Flexi Gateway GETC1

Expansion module - gateway

SICK
Sensor Intelligence.

Described product

Flexi Gateway GETC1

Manufacturer

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Legal information

Original document

This document is an original document of SICK AG.

EtherCAT®

EtherCat® is a registered trademark and patented technology licensed by Beckhoff Automation GmbH, Germany.

Contents

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1 About this document

1.1 Purpose of this document

These operating instructions contain the information required during the life cycle of the safety controller.

Operating instructions of the safety controller must be made available to all people who work with the device.

1.2 Scope

Product

This document applies to the following products:
- Product code: Flexi Gateway GETC1
- "Operating instructions" type label entry: 8024566

Document identification

Document part number:
- This document: 8024579
- Available language versions of this document: 8024566

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

Other documents relevant for the product

Table 1: Available documents

Document	Title	Part number
Operating instructions	Flexi Compact safety controller	8024573
Operating instructions	FLX3-XTDI1 Expansion module for safety controllers	8024571
Operating instructions	FLX3-XTDO1 Expansion module for safety controllers	8024570
Operating instructions	FLX0-GPNT1 Expansion module for safety controllers	8024567
Operating instructions	FLX0-GETC1 Expansion module for safety controllers	8024566
Operating instructions	FLX0-GCAN1 Expansion module for safety controllers	8024572
Operating instructions	Flexi Loop Safe Series Connection Hardware	8015834
Operating instructions	Flexi Loop in the Safety Designer Software	8018174
Competence brochure	Guide for Safe Machinery	8008007

1.3 Target groups and structure of these operating instructions

These operating instructions are intended for the following target groups: project developers (planners, developers, designers), installers, electricians, safety experts (such as CE authorized representatives, compliance officers, people who test and approve the application), operators, and maintenance personnel.

These operating instructions are organized by the life phases of the device: project planning, mounting, electrical installation, commissioning, operation and maintenance.

The table below shows the target groups and how – for many applications – these are typically divided up between the manufacturer and the entity operating the machine in which the device is to be integrated:

Area of responsibility	Target group	Specific chapters of these operating instructions [1]
Manufacturer	Project developers (planners, developers, designers)	Project planning, page 13 Technical data, page 29
	Installers	Mounting, page 15
	Electricians	Electrical installation, page 16
	Safety experts	Project planning, page 13 Commissioning, page 22 Technical data, page 29
Operating entity	Operators	Troubleshooting, page 27
	Maintenance staff	Troubleshooting, page 27 Ordering information, page 37

[1]   Chapters not listed here are intended for all target groups. All target groups must follow all of the safety and warning instructions in all chapters of the operating instructions!

In other applications, the operating organization is also the manufacturer of the equipment with the corresponding allocation of the target groups.

1.4 Further information

www.sick.com

The following information is available via the Internet:

- Data sheets and application examples
- CAD files and dimensional drawings
- Certificates (such as the EU declaration of conformity)
- Guide for Safe Machinery. Six steps to a safe machine
- Safety Designer (software for configuring safety solutions made by SICK AG)

1.5 Symbols and document conventions

The following symbols and conventions are used in this document:

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 Flexi Compact safety controller is a freely configurable control for safety applications.

Sensors and switching elements (e.g. light curtains, laser scanners, switches, sensors, encoders, emergency stop pushbuttons) are connected to the safety controller and are linked logically. The corresponding actuators of the machines or systems can be switched off safely via the switching outputs of the safety controller.

The gateway is an extension module of the safety controller. The gateway module enables a safety controller to send data to a network for control and diagnostic purposes, and to receive data from the network.

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.

The product is only suitable for use in industrial environments.

2.3 Improper use

Among others, the safety controller is not suitable for the following applications:

- Outdoors
- Underwater

- In explosion-hazardous areas
- In residential areas

2.4 Cybersecurity

Overview

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive cybersecurity concept. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

You will find further information at www.sick.com/psirt, e.g.:
- General information on cybersecurity
- Contact option for reporting vulnerabilities
- Information on known vulnerabilities (security advisories)

2.5 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 Configuration of the safety controller

Configuration of the safety controller

A safety controller comprises the following components:

- A main module
- Up to 12 optional expansion modules (excluding maximum 1 gateway)
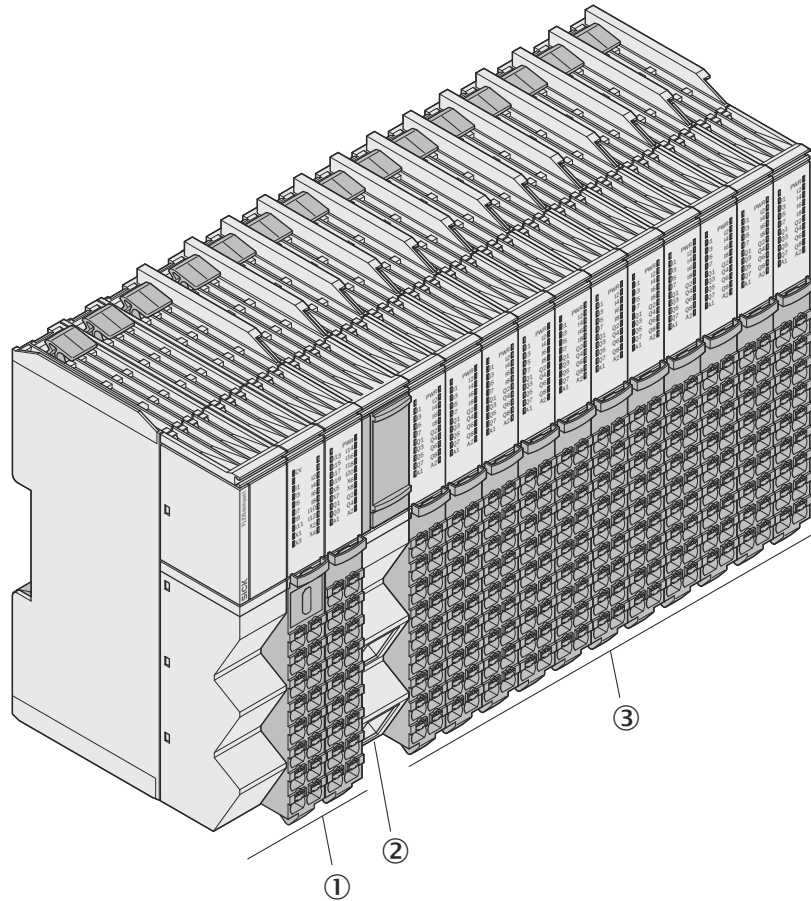
Figure 1: Example maximum configuration

① Main module
② Expansion module - gateway
③ IO expansion module

Complementary information

- The gateway and IO expansion modules can be arranged arbitrarily.

3.2 Overview of the module
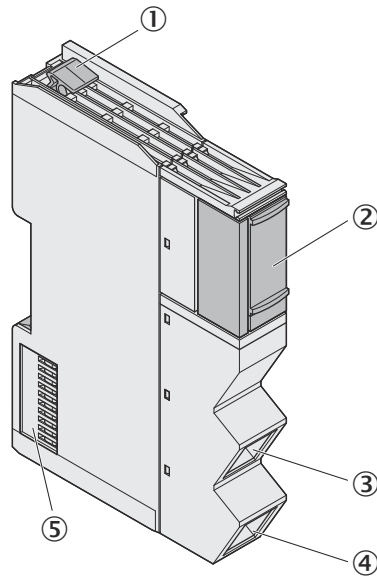
Figure 2: Gateway expansion module

①   Release element of the module
②   Display
③   RJ45 female connector: EtherCAT® input
④   RJ45 female connector: EtherCAT® output
⑤   Backplane bus

3.3 Design and function of the module

Prerequisites

- The module can only be operated with a main module.

Configuration

Table 2: Interfaces of the module

Description	Quantity
Ethernet (RJ45 female connector)	2

Function

The module enables a safety controller to send data to a network for control and diagnostic purposes, and to receive data from the network.

The module offers the following functions:

- Integration into an EtherCAT® network as a slave

An EtherCAT® master (e.g., higher-level controller or computer) and/or another Ether-CAT® slave device can be connected at the RJ45 female connector.

Complementary information

- Voltage is supplied to the module via the backplane bus. Communication with the main module of the safety controller also occurs via the backplane bus.

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3.4 Status indicators

Status indicators

Figure 3: Status indicators

Status indicator

Table 3: Status indicator

Labeling	Color	Function
PWR (power)	Green/Red	Device status
RUN	Green	EtherCAT® operational status
ERR	Red	EtherCAT® error
IN, OUT	Green/yellow/white	Network activity for Ethernet RJ45 female connector 1 and female connector 2

Further topics

- "Status indicators", page 23
- "Troubleshooting", page 27
- "Operation", page 23

4 Project planning

4.1 Design

Installation site

- The safety controller must be protected against condensation and conductive contamination, e.g. in an IP54 control cabinet.
- Mounting on a 35 mm × 7.5 mm mounting rail in accordance with IEC 60715.
- The mounting rail is connected to the functional earth.
- Mounting rail is mounted on a mounting plate.
- Mounting plate is connected to functional earth.
- Mounting in a vertical orientation (on a horizontal mounting rail).
- Take suitable ESD protection measures.

Air circulation

To ensure sufficient air circulation and cooling, sufficient distance must be kept in the control cabinet above and below the module.

Provide an adequate clearance in front of the module (front side) for the connected cables.
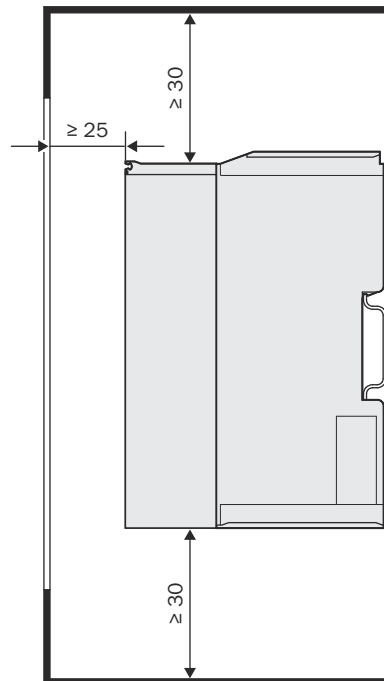
Figure 4: Clearances for adequate air circulation

Required distance:
- Above and below the module: ≥ 30 mm
- In front of the module: ≥ 25 mm

4.2 Integration into the network

4.2.1 Integration via the fieldbus interface

Prerequisites

- ESI file (device description file) is installed in the hardware catalog of the higher-level controller.

Parameters to be configured

Parameter:
- Unique station alias

You can configure the parameters via the following interfaces:
- Safety Designer
- Configuration software for the relevant fieldbus network

Complementary information

You can find the required device description file and the device symbol for integration into a higher-level controller in the following locations:

- On the Internet on the gateway product page at www.sick.com
- In the configuration software program directory on the computer

5   Mounting

5.1   Mounting procedure

For information on the mounting process, please see the operating instructions:

- "Flexi Compact" (SICK part number 8024573)

5.2   Module exchange

Approach

1. Disconnect the module and the connected components from all voltage sources.
2. Remove the module.
3. Mount the new module.

6 Electrical installation

6.1 Connecting

Prerequisites

- Mounting is completed.
- Electrical installation is carried out according to the project planning.
- Dangerous condition of the machine is and remains off during the electrical installation.
- The outputs of the safety controller do not affect the machine during electrical installation.

6.1.1 RJ45 port connection

Prerequisites

Network cable requirement:
- Type: 100Base-TX
- Cables with RJ45 connections
- Twisted pair Ethernet cable, maximum length 100 m in accordance with EN 50173
- Use of wire pairs 1/2 and 3/6
- Shielded cables
- Cat 5 STP or higher

Connection

Figure 5: Connections

① RJ45 Ethernet female connector, port 1
② RJ45 Ethernet female connector, port 2

7 Configuration

7.1 Delivery state

The device is not configured in the delivery state.

7.2 Overview

For more information on configuring the safety controller, see the operating instructions:

- "Flexi Compact" (SICK part number 8024573)

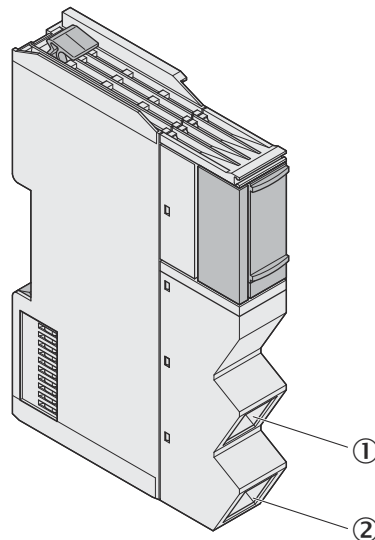## 7.3 Offline, online and security configuration

Overview

All configuration parameters are assigned to a configuration group. The configuration groups differ, for example, when transmitting and saving the configuration.

The following configuration groups are available
- Offline configuration
- Online configuration
- Security configuration

Offline configuration

All offline configuration parameters are written to the safety controller using the **Transfer to device** function. The offline configuration includes, for example, all parameters of the hardware configuration.

These parameters can only be configured in the configuration software.

To configure the parameters, no connection to the safety controller must exist. Only establish a connection to the safety controller when you want to transfer the configuration.

The application is stopped while the configuration is transferred to the safety controller.

The offline configuration is stored in the SmartPlug. A (defective) module can be replaced with a compatible module without having to reconfigure the device. The offline configuration must be compatible with the physical safety controller.

Within the offlline configuration, a distinction is made between the following configuration data.

Configuration data:
- Safety configuration
  Configuration data that affect the safety function of a device, e.g., configuration of safety capable inputs, safety outputs, logic, …
- Standard configuration
  Configuration data that affect the non-safety function of a device, e.g., configuration of test outputs, configuration of non-safe modules.
- Non-functional configuration
  Configuration data that have no effect on the functioning of the device, e.g. tag names, comments in the logic, project information of the user

Online configuration

Each of the online configuration parameters have their own transfer option and can be individually written to the safety controller. The online configuration includes, for example, the parameters relating to the network settings.

These parameters can be configured in the configuration software or via a module with a display.

To configure the parameters using the configuration software, a connection to the safety controller must exist.

The application does not need to be stopped while the configuration is transferred to the safety controller.

The online configuration is saved in and read back from the SmartPlug using the module position and the module type. If the module position is maintained, a (defective) module can be replaced with a compatible module without having to reconfigure the device. If the module position is changed, the saved parameters will not work. If, for example, the module position of a gateway is changed, the connection parameters need to be reconfigured before a connection to the safety controller can be established. The old module positions are corrected when writing an offline configuration.

If online configuration parameters are configured without a SmartPlug inserted, these settings will only apply temporarily until the safety controller is restarted or a SmartPlug is inserted.

Security configuration

The security configuration includes the following parameters:
- Passwords for user groups

These parameters can only be configured in the configuration software.

The application does not need to be stopped while the configuration is transferred to the safety controller.

The security configuration is saved in the SmartPlug. A (defective) module can be replaced with a compatible module without having to reconfigure the device.

Further topics

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7.4 Configuring the network interfaces

7.4.1 Configuring the higher-level controller

Approach

1. Load the device description file into the configuration software of the higher-level controller. Follow the instructions in the online help or in the user manual of the higher-level controller to do so.
2. Add the gateway in the EtherCAT® network.
3. Select and configure the process data objects (PDOs). Only one input PDO and one output PDO can be active at any one time.
4. If necessary, assign a station alias.

Complementary information

You can find the device description file and device symbol on the gateway product page at **www.sick.com**.

The selected PDOs of the higher-level controller must match the selected PDOs in the configuration software.

Further topics

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7.4.2 Enabling emergency messages

Approach

1. In the main navigation pane, click **Configuration**.
2. In the navigation pane under **GETC1**, select the **EtherCAT Emergency Messages** menu item.
3. Activate the **All active** option.
✓ The emergency messages are transmitted to the higher-level control system.

7.4.3 Addressing

7.4.3.1 Setting a station alias

Overview

Station alias is a 16-bit address than you can use to address the device in the higher-level control system.

Approach

1. In the main navigation pane, click **Configuration**.
2. In the navigation tree of the required module, select the **Addressing** menu item.
3. Enter the station alias in the **Setting for station alias** field.

7.4.3.2 Reading and transmitting values

Overview

If the values in the project and the values in the device differ, you can read the values from the device and apply them to the project or transfer the values from the project to the device.

Approach

1. In the main navigation pane, click **Configuration**.
2. In the navigation tree of the required module, select the **Addressing** menu item.
3. Perform the required action:
   - Click on **Read from device**. The values are read from the device and adopted in the project.
   - Click on **Transmit to device**. The values are read from the device and adopted in the project.

7.4.4 Configuring the output data (routing to CPU)

Overview

The gateway can receive up to 100 bytes of output data from a higher-level control system. The actual data volume and contents depends on how the output data are configured in the higher-level control system.

The CPUc2 main module can receive up to 50 bytes of output data from a higher-level control system. The actual data volume and contents depends on how the output data are configured in the higher-level control system.

The configuration of the output data includes the following points:
- Specifying the routing
- Optional: Enter the tag names for the data received from the network

Approach

1. In the main navigation pane, click **Configuration**.
2. In the navigation pane under **CPU main module** > **Fieldbus**, select the **Fieldbus** menu item.
3. In the navigation tree of the required module, select **Routing to CPU**.
4. In the **Data used from ESI file** drop-down menu, select the data volume configured in the higher-level control system.
✓ A red guide line shows the end of the configured data volume.
5. Select a routing template and drag it onto a single byte or several bytes of the output data block.
✓ The bits, bytes or data formats are available as inputs in the logic editor.
✓ Each bit, byte or data format inherits a default tag name from the routing.
6. If required, edit the default tag name in the **Properties** tab.

Complementary information

Table 4: Colors of the bytes and bits of a record

Color	Meaning
Light blue	The byte or the bit is empty.
Blue	The byte or the bit is occupied. The relevant module, input or output is configured in the hardware configuration of the safety controller.
Gray	The byte or the bit is occupied. The relevant module, input or output is not yet configured in the hardware configuration of the safety controller.

You can monitor the status of the communication with the network. A status bit for the receipt of data from the network is provided for this. If the gateway detects a fault in the communication, it sets the contents of the output records and the associated status bit to Null.

7.4.5 Configuring the input data (routing to network)

Overview

The gateway can send up to 100 bytes of input data to a higher-level control system.

The CPUc2 main module can send up to 50 bytes of input data to a higher-level control system.

The input data can comprise the statuses of the inputs and outputs, the logic results, or diagnostic data.

Approach

1. In the main navigation pane, click **Configuration**.
2. In the navigation pane under **CPU main module** > **Fieldbus**, select the **Fieldbus** menu item.
3. In the navigation tree of the required module, select **Routing to network**.
4. In the **Data used from ESI file** drop-down menu, select the data volume configured in the higher-level control system.
✓ A red guide line shows the end of the configured data volume.
5. Select the required input data and drag it onto a single byte or several bytes of the input data block.
   The following input data are available:
   o **Routing Templates** contains templates for the routing of data from the logic editor.
   o **Inputs** contain the input values of the modules.

- o **Outputs** contain the output values of the modules as well as the logic results from the logic editor.
- o **Diagnostics** contains the checksums and status information of the modules.
- ✓ The bits, bytes or data formats are available as individual outputs in the logic editor.
- ✓ Each bit, byte or data format inherits a default tag name from the routing.
6. If required, edit the default tag name in the **Properties** tab.

Complementary information

Table 5: Colors of the bytes and bits of a record

Color	Meaning
Light blue	The byte or the bit is empty.
Blue	The byte or the bit is occupied. The relevant module, input or output is configured in the hardware configuration of the safety controller.
Gray	The byte or the bit is occupied. The relevant module, input or output is not yet configured in the hardware configuration of the safety controller.

The status of the communication with the network can be monitored. A status bit for the sending of data to the network is provided for this. If the gateway detects a fault in the communication, it sets the contents of the input records and the associated status bit to Null. The bit also switches to Null if the gateway is not ready for operation or the safety controller was stopped via the configuration software.

8 Commissioning

8.1 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.

9 Operation

9.1 Operation of the display
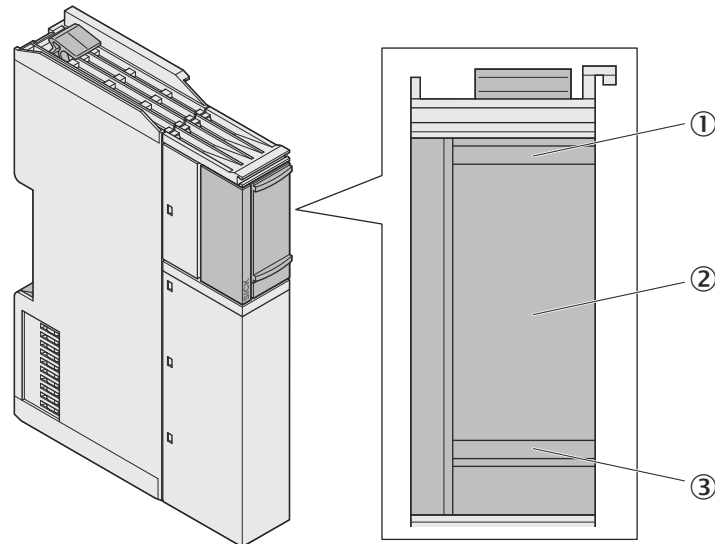
Figure 6: Display

① Up
② Confirm
③ Down

9.2 Display menu

Display menu

The display menu contains three submenus:
- **Info** Device, system and project information
- **Diag** Diagnostic information
- **Setup** Settings

You can configure the following, for example, in the Setup submenu:
- Activation or deactivation of the fieldbus alarms
- Display brightness
- System reset

Complementary information

If you use a display (e.g., on a gateway) to configure settings on the safety controller that can also be configured using the configuration software, the configuration in the SmartPlug is updated accordingly.

9.3 Status indicators

Possible indications

Table 6: PWR and CV indications

Display PWR	Display CV Main module	Description	Measures
○	○	No supply voltage	▶ Switch on the supply voltage to the main module.

Display PWR	Display CV Main module	Description	Measures
☀ Red / green (1 Hz)	○	Self-test is in progress or the safety controller is being initializing.	
☀ Green (1 Hz)	see table 7, page 24	Application is ready to run.	▸ Press the start button in the configuration software.
☀ Red / green (1 Hz)	see table 7, page 24	Application is running. A recoverable external error is present at this module.	▸ Check the connection settings and cabling to the fieldbus master.
● Green	see table 7, page 24	Application is running.	
☀ Red (1 Hz)	○	Configuration is invalid.	▸ Check the module type and version. ▸ Adjust the configuration using the configuration software. ▸ Run diagnostics using the configuration software.
☀ Red (2 Hz)	○	Critical error, presumably at this module. The application was stopped. All outputs of the safety controller are switched off.	▸ Switch the supply voltage off and then on again. ▸ If the fault persists, replace the module. ▸ Run diagnostics using the configuration software.
● Red	○	Critical error, presumably at another module. The application was stopped. All outputs of the safety controller are switched off.	▸ Switch the supply voltage off and then on again. ▸ If the fault persists, replace the module where the PWR ☀ is showing red (2 Hz). ▸ Run diagnostics using the configuration software.

○ LED off. ☀ LED flashes. ● LED illuminates.

Table 7: CV indications

Display CV Main module	Description	Measures
○	see table 6, page 23	
● Yellow	Configuration is verified.	
☀ Yellow (1 Hz)	Configuration is not verified.	▸ Verