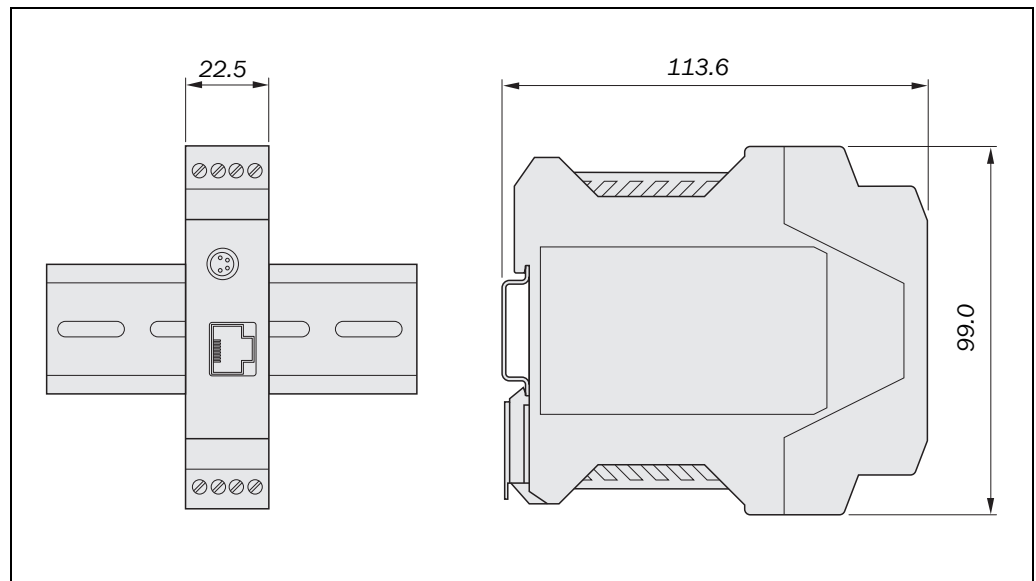
9.3.2   Dimensional drawing UE4140/UE1140/UE1940 EFI gateway

Fig. 15: Dimensional drawing UE4140/UE1140/UE1940 EFI gateway (mm)
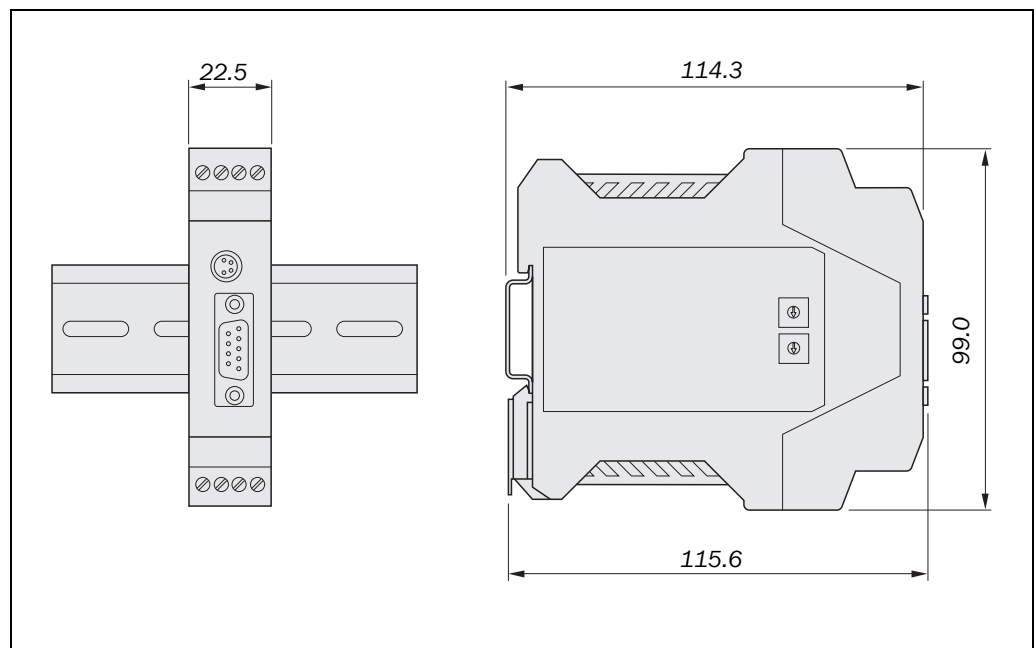
9.3.3   Dimensional drawing UE4740 EFI gateway

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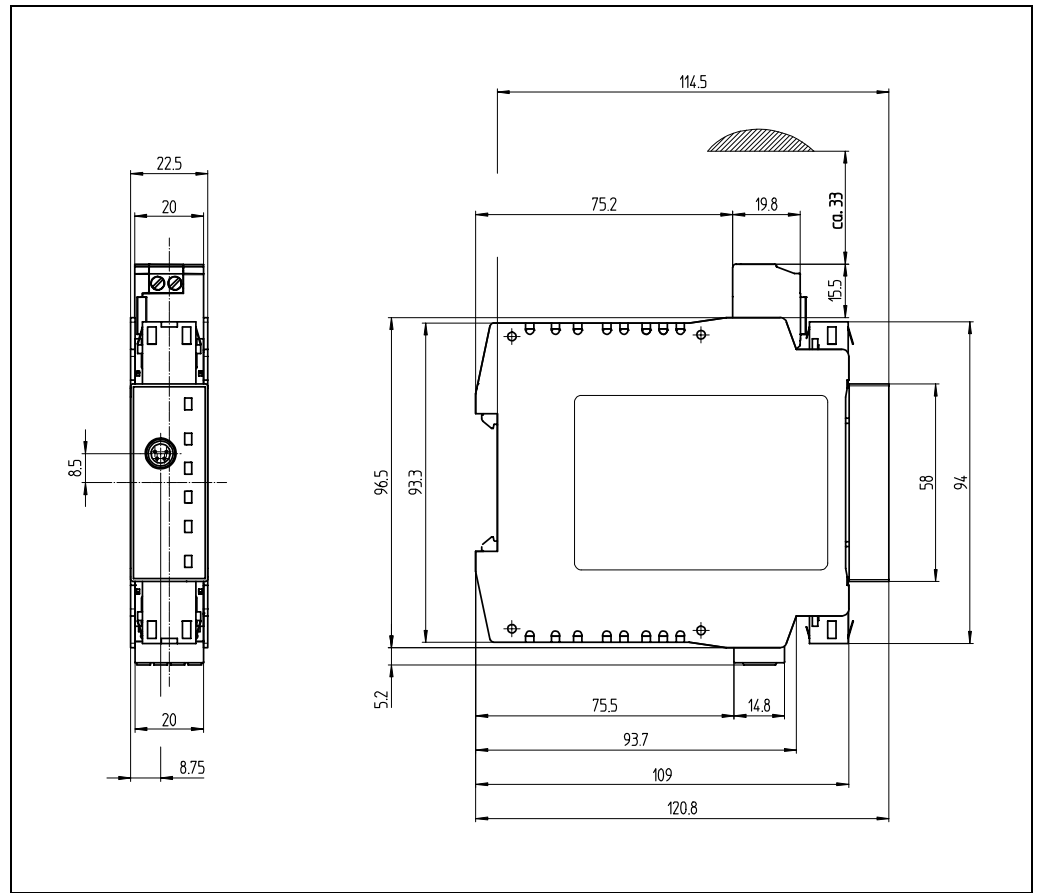
10   Ordering information

10.1   EFI gateway

Tab. 20: Part numbers EFI gateway

Part	Part no.
UE4140-22I0000 PROFIsafe gateway for up to 2 EFI connections (incl. Configuration & Diagnostic Software and operating instructions on CD-ROM)	1029098
UE1140-22I0000 PROFIBUS gateway for up to 2 EFI connections (incl. Configuration & Diagnostic Software and operating instructions on CD-ROM)	1029099
UE4740-22H0000 PROFINET IO gateway for up to 2 EFI connections (incl. mounting instructions)[10]	1046978
UE1840-22H0000 Ethernet gateway for up to 2 EFI connections (incl. Configuration & Diagnostic Software and operating instructions on CD-ROM)	1029100
UE1940-22I0000 CANopen gateway for up to 2 EFI connections (incl. Configuration & Diagnostic Software and operating instructions on CD-ROM)	1040397

[10] Note: The latest version of the Configuration & Diagnostic Software can be downloaded from www.sick.com.

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10.2 Accessories

Tab. 21: Accessories part numbers

Part	Part no.
CDS (Configuration & Diagnostic Software) On CD-ROM including online documentation and operating instructions in all available languages	2032314
2 m connection cable For connection of the configuration connection to the serial interface of the PC M8 × 4-pin/D-Sub 9-pin (DIN 41 642), approx. 2 m	6021195
8 m connection cable For connection of the configuration connection to the serial interface of the PC M8 × 4-pin/D-Sub 9-pin (DIN 41 642), approx. 8 m	2027649
FX3-MPL100001 System plug for UE4740 PROFINET IO EFI gateway	1047162
EFI cable, shielded Cut to length (2 × 0.34 mm² and 2 × 0.25 mm²)	6030921
PROFIBUS connection	
M12 × 5 plug, straight, B coded, screwed, for cross wire section max. 0.75 mm²	6021354
M12 × 5 socket, straight, B coded, screwed, for cross wire section max. 0.75 mm²	6021353
M12 × 4 plug, with terminator, straight, B coded	6021156

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11 Annex

11.1 Process images

11.1.1 Structure of the UE4140/UE4740/UE1140/UE1940 process images

The process images of the UE4140/UE4740/UE1140/UE1940 EFI gateway can be configured freely with the CDS. Predefined process images can also be used for each sensor type.

