

UE4740 PROFINET IO PROFIsafe

EFI gateway



Described product

UE4740 PROFINET IO PROFIsafe

Manufacturer

SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
Germany

Legal information

This work is protected by copyright. Any rights derived from the copyright shall be reserved for SICK AG. Reproduction of this document or parts of this document is only permissible within the limits of the legal determination of Copyright Law. Any modification, abridgment or translation of this document is prohibited without the express written permission of SICK AG.

The trademarks stated in this document are the property of their respective owner.

© SICK AG. All rights reserved.

Original document

This document is an original document of SICK AG.



Contents

1	About this document.....	5
1.1	Purpose of this document.....	5
1.2	Scope.....	5
1.3	Target group.....	5
1.4	Additional information.....	5
1.5	Abbreviations used.....	5
1.6	Symbols and document conventions.....	6
2	Safety information.....	7
2.1	General safety notes.....	7
2.2	Intended use.....	7
2.3	Requirements for the qualification of personnel.....	8
3	Product description.....	9
3.1	Special features of the EFI gateway.....	9
3.2	Status indicators.....	10
3.3	Configurable functions.....	11
3.3.1	Changing the EFI device address.....	12
3.3.2	Functions of the EFI connections.....	12
3.3.3	Configuration in the device window.....	12
4	Project planning.....	13
4.1	Manufacturer of the machine.....	13
4.2	Operating entity of the machine.....	13
5	Mounting.....	14
5.1	Mounting the device.....	14
6	Electrical installation.....	15
6.1	Safety notes.....	15
6.2	Power supply and EFI connections	16
6.3	Ethernet connection (RJ45 plug).....	17
6.4	Configuration connection (M8 × 4).....	17
7	Commissioning.....	19
7.1	Configuration.....	19
7.2	Sequence for commissioning sub-systems.....	19
7.3	System self-check after switching on.....	19
7.4	Full approval of the EFI gateway.....	19
7.5	Check during commissioning and modifications.....	20
8	Configuration.....	21
8.1	Delivery state.....	21
8.2	Prerequisites for the configuration.....	21
8.3	PROFINET IO configuration of the UE4740 EFI gateway.....	21

8.3.1	Reading the general station description.....	21
8.3.2	Adding the EFI gateway to the hardware configuration.....	22
8.4	Connection of the Configuration & Diagnostic Software.....	22
8.4.1	Configuration via the configuration connection of the EFI gateway.....	23
8.4.2	Configuration via PROFINET IO.....	24
8.4.3	Setting the PROFIsafe address.....	24
8.5	Configuration of the devices connected to the EFI gateway.....	24
9	Troubleshooting.....	26
9.1	In the event of faults or errors.....	26
9.2	Fault indicators.....	26
9.3	System behaviour in case of errors of connected devices.....	27
9.4	Extended diagnostics.....	28
10	Decommissioning.....	29
10.1	Disposal.....	29
11	Technical data.....	30
11.1	Data sheet.....	30
11.2	Response time.....	31
11.3	Dimensional drawings.....	32
12	Ordering information.....	33
12.1	EFI gateway.....	33
13	Accessories.....	34
13.1	Accessories.....	34
14	Annex.....	35
14.1	Structure of the UE4740 process images.....	35
14.2	Process images of the EFI connections.....	35
14.2.1	Input signals from the EFI connection to the (F)PLC.....	35
14.2.2	Output signals from the FPLC to the EFI connection.....	36
14.3	Diagnostics data.....	37
14.4	Conformities and certificates.....	39
14.4.1	EU declaration of conformity.....	39
14.4.2	UK declaration of conformity.....	39
14.5	Checklist for initial commissioning and commissioning.....	39
15	List of figures.....	40
16	List of tables.....	41

1 About this document

1.1 Purpose 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 Scope

Product

This document applies to the following products:

- Product code: UE4740 PROFINET IO PROFIsafe
- “Operating instructions” type label entry: 8020180

Document identification

Document part number:

- This document: 8020182
- Available language versions of this document: 8020180

You can find the current version of all documents at www.sick.com.

1.3 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.

1.4 Additional information

www.sick.com

The following information is available on the Internet:

- Data sheets and application examples
- CAD data and dimensional drawings
- Certificates (e.g. EU declaration of conformity)
- Guide for Safe Machinery Six steps to a safe machine

1.5 Abbreviations used

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)
ESPE	Electro-sensitive protective equipment, for example SICK C4000 safety light curtain
FPLC	Fail-safe programmable logic controller
GSDML	General Station Description based on XML
GSG	General Station Description German
OSSD	Output signal switching device = switching output which operates the safety circuit

PROFINET IO	Process Fieldbus = an open communication protocol conforming to IEC 61158 and IEC 61784 for use in the entire field section
PROFIsafe TCP/IP	Profile for safe data transfer via the PROFIBUS or PROFINET network Transmission Control Protocol/Internet Protocol

1.6 Symbols and document conventions

Safety notes and other notes

**DANGER**

Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.

**WARNING**

Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.

**CAUTION**

Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.

**NOTICE**

Indicates a situation presenting possible danger, which may lead to property damage if not prevented.

**NOTE**

Indicates useful tips and recommendations.

Instructions to action

- ▶ The arrow denotes instructions to action.
- 1. The sequence of instructions for action is numbered.
- 2. Follow the order in which the numbered instructions are given.
- ✓ The check mark denotes the result of an instruction.

2 Safety information

2.1 General safety notes

Product integration



DANGER

The product can not offer the expected protection if it is integrated incorrectly.

- ▶ Plan the integration of the product in accordance with the machine requirements (project planning).
 - ▶ Implement the integration of the product in accordance with the project planning.
-

Mounting and electrical installation



DANGER

Death or severe injury due to electrical voltage and/or an unexpected startup of the machine

- ▶ Make sure that the machine is (and remains) disconnected from the voltage supply during mounting and electrical installation.
 - ▶ Make sure that the dangerous state of the machine is and remains switched off.
-

Repairs and modifications



DANGER

Improper work on the product

A modified product may not offer the expected protection if it is integrated incorrectly.

- ▶ Apart from the procedures described in this document, do not repair, open, manipulate or otherwise modify the product.
-

2.2 Intended use

The EFI gateway allows access to SICK sensors via PROFINET IO or PROFIsafe. 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 ISO 13849-1.

The EFI gateway may be used only by qualified safety personnel and only on the system where it has been installed and initialised by qualified safety personnel.

The product may be used in safety functions.

Incorrect use, improper modification or manipulation of the product will invalidate any warranty from SICK; in addition, any responsibility and liability of SICK for damage and secondary damage caused by this is excluded.

UL/CSA applications

If the product is being used in accordance with UL 508 or CSA C22.2 No. 142, the following conditions must also be met:

- To protect the device's 24-volt voltage supply, use a fuse with a maximum voltage of 4 A and a minimum of 30 V DC in accordance with UL 248.
- For the wiring, use only copper wire with a temperature resistance of at least 60 °C/75 °C (140 °F/167 °F), wire cross-section AWG 30-12 for screw terminals or AWG 24-16 for spring terminals.

- The screw terminal tightening torque must be 5 to 7 lb-in.
- Use the devices only in an environment with degree of contamination 2 as a maximum.

**NOTE**

The safety functions have not be evaluated by UL. Authorization is in accordance with UL 508, general applications.

2.3 Requirements for the qualification of personnel

The product must be configured, installed, connected, commissioned, and serviced by qualified safety personnel only.

Project planning

You need safety expertise to implement safety functions and select suitable products for that purpose. You need expert knowledge of the applicable standards and regulations.

Mounting, electrical installation and commissioning

You need suitable expertise and experience. You must be able to assess if the machine is operating safely.

Configuration

You need suitable expertise and experience. You must be able to assess if the machine is operating safely.

Operation and maintenance

You need suitable expertise and experience. You must be instructed in machine operation by the machine operator. For maintenance, you must be able to assess if the machine is operating safely.

3 Product description

3.1 Special features of the EFI gateway

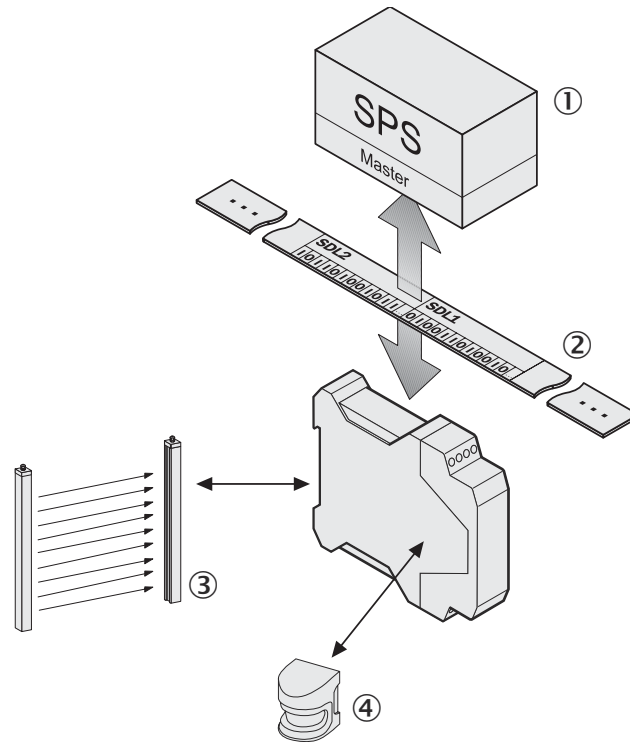


Figure 1: Operating principle UE4740

- ① SPS (= PLC)
- ② Message transports process image of the Slave
- ③ e.g. C4000 safety light curtain
- ④ e.g. S3000 safety laser scanner

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

3.2 Status indicators

Status indicators

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.



Figure 2: Status indicators

Table 1: Status indicators

Display		Meaning
PWR	○	No supply voltage
	● Red	Internal supply voltage too low or firmware is being updated
	● Green	Voltage supply OK

Display		Meaning
BUS	○	PROFINET IO is running, but safety communication inactive. No PROFIsafe master was recognised
	● Green	PROFINET IO is running with PROFIsafe, safety communication active
	◐ Green	Acknowledgement by the user required
	● Red	General error of the PROFINET IO, no communication possible
	◐ Red	No valid PROFINET IO configuration
	◐ Red/ Green (2 Hz), at the same time as the PWR LED	PROFINET identification
DIA	○	Device ready for operation
	● Red	Configuration is being transferred or has not been completed
	◐ Red	1 Hz: System error (lockout)
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
LNK1/ LNK2	○	No Ethernet connection
	● Green	Ethernet connection active
ACT1/ ACT2	○	No data transmission
	◐ Yellow	Data transmission active

○ LED off. ◐ LED flashes. ● LED illuminates.

Further topics

- ["Fault indicators", page 26](#)

3.3 Configurable functions

Important information



DANGER

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.

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.



NOTE

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

Further topics

- ["Full approval of the EFI gateway", page 19](#)

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 PROFIsafe on PROFINET IO.

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 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

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.

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 PROFINET IO specification.

Alarms

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 Project planning

4.1 Manufacturer of the machine

The manufacturer of the machinery must carry out a risk assessment and apply appropriate protective measures. Further protective measures may be required in addition to the product.

The product must not be tampered with or changed, except for the procedures described in this document.

The product must only be repaired by the manufacturer of the product or by someone authorized by the manufacturer. Improper repair can result in the product not providing the expected protection.

4.2 Operating entity of the machine

Changes to the electrical integration of the product in the machine controller and changes to the mechanical mounting of the product necessitate a new risk assessment. The results of this risk assessment may require the entity operating the machine to meet the obligations of a manufacturer.

After each change to the configuration, it is necessary to check whether the protective measure provides the necessary protection. The person making the change is responsible for ensuring that the protection measure provides the necessary protection.

The product must not be tampered with or changed, except for the procedures described in this document.

The product must only be repaired by the manufacturer of the product or by someone authorized by the manufacturer. Improper repair can result in the product not providing the expected protection.

5 Mounting

5.1 Mounting the device

Overview

The EFI gateway is designed for mounting on a 35 mm mounting rail in accordance with EN 50022.

Prerequisites

Installation site:

- Earthed DIN rail for earthing the shields (e.g. 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.
- The installation site must at least comply with enclosure rating IP 54
- Take suitable measures to ensure that the device cannot be manipulated
- Take suitable measures so that foreign bodies cannot enter openings, in particular for the system plug.

Approach

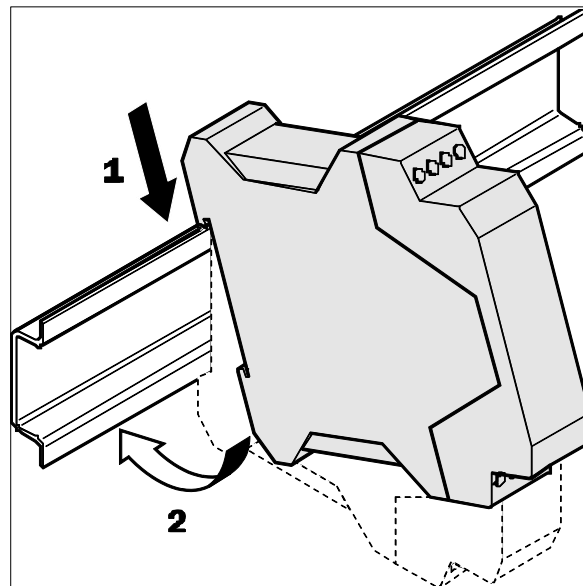


Figure 3: Mounting the device

1. Hang the device onto the DIN rail.
2. Latch the module onto the DIN rail by pressing it lightly in the direction of the arrow.
3. Install end clips on the left and right to provide adequate thermal convection.

6 Electrical installation

6.1 Safety notes



WARNING

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.



WARNING

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 6164311 erfüllen.

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

- ▶ SICK industrial safety devices are designed for local DC supplies only.



WARNING

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.

6.2 Power supply and EFI connections

Overview

The UE4740 EFI gateway is only supplied electrically via the system plug FX3MPL1. 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.

Terminal assignment of the UE4740 EFI gateway

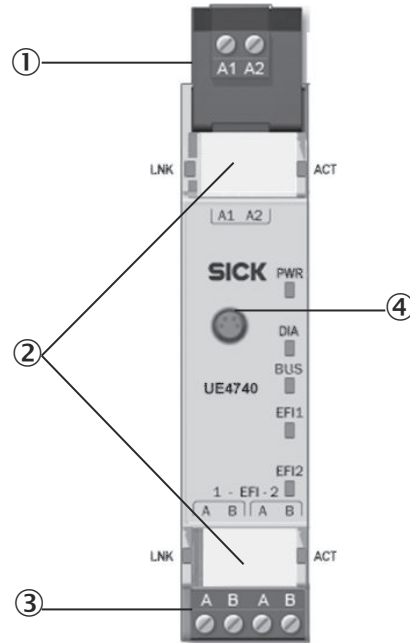


Figure 4: Terminal assignment of the UE4740 EFI gateway

- ① System plug with integrated configuration memory (for gateway replacement)
- ② 2 × RJ45 for PROFINET IO
- ③ Screw type terminals for 2 × EFI (shield if necessary via mounting rail terminal)
- ④ M8 socket for RS-232 (CDS)

Table 2: Terminal assignment of the UE4740 EFI gateway

Terminal	Designation	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.

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.

Table 3: Terminal assignment of the FX3-MPL1 system plug

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

6.3 Ethernet connection (RJ45 plug)

Overview

For the connection to the network you must use RJ45 plugs. If the network is not connected to a following bus device, then a connection using a RJ45 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.

Ethernet connection (RJ45 plug)

Table 4: Pin assignment Ethernet connection UE4740 (RJ-45 plug)

PIN	Designation	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

6.4 Configuration connection (M8 × 4)

Overview

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

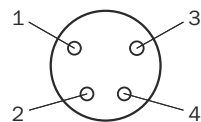


Figure 5: Pin assignment configuration connection (M8 × 4)

Important information



NOTICE

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



NOTICE

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

Configuration connection

Table 5: Pin assignment configuration connection

PIN	EFI gateway	RS232 DSub (9pin) at PC end
1	Reserved	Not assigned
2	RxD	Pin 3
3	0 V	Pin 5
4	TxD	Pin 2

7 Commissioning

7.1 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.

7.2 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.

7.3 System self-check after switching on

Self-check

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

Complementary information

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 ● and the EFI gateway transfers only fail-safe values.

Further topics

- ["Troubleshooting", page 26](#)

7.4 Full approval of the EFI gateway

Overview

You may only start operating the system when the general acceptance was successful.

Prerequisites

- Ensure there is no person in the hazardous area before commissioning.

Approach

- ▶ 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.
- ▶ Check the correct data transfer from the devices at the EFI connections to the (F)PLC and vice versa.
- ▶ 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.

7.5 Check during commissioning and modifications

The thorough check is intended to ensure that the safety functions are fulfilling their planned purpose and whether persons are being adequately protected.

- ▶ Carry out the checks specified in the test plan of the manufacturer of the machine and the operating entity.

8 Configuration

8.1 Delivery state

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

8.2 Prerequisites for the configuration

Overview

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.

Important information



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.

Prerequisites

- The application must already have been planned completely. The planning must include among other things
 - a detailed safety analysis of the planned application
 - 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
- The safety components must be connected electrically to the EFI gateway

Further topics

- ["Electrical installation", page 15](#)

8.3 PROFINET IO configuration of the UE4740 EFI gateway

8.3.1 Reading the general station description

Overview

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

Approach

1. Insert the CD-ROM „CDS – Configuration & Diagnostic Software“ contained in the package into the CD-ROM drive of the Notebook/PC.
The general station description for the UE4740 EFI gateway is on the CD-ROM in the folder „\EFI gateway\GSDML“.

2. 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.

8.3.2 Adding the EFI gateway to the hardware configuration

Overview

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.

Approach

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).

Complementary information

- 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.

8.4 Connection of the Configuration & Diagnostic Software

Overview

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.

Important information



NOTICE

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 (RS232, Ethernet or PROFINET IO).



DANGER

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.

Connection possibilities for the Configuration & Diagnostic Software (CDS)

Table 6: Connection possibilities for the Configuration & Diagnostic Software (CDS)

Connection of the CDS	Limitation	Suitable for
Directly to the configuration connection (RS232) 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) ¹⁾	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 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 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.

¹⁾ Access to the EFI gateway via the EFI interface is not possible if the CDS is connected to a C4000 or M4000.

8.4.1 Configuration via the configuration connection of the EFI gateway

Prerequisites

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

While configuring please use the online help of the program.

Approach

- ▶ 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.

8.4.2 Configuration via PROFINET IO

Prerequisites

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

- an Ethernet connection

Approach

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.

8.4.3 Setting the PROFIsafe address

Overview

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.

Approach

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

8.5 Configuration of the devices connected to the EFI gateway

Approach

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.

Complementary information

- 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.

9 Troubleshooting

9.1 In the event of faults or errors

Important information



WARNING

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.

In the event of faults or errors

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.

9.2 Fault indicators

EFI gateway

Table 7: Fault indicators of the EFI gateway

Display		Error	Troubleshooting
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.
	⦿ (1 Hz) Red	System error (lockout)	▶ 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, 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).

○ LED off. ⦿ LED flashes. ● LED illuminates.

PROFIsafe

Table 8: Fault indicators PROFIsafe

Display		Error	Troubleshooting
BUS	○	PROFINET IO communication with the FPLC is established, but the safety communication is still inactive. The FPLC safety program has not been started yet	<ul style="list-style-type: none"> ▶ 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	<ul style="list-style-type: none"> ▶ Check the PROFINET IO diagnostic data of the EFI gateway. ▶ Eliminate any errors. ▶ Then acknowledge the error elimination.
	●Red	General error of the PROFINET IO, no communication possible	<ul style="list-style-type: none"> ▶ Check the PROFINET IO connecting cable. ▶ Check that the PROFINET IO settings in the FPLC and at the EFI gateway agree.
	◐Red	No valid PROFINET IO configuration	<ul style="list-style-type: none"> ▶ Check that the PROFIsafe address in the FPLC and at the EFI gateway agree.

○ LED off. ◐ LED flashes. ● LED illuminates.

PROFINET IO

Table 9: Fault indicators PROFINET IO

Display		Error	Troubleshooting
BUS	●Red	No communication on PROFINET IO	<ul style="list-style-type: none"> ▶ 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	<ul style="list-style-type: none"> ▶ Verify that the PROFINET IO settings in the PLC and on the EFI gateway correspond.


○ LED off. ◐ LED flashes. ● LED illuminates.

9.3 System behaviour in case of errors of connected devices

Errors in safe communication to FPLC

If there is no safe communication to the higher-level FPLC, then the 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 UE4740 signals an I/O error to the device connected to the EFI connection.
- the error display  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 lockout of the EFI gateway.

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



DANGER

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 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.

Error in connected EFI devices

If the 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 PROFINET diagnostics message is generated.

The UE4740 deletes the error status information and the 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.

9.4 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).

10 Decommissioning

10.1 Disposal

Approach

- ▶ Always dispose of unusable devices in accordance with national waste disposal regulations.



Complementary information

SICK will be glad to help you dispose of these devices on request.

11 Technical data

11.1 Data sheet

Safety-related parameters

Table 10: Safety-related parameters

Safety integrity level (IEC 61508)	SIL 3
Safety integrity level (IEC 62061)	SIL 3
Category (ISO 13849)	Category 4
Performance level (ISO 13849)	PL e
PFH _D (mean probability of a dangerous failure per hour)	2,84 × 10 ⁻⁹

Electrical data

Table 11: Electrical data

Operating data	
Protection class (IEC 61140)	III
Supply voltage V _S at device	24 V (16.8 V ... 30 V) (SELV/PELV)
Supply voltage UL/CSA applications	24 V DC
Residual ripple U _{ss} (within the limits of V _S .)	5 V
Power consumption	≤ 5 W
Short-circuit protection	4 A gG (with tripping characteristic B or C)
Power-up delay after supply voltage applied	2 ... 10 s
PROFINET IO connection	
Connection type	2 RJ45 female connectors
Integrated switch	3-port layer-2 managed switch with auto-MDI-X for automatic detection of crossed Ethernet cable
MAC-Adresse	Printed on the type label, 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 mm ² and 2 × 0.25 mm ²
Cable length at 500 kBaud and 2 × 0.34 mm ² and 2 × 0.25 mm ² cables	50 m
Type of cable to be connected	Twisted pairs with copper shielding mesh, cable cross section: ≤ 6.8 mm
Power supply (A1, A2) via system plug FX3-MPL1	
Supply voltage	24 V (16.8 V ... 30 V) (SELV/PELV) ¹⁾

¹⁾ 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.

Mechanical data

Table 12: Mechanical data

Weight	147 g
--------	-------

Ambient data

Table 13: Ambient data

Enclosure rating	IP20 (IEC 60529)
Ambient operating temperature (UL/CSA: surrounding air temperature)	-25 °C ... +50 °C
Storage temperature	-25 °C ... +70 °C
Air humidity	≤ 95 %, non-condensing
Climatic conditions	According to IEC 61131-2 (55 °C, 95 % r.H.)
Vibration resistance	According to IEC 61131-2
Shock resistance, single shock	According to IEC 61131-2

11.2 Response time

Overview

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 PROFINET IO,
- the processing time in the FPLC.

Using the following calculation scheme, you determine the response time on a signal path up to the provision of the information at the 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.

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:

Table 14: 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 Max. reaction time if an error exists	Response time	Refer to the following table
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 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 [table 15](#), Line 2.
- ▶ Fill out the following table to determine the response time of this signal path:

Table 15: Determining the response time from the EFI interface to the PROFINET IO connection

Line	Required detail	Time
1	Response time of the connected device	+ _____ ms
2	If safe SICK device communication is used: <ul style="list-style-type: none"> • C4000 • M4000 • S3000 • S300 	+ _____ ms
3	Internal processing time of the EFI gateway	+ 6 ms
4	Response time of the EFI connection	= _____ ms

11.3 Dimensional drawings

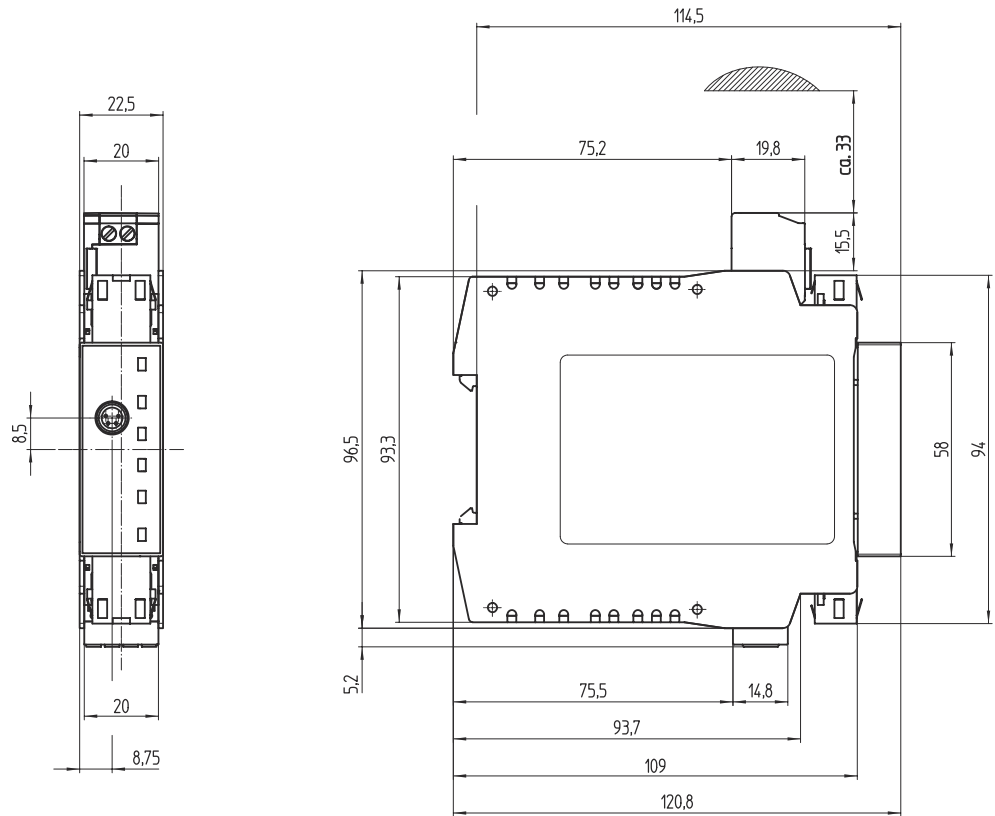


Figure 6: Dimensional drawing UE4740

12 Ordering information

12.1 EFI gateway

Table 16: EFI gateway

Part	Type code	Part number
PROFINET IO gateway for up to 2 EFI connections (incl. mounting instructions)	UE4740-22H0000	1046978

13 Accessories

13.1 Accessories

Table 17: Accessories

Part	Type code	Part number
System plug	FX3-MPL100001	1047162

14 Annex

14.1 Structure of the UE4740 process images

The process images 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.

Table 18: Structure of the 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

14.2 Process images of the EFI connections

- 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.

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

Table 19: Process image of the input signals from the EFI connection to the (F)PLC

	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0
EFI1 address								
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 ¹⁾		Used monitoring range		Warning field free ²⁾	OSSD (Switching output) green
			Warning field free ²⁾	Protective field free ²⁾	Warning field free ²⁾	Protective field free ²⁾		
S300	Reset required	Reset	Reserved	Reserved	Used monitoring range		Warning field free	OSSD (Switching output) green
					Warning field free	Protective field free		

- 1) Simultaneous monitoring range: The return value depends on the firmware version of the used S3000, see table 20, page 36
- 2) This information is only valid for UE4740 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 UE4740!
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).

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 UE403	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

Complementary information

Simultaneous monitoring range: The return value depends on the firmware version of the used S3000.

Table 20: Return value

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)
Controller < 2.26 and Interface < 1.00		Permanently 0 (protective field/warning field free)

14.2.2 Output signals from the FPLC to the EFI connection

Table 21: Process image of the 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	Reserv ed	Muting lamp status	Reset/ over- ride or reset	Over- ride or addi- tional signal C1 or belt stop	Muting sensors			
					B2	B1	A2	A1
M4000 Advanced with UE403	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserve d	Reserve d	Reserve d	Reserve d
S3000	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserve d	Reserve d	Reserve d	Reserve d
S300	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserve d	Reserve d	Reserve d	Reserve d
EF11 address	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0
EF12 address	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.0
C4000 Standard/ Advanced	Bypas s chan- nel 2	Bypas s chan- nel 1	Reserv ed	Reserv ed	Reserve d	Run-on moni- toring (SCC)	Bottom dead centre (MCCB DC)	Top dead centre (MCCTD C)
M4000 Advanced	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserve d	Reserve d	Reserve d	Reserve d
M4000 Advanced with UE403	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserve d	Reserve d	Reserve d	Reserve d
S3000	In D2	In D1	In C2	In C1	In B2	In B1	In A2	In A1
S300	Reserv ed	Reserv ed	Reserv ed	Reserv ed	In B2	In B1	In A2	In A1

14.3 Diagnostics data

The diagnostics data for the UE4740 can be read via an acyclic read on API 0, slot 1, subplot 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:

Table 22: 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:

Table 23: 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:

Table 24: 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

14.4 Conformities and certificates

You can obtain declarations of conformity, certificates, and the current operating instructions for the product at www.sick.com. To do so, enter the product part number in the search field (part number: see the entry in the “P/N” or “Ident. no.” field on the type label).

14.4.1 EU declaration of conformity

Excerpt

The undersigned, representing the manufacturer, herewith declares that the product is in conformity with the provisions of the following EU directive(s) (including all applicable amendments), and that the standards and/or technical specifications stated in the EU declaration of conformity have been used as a basis for this.

- ROHS DIRECTIVE 2011/65/EU
- EMC DIRECTIVE 2014/30/EU
- MACHINERY DIRECTIVE 2006/42/EC

14.4.2 UK declaration of conformity

Excerpt

The undersigned, representing the following manufacturer herewith declares that this declaration of conformity is issued under the sole responsibility of the manufacturer. The product of this declaration is in conformity with the provisions of the following relevant UK Statutory Instruments (including all applicable amendments), and the respective standards and/or technical specifications have been used as a basis.

- Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
- Electromagnetic Compatibility Regulations 2016
- Supply of Machinery (Safety) Regulations 2008

14.5 Checklist for initial commissioning and commissioning

Checklist for manufacturers or installers for installing gateways

The details relating to the items listed below must be available no later than when the system is commissioned for the first time. However, these depend on the specific application (the requirements of which must be reviewed by the manufacturer or installer).

This checklist should be retained and kept with the machine documentation to serve as reference during recurring tests.

This checklist does not replace the initial commissioning, nor the regular inspection by qualified safety personnel.

Have the safety rules and regulations been observed in compliance with the directives and standards applicable to the machine?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the applied directives and standards listed in the declaration of conformity?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Does the protective device correspond to the required PL/SIL and PFHd in accordance with ISO 13849-1 / IEC 62061 and the required type in accordance with IEC 61496-1?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the required protective measures against electric shock in effect (protection class)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Has the protective function been checked in compliance with the test notes of this documentation?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are you sure that the gateway was tested fully for safety functionality after each configuration change?	Yes <input type="checkbox"/> No <input type="checkbox"/>

15 List of figures

1.	Operating principle UE4740.....	9
2.	Status indicators.....	10
3.	Mounting the device.....	14
4.	Terminal assignment of the UE4740 EFI gateway.....	16
5.	Pin assignment configuration connection (M8 × 4).....	17
6.	Dimensional drawing UE4740.....	32

16 List of tables

1.	Status indicators.....	10
2.	Terminal assignment of the UE4740 EFI gateway.....	16
3.	Terminal assignment of the FX3-MPL1 system plug.....	17
4.	Pin assignment Ethernet connection UE4740 (RJ-45 plug).....	17
5.	Pin assignment configuration connection.....	18
6.	Connection possibilities for the Configuration & Diagnostic Software (CDS).....	23
7.	Fault indicators of the EFI gateway.....	26
8.	Fault indicators PROFIsafe.....	27
9.	Fault indicators PROFINET IO.....	27
10.	Safety-related parameters.....	30
11.	Electrical data.....	30
12.	Mechanical data.....	30
13.	Ambient data.....	31
14.	Data for calculating the “maximum reaction time” of the entire system.....	31
15.	Determining the response time from the EFI interface to the PROFINET IO connection.....	32
16.	EFI gateway.....	33
17.	Accessories.....	34
18.	Structure of the UE4740 process images.....	35
19.	Process image of the input signals from the EFI connection to the (F)PLC.....	35
20.	Return value.....	36
21.	Process image of the output signals from the FPLC to the EFI connection.....	36
22.	Diagnostics data of the UE4740.....	37
23.	Additional diagnostics of the UE4740.....	38
24.	Values for ChannelErrorType on the UE4740.....	38

Australia

Phone +61 (3) 9457 0600
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Austria

Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

Belgium/Luxembourg

Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

Brazil

Phone +55 11 3215-4900
E-Mail comercial@sick.com.br

Canada

Phone +1 905.771.1444
E-Mail cs.canada@sick.com

Czech Republic

Phone +420 234 719 500
E-Mail sick@sick.cz

Chile

Phone +56 (2) 2274 7430
E-Mail chile@sick.com

China

Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

Denmark

Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland

Phone +358-9-25 15 800
E-Mail sick@sick.fi

France

Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany

Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

Greece

Phone +30 210 6825100
E-Mail office@sick.com.gr

Hong Kong

Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary

Phone +36 1 371 2680
E-Mail erteakesites@sick.hu

India

Phone +91-22-6119 8900
E-Mail info@sick-india.com

Israel

Phone +972 97110 11
E-Mail info@sick-sensors.com

Italy

Phone +39 02 27 43 41
E-Mail info@sick.it

Japan

Phone +81 3 5309 2112
E-Mail support@sick.jp

Malaysia

Phone +603-8080 7425
E-Mail enquiry.my@sick.com

Mexico

Phone +52 (472) 748 9451
E-Mail mexico@sick.com

Netherlands

Phone +31 (0) 30 204 40 00
E-Mail info@sick.nl

New Zealand

Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway

Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland

Phone +48 22 539 41 00
E-Mail info@sick.pl

Romania

Phone +40 356-17 11 20
E-Mail office@sick.ro

Singapore

Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia

Phone +421 482 901 201
E-Mail mail@sick-sk.sk

Slovenia

Phone +386 591 78849
E-Mail office@sick.si

South Africa

Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

South Korea

Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

Spain

Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden

Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland

Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan

Phone +886-2-2375-6288
E-Mail sales@sick.com.tw

Thailand

Phone +66 2 645 0009
E-Mail marcom.th@sick.com

Turkey

Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates

Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

United Kingdom

Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

USA

Phone +1 800.325.7425
E-Mail info@sick.com

Vietnam

Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Detailed addresses and further locations at www.sick.com