A process image that is a maximum of 6 bytes long is available. All the information provided by a connected sensor can be linked in this image. In addition results of the logic evaluations or information from the process input image can be used.

If you use the predefined process images, the process image is as follows.

11.1.2 Structure of the UE4140/UE4740 process images

Tab. 22: Structure of the UE4140/UE4740 process images

	Range	Position	Description
Input signals from the gateway to the PLC	Unoccupied	Bytes 0–1	2 × 8 bits (Boolean)
	EFI connection 1	Bytes 2–3	2 × 8 bits (Boolean)
	EFI connection 2	Bytes 4–5	2 × 8 bits (Boolean)
	PROFIsafe header	Bytes 6–9	Reserved for PROFIsafe data
Output signals from the PLC to the gateway	Unoccupied	Bytes 0–1	2 × 8 bits (Boolean)
	EFI connection 1	Bytes 2–3	2 × 8 bits (Boolean)
	EFI connection 2	Bytes 4–5	2 × 8 bits (Boolean)
	PROFIsafe header	Bytes 6–9	Reserved for PROFIsafe data

11.1.3 Structure of the UE1140/UE1940 process images

Tab. 23: Structure of the UE1140 PROFIBUS and UE1940 CANopen process images

	Range	Position	Description
Input signals from the gateway to the PLC	Unoccupied	Bytes 0–1	2 × 8 bits (Boolean)
	EFI connection 1	Bytes 2–3	2 × 8 bits (Boolean)
	EFI connection 2	Bytes 4–5	2 × 8 bits (Boolean)
Output signals from the PLC to the gateway	Unoccupied	Bytes 0–1	2 × 8 bits (Boolean)
	EFI connection 1	Bytes 2–3	2 × 8 bits (Boolean)
	EFI connection 2	Bytes 4–5	2 × 8 bits (Boolean)

11.2 Process images of the EFI connections

Note
- The information in this section applies only for the UE4140/UE4740/UE1140/UE1940 EFI gateways.

- The process images of the EFI connections are two bytes long each. Their structure depends on the device that is connected to the respective EFI connection.

- Please consult the operating instructions of the corresponding device when using device-specific functions.

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11.2.1   Input signals from the EFI connection to the (F)PLC

EFI1 address	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0
EFI2 address	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0
C4000 Standard/Advanced	Reset required	Reset	Status message output (ADO)	Reserved	Reserved	Reserved	Reserved	OSSD (Switching output) green
M4000 Advanced	Reset required	Reset	Status message output (ADO)	Reserved	Additional signal C1 or belt stop	Muting lamp off/on	Muting status	OSSD (Switching output) green
M4000 Advanced with UE403	Reset required	Reset	Status message output (ADO)	Reserved	Additional signal C1 or belt stop	Muting lamp off/on	Muting status	OSSD (Switching output) green
S3000	Reset required	Reset	Simultaneous monitoring range[11]		Used monitoring range		Warning field free[12]	OSSD (Switching output) green
			Warning field free[12]	Protective field free[12]	Warning field free[12]	Protective field free[12]		
S300	Reset required	Reset	Reserved	Reserved	Used monitoring range		Warning field free	OSSD (Switching output) green
					Warning field free	Protective field free		

EFI1 address	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0
EFI2 address	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.0
C4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
M4000 Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
M4000 Advanced with UE404	Override lamp	Reset/ Override	Additional signal C1/ belt stop/ Override	Reserved	Status of the muting sensors on UE403			
					B2	B1	A2	A1
S3000	Status of the monitoring case inputs at the S3000							
	In D2	In D1	In C2	In C1	In B2	In B1	In A2	In A1
S300	Status of the monitoring case inputs at the S300							
	Reserved	Reserved	Reserved	Reserved	In B2	In B1	In A2	In A1

Tab. 24: Process image of the input signals from the EFI connection to the (F)PLC

[11] ⚠ **Warning:** The return value depends on the firmware version of the used S3000:

S3000 firmware version	Return value	
	Simultaneously monitored area defined	**Simultaneously monitored area not defined**
Controller ≥ 2.26 and interface ≥ 1.00	Status of the protective field/warning field	Permanently 1 (protective field/warning field free)
Controllers < 2.26 and Interface < 1.00		Permanently 0 (protective field/warning field free)

[12] ⚠ **Attention, this information is only valid for UE4140 and S3000 using S3000 controller software version < 2.26 and S3000 interface software version < 1.00:**
Only evaluate this bit in the FPLC together with the passivation state of the UE4100! Reason: The bit logic is inverted. The bit has the value 1 when a dangerous state has been recognised. The bit has the value 0 when no dangerous state has been determined. However, the bit can assume the value 0 due to faulty communication. The passivation state of the UE4100 must therefore be monitored additionally (for example at Siemens Step 7: PASS_OUT variable in the data block F-Periphery DB)

11.2.2 Output signals from the FPLC to the EFI connection

EFI1 address	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0
EFI2 address	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0
C4000 Standard/Advanced	Reserved	Activate teach-in	Operating mode switching					
			6	5	4	3	2	1
M4000 Advanced	Reserved	Muting lamp status	Reset/ override or reset	Override or additional signal C1 or belt stop	Muting sensors			
					B2	B1	A2	A1
M4000 Advanced with UE403	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
S3000	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
S300	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
EFI1 address	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0
EFI2 address	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.0
C4000 Standard/Advanced	Bypass channel 2	Bypass channel 1	Reserved	Reserved	Reserved	Run-on monitoring (SCC)	Bottom dead centre (MCC-BDC)	Top dead centre (MCC-TDC)
M4000 Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
M4000 Advanced with UE403	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
S3000	In D2	In D1	In C2	In C1	In B2	In B1	In A2	In A1
S300	Reserved	Reserved	Reserved	Reserved	In B2	In B1	In A2	In A1

Tab. 25: Process image of the output signals from the FPLC to the EFI connection

11.3 Diagnostics data (only for UE1140/UE4140)

The diagnostics data of the EFI gateway begin at Byte 12 of the diagnostic message. The diagnostic message is structured in accordance with IEC 61158.

The diagnostics data consist of 40 bytes at the UE4140/UE1140. See the following tables for the structure.

Tab. 26: Structure of the diagnostics data of the EFI gateway

	Range	Position	Details
UE4140/ UE1140	Station status	Bytes 0–2	
	PROFIBUS address of the PROFIBUS master	Byte 3	
	Manufacturer identifier	Bytes 4–5	Section 9.1 from page 46 on
	DP V1 diagnostics header	Bytes 6–9	
	PROFIsafe diagnostics byte	Byte 10	See Tab. 27
	Diagnostics data EFI gateway	Bytes 11–15	See Tab. 29
	Diagnostics data of the 1st device at the EFI connection 1 (host)	Bytes 16–19	See Tab. 29
	Diagnostics data of the 2nd device at the EFI connection 1 (Guest 1)	Bytes 0–2	See Tab. 29
	Diagnostics data of the 3rd device at the EFI connection 1 (Guest 2)	Bytes 24–27	See Tab. 29
	Diagnostics data of the 1st device at the EFI connection 2 (host)	Bytes 2–3	See Tab. 29
	Diagnostics data of the 2nd device at the EFI connection 2 (Guest 1)	Bytes 32–35	See Tab. 29
	Diagnostics data of the 3rd device at the EFI connection 2 (Guest 2)	Bytes 36–39	See Tab. 29

11.3.1   PROFIsafe diagnostics byte

Address	10.7	10.6	10.5	10.4	10.3	10.2	10.1	10.0
PROFIsafe diagnostics byte (decimal value)	64 The F-address transferred by the firmware does not agree with the parameter **F_Dest_Add**. 65 The parameter **F_Dest_Add** has the value 0x0000 or 0xFFFF. 66 The parameter **F_Source_Add** has the value 0x0000 or 0xFFFF. 67 The parameter **F_WD_Time** has the value 0 ms. 68 The value of the parameter **F_SIL** exceeds the SIL value of the firmware.				69 The parameter **FCRC_Length** does not agree with the generated values. 70 Incorrect version of the F-parameter record 71 CRC1 error 72 Reserved (neither use nor sample number) 73 Reserved (neither use nor sample number) 74 Reserved (neither use nor sample number)			

Tab. 27: PROFIsafe diagnostics byte

11.3.2   Diagnostics data of the UE1140/UE4140 EFI gateway

Address	11.7	11.6	11.5	11.4	11.3	11.2	11.1	11.0
Gateway	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Address	12.7	12.6	12.5	12.4	12.3	12.2	12.1	12.0
Gateway	Reserved	Reserved	Reserved	Configuration required	Restart	New configuration recognised	Operating status of the EFI gateway 00: Operation 01: Initialisation or configuration required 10: Configuration mode 11: Lock-out	

Address	13.7	13.6	13.5	13.4	13.3	13.2	13.1	13.0
PROFIBUS	Reserved	EFI2 device passive	EFI1 device passive	Reserved	PROFIsafe I/O error	PROFIBUS network configured incorrectly	Error in PROFIBUS communication	PROFIBUS address changed

Address	14.7	14.6	14.5	14.4	14.3	14.2	14.1	14.0
EFI1	Restart of the EFI device	New configuration recognised	Error in connected devices	EFI device unconfigured or configuration faulty	Reserved	Error in communication	Error in safe communication	Reserved

Address	15.7	15.6	15.5	15.4	15.3	15.2	15.1	15.0
EFI2	Restart of the EFI device	New configuration recognised	Error in connected devices	EFI device unconfigured or configuration faulty	Reserved	Error in communication	Error in safe communication	Reserved

Tab. 28: Diagnostics data of the EFI gateway

11.3.3 Diagnostics data from devices to the EFI connections

Note The information in this section applies only for the UE4140/UE1140 EFI gateway.

The diagnostics data of the EFI connections are twelve bytes long per connection. Their structure depends on the device that is connected to the respective EFI connection. Please read the operating instructions of the UE4140 function package for the respective device to this purpose.

Diagnostics data of the devices at the EFI connections

EFI1 Host	16.7	16.6	16.5	16.4	16.3	16.2	16.1	16.0
EFI1 Guest 1	20.7	20.6	20.5	20.4	20.3	20.2	20.1	20.0
EFI1 Guest 2	24.7	24.6	24.5	24.4	24.3	24.2	24.1	24.0
EFI2 Host	28.7	28.6	28.5	28.4	28.3	28.2	28.1	28.0
EFI2 Guest 1	32.7	32.6	32.5	32.4	32.3	32.2	32.1	32.0
EFI2 Guest 2	36.7	36.6	36.5	36.4	36.3	36.2	36.1	36.0
C4000 Standard/Advanced / **S3000**	Reserved	Contamination	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
M4000 Advanced	Reserved	Contamination	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

EFI1 Host	17.7	17.6	17.5	17.4	17.3	17.2	17.1	17.0
EFI1 Guest 1	21.7	21.6	21.5	21.4	21.3	21.2	21.1	21.0
EFI1 Guest 2	25.7	25.6	25.5	25.4	25.3	25.2	25.1	25.0
EFI2 Host	29.7	29.6	29.5	29.4	29.3	29.2	29.1	29.0
EFI2 Guest 1	33.7	33.6	33.5	33.4	33.3	33.2	33.1	33.0
EFI2 Guest 2	37.7	37.6	37.5	37.4	37.3	37.2	37.1	37.0
C4000 Standard/Advanced	Status of the emergency stop	Operating mode set at the C4000 (000 = None, 001–110 = 1–6)			Operating state of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Error in the device	Reserved
S3000	Status of the monitoring case inputs at the S3000 — In B2	In B1	In A2	In A1				
M4000 Advanced	Reserved	Reserved	Reserved	Reserved	Operating state of the device 00: Operation 01: Initialisation 10: Configuration mode 11: Lock-out		Error in the device	Reserved

EFI gateway

EFI1 Host	18.7	18.6	18.5	18.4	18.3	18.2	18.1	18.0
EFI1 Guest 1	22.7	22.6	22.5	22.4	22.3	22.2	22.1	22.0
EFI1 Guest 2	26.7	26.6	26.5	26.4	26.3	26.2	26.1	26.0
EFI2 Host	30.7	30.6	30.5	30.4	30.3	30.2	30.1	30.0
EFI2 Guest 1	34.7	34.6	34.5	34.4	34.3	34.2	34.1	34.0
EFI2 Guest 2	38.7	38.6	38.5	38.4	38.3	38.2	38.1	38.0
C4000 Standard/Advanced	Reserved	Reserved	Protective field diagnostics 00: Error 01: Invalid PSDI interruption 10: Valid PSDI interruption 11: No object/no PSDI interruption		Reserved	Teach-in active	Reserved	Teach-in key-operated switch activated
S3000			Reserved	Reserved	Status of the monitoring case inputs at the S3000			
					In D2	In D1	In C2	In C1
M4000	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
EFI1 Host	19.7	19.6	19.5	19.4	19.3	19.2	19.1	19.0
EFI1 Guest 1	23.7	23.6	23.5	23.4	23.3	23.2	23.1	23.0
EFI1 Guest 2	27.7	27.6	27.5	27.4	27.3	27.2	27.1	27.0
EFI2 Host	31.7	31.6	31.5	31.4	31.3	31.2	31.1	31.0
EFI2 Guest 1	35.7	35.6	35.5	35.4	35.3	35.2	35.1	35.0
EFI2 Guest 2	39.7	39.6	39.5	39.4	39.3	39.2	39.1	39.0
C4000 Standard/Advanced	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Bypass status	Reserved
S3000							Reserved	
M4000	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Tab. 29: Diagnostics data of the 1st device at the EFI connection 1 (host)

11.4 Diagnostics data UE4740

The diagnostics data for the UE4740 can be read via an acyclic read on API 0, slot 1, subslot 1 with the index 0xe00c (diagnostics, maintenance, qualified and status for one AR). The diagnostics data set is part of the reply to the acyclic read and is only present if diagnostics are available. If there are no diagnostics in the device, the reply comprises only the related ReadResponseHeader.

The diagnostics data set has the following structure, where the actual diagnostics data for the UE4740 start at byte 20:

Tab. 30: Diagnostics data of the UE4740

Range	Meaning
Byte 0–5	Block header
Byte 6–9	API
Byte 10–11	SlotNumber
Byte 12–13	SubslotNumber
Byte 14–15	ChannelNumber
Byte 16–17	ChannelProperties
Byte 18–19	Userstructureidentifier
Byte 20–21	ChannelNumber
Byte 22–23	ChannelProperties
Byte 24–25	ChannelErrorType

If there are more diagnostics data in the device, the additional diagnostics consisting of ChannelNumber, ChannelProperties and ChannelErrorType are appended:

Tab. 31: Additional diagnostics of the UE4740

Range	Meaning
Byte 26–27	ChannelNumber
Byte 28–29	ChannelProperties
Byte 30–31	ChannelErrorType

The following values exist for ChannelErrorType:

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*Tab. 32: Values for
ChannelErrorType on the
UE4740*

ChannelErrorType	Meaning
0x40	Incorrect failsafe destination address (F_Dest_Addr)
0x41	Invalid failsafe destination address (F_Dest_Add)
0x42	Invalid failsafe source address (F_Source_Add)
0x43	Failsafe monitoring time is 0 ms (F_WD_Time)
0x44	Parameter F_SIL exceeds the maximum SIL for the device
0x45	The parameter F_CRC_Length does not correspond to the value generated
0x46	Incorrect version of the F parameter
0x47	CRC1 fault
0x100	Device in error state
0x101	Device in configuration state
0x102	New configuration data
0x103	Configuration required
0x104	PROFINET configuration error
0x105	PROFIsafe parameterization error
0x106	PROFIsafe communication inactive
0x107	EFI1 communication error
0x108	EFI2 communication error
0x109	Undervoltage detected
0x200	Error in safety-related communication on EFI1
0x201	Physical data transmission error on EFI1
0x202	Invalid configuration on EFI1
0x203	Device restart on EFI1 detected
0x204	General error in EFI1 communication
0x205	Safety-related communication on EFI1 inactive
0x300	Error in safety-related communication on EFI2
0x301	Physical data transmission error on EFI2
0x302	Invalid configuration on EFI2
0x303	Device restart on EFI2 detected
0x304	General error in EFI2 communication
0x305	Safety-related communication on EFI2 inactive

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11.5   EC declaration of Conformity

Fig. 17: EC declaration of conformity (page 1)

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EC declaration of conformity   en
The undersigned, representing the following manufacturer herewith declares that the product is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the respective standards and/or technical specifications have been applied.

EG-Konformitätserklärung   de
Der Unterzeichner, der den nachstehenden Hersteller vertritt, erklärt hiermit, dass das Produkt in Übereinstimmung mit den Bestimmungen der nachstehenden EG-Richtlinie(n) (einschließlich aller zutreffenden Änderungen) ist, und dass die entsprechenden Normen und/oder technischen Spezifikationen zur Anwendung gelangt sind.

ЕС декларация за съответствие   bg
Подписалият, който представя долуспоменатия производител, обявява, че продуктът съответва на разпоредбите на долуизброените директиви на ЕС (включително на всички действащи изменения) и че отговаря на съответните норми и/или технически спецификации за приложение.

ES prohlášení o shodě   cs
Níže podepsaný, zastupující následujícího výrobce, tímto prohlašuje, že výrobek je v souladu s ustanoveními následující(ch) směrnice (směrnic) ES (včetně všech platných změn) a že byly použity odpovídající normy a/nebo technické specifikace.

EF-overensstemmelseserklæring   da
Undertegnede, der repræsenterer følgende producent erklærer hermed at produktet er i overens-stemmelse med bestemmelserne i følgende EF-direktiv(er) (inklusive alle gældende ændringer) og at alle tilsvarende standarder og/eller tekniske specifikationer er blevet anvendt.

ΕΕ-Δήλωση συμμόρφωσης   el
Ο Υπογράφων, εκπροσωπών τον ακόλουθο κατασκευαστή δηλώνει με το παρόν έγγραφο ότι το προϊόν συμμορφώνεται με τους όρους της (των) ακόλουθης (-ων) Οδηγίας (-ών) της ΕΕ (συμπεριλαμβανομένων όλων των εφαρμοζόμενων τροποποιήσεων) και ότι έχουν εφαρμοστεί τα αντίστοιχα πρότυπα και/ή οι τεχνικές προδιαγραφές.

Declaración de conformidad CE   es
El abajo firmante, en representación del fabricante indicado a continuación, declara que el producto es conforme con las disposiciones de la(s) siguiente(s) directiva(s) de la CE (incluyendo todas las modificaciones aplicables) y que las respectivas normas y/o especificaciones técnicas han sido aplicadas.

EÜ vastavusdeklaratsioon   et
Allakirjutanu, kes esindab järgmist tootjat, kinnitab käesolevaga, et antud toode vastab järgneva(te) EÜ direktiivi(de) sätetele (kaasa arvatud kõikidele asjakohastele muudatustele) ja et on kohaldatud vastavaid nõudeid ja/või tehnilisi kirjeldusi.

EY-vaatimustenmukaisuusvakuutus   fi
Allekirjoittanut, joka edustaa alla mainittua valmistajaa, vakuuttaa täten, että tuote on seuraavan (-ien) EU-direktiivin (-ien) vaatimusten mukainen (mukaan lukien kaikki sovellettavat muutokset) ja että vastaavia standardeja ja teknisiä erittelyjä on sovellettu.

Déclaration CE de conformité   fr
Le soussigné, représentant le constructeur ci-après, déclare par la présente que le produit est conforme aux exigences de la (des) directive(s) CE suivantes (y compris tous les amendements applicables) et que les normes et/ou spécifications techniques correspondantes ont été appliquées.

EK megfelelőségi nyilatkozat   hu
Alulírott, az alábbi gyártó képviseletében ezennel kijelenti, hogy a termék megfelel az alábbi EK-irányelv(ek) követelményeinek (beleértve azok minden vonatkozó módosítását) és kijelenti hogy a megfelelő szabványokat és/vagy műszaki előírásokat alkalmazta.

EB-samræmisyfirlýsing   is
Undirritaður, fyrir hönd framleiðandans sem nefndur er hér að neðan, lýsir því hér með yfir að varan er í samræmi við ákvæði eftirtalinna EB-tilskipana (að meðtöldum öllum breytingum sem við eiga) og að varan er í samræmi við viðeigandi staðla og/eða tækniforskriftir.

Dichiarazione CE di conformità   it
Il sottoscritto, rappresentante il seguente costruttore dichiara qui di seguito che il prodotto risulta in conformità a quanto previsto dalla(e) seguente(i) direttiva(e) comunitaria(e) (comprese tutte le modifiche applicabili) e che sono state applicate tutte le relative norme e/o specifiche tecniche.

EB atitikties deklaracija   lt
Pasirašiusysis, atstovaujantis šiam gamintojui deklaruoja, kad gaminys atitinka šios (-ių) EB direktyvos (-ų) reikalavimus (įskaitant visus taikytinus keitinius) ir kad buvo taikomi antrajame puslapyje nurodyti standartai ir (arba) techninės specifikacijos.

EFI gateway

*EC declaration of conformity
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EK atbilstības deklarācija   lv
Apakšā parakstījusies persona, kas pārstāv zemāk minēto ražotāju ar šo deklarē, ka izstrādājums atbilst zemāk minētajai (-ām) EK direktīvai (-ām) (ieskaitot visus atbilstošos grozījumus) un ka izstrādājumam ir piemēroti attiecīgie standarti un/vai tehniskās specifikācijas.

EG-verklaring van overeenstemming   nl
Ondergetekende, vertegenwoordiger van de volgende fabrikant, verklaart hiermee dat het product voldoet aan de bepalingen van de volgende EG-richtlijn(en) (inclusief alle van toepassing zijnde wijzigingen) en dat de overeenkomstige normen en/of technische specificaties zijn toegepast.

EF-samsvarserklæring   no
Undertegnede, som representerer nedennevnte produsent, erklærer herved at produktet er i samsvar med bestemmelsene i følgende EU-direktiv(er) (inkludert alle relevante endringer) og at relevante normer og/eller tekniske spesifikasjoner er blitt anvendt.

Deklaracja zgodności WE   pl
Niżej podpisany, reprezentujący następującego producenta niniejszym oświadcza, że wyrób jest zgodny z postanowieniami następujących dyrektyw WE (wraz z odnośnymi poprawkami) oraz, że zastosowano odpowiednie normy i/lub specyfikacje techniczne.

Declaração CE de conformidade   pt
O abaixo assinado, que representa o seguinte fabricante, declara deste modo que o produto está em conformidade com as disposições da(s) seguinte(s) directiva(s) CE (incluindo todas as alterações aplicáveis) e que foram aplicadas as respectivas normas e/ou especificações técnicas.

Declaraţie de conformitate CE   ro
Semnatarul, în calitate de reprezentant al producătorului numit mai jos, declară prin prezenta că produsul este în conformitate cu prevederile directivelor CE enumerate mai jos (inclusiv cu toate modificările aferente) şi că s-au întrunit normele şi/sau specificaţiile tehnice corespunzătoare.

ES vyhlásenie o zhode   sk
Dolu podpísaný zástupca výrobcu týmto vyhlasuje, že výrobok je v súlade s ustanoveniami nasledujúcej (nasledujúcich) smernice (smerníc) ES (vrátane všetkých platných zmien) a že sa použili príslušné normy a/alebo technické špecifikácie.

Izjava ES o skladnosti   sl
Podpisani predstavnik spodaj navedenega proizvajalca izjavljam, da je proizvod v skladu z določbami spodaj navedenih direktiv ES (vključno z vsemi ustreznimi spremembami) in da so bili uporabljeni ustrezni standardi in/ali tehnične specifikacije.

EG-försäkran om överensstämmelse   sv
Undertecknad, som representerar nedanstående tillverkare, försäkrar härmed att produkten överensstämmer med bestämmelserna i följande EU-direktiv (inklusive samtliga tillämpliga tillägg till dessa) och att relevanta standarder och/eller tekniska specifikationer har tillämpats.

AB-Uygunluk Beyanı   tr
Aşağıdaki üreticiyi temsil eden imza sahibi böylelikle, ürünün aşağıdaki AB-Yönergesinin(lerin) direktifleri ile (tüm ilgili değişiklikleri kapsayacak şekilde) uyumlu olduğunu ve ilgili normların ve/veya teknik spesifikasyonların uygulandığını beyan eder.

Directives used:	MAS-DIRECTIVE	2006/42/EC
	EMC-DIRECTIVE	2004/108/EC
Standards used:	SAFETY OF MACHINERY; ELECTRICAL EQUIPMENT	EN 60204- 1
	EMC;IMMUNITY/ EMISSION INDUST. ENVIRONMENT	EN 61000- 6
	SAFETY-RELATED PARTS OF CONTROL SYSTEMS	EN 13849- 1
	FUNCTIONAL SAFETY	EN 62061
Product:	**UExx40**	

You can obtain the EC declaration of conformity with the standards used at: **www.sick.com**, search: 9106385

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authorized for technical documentation

ppa. Birgit Knobloch
Division Manager Production
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11.6   Manufacturers checklist

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Checklist for the manufacturer/installer for installation of the EFI gateway

The specifications for the following items listed must be available at least for the initial commissioning. They are dependent on the application, whose requirement must be checked by the manufacturer/installer.

This checklist should be retained/stored with the machine documentation so that you can use it as a reference for periodical tests.

	Yes	No
1. Have the safety rules and regulations been observed in compliance with the directives/standards applicable to the machine?	Yes	No
2. Are the applied directives and standards listed in the declaration of conformity?	Yes	No
3. Does the protective device comply with the required category?	Yes	No
4. Are the required protective measures against electric shock in effect (protection class)?	Yes	No
5. Has the protective function been checked in compliance with the test notes in this documentation? Especially:	Yes	No

- Functional check of the encoders, sensors and actuators at the EFI gateway
- Test of the switch-off paths

	Yes	No
6. Are you sure that the EFI gateway was tested fully for safety functionality after each configuration change?	Yes	No

This checklist does not replace initial commissioning and regular tests by qualified safety personnel.

11.7　List of tables

11.8   List of illustrations

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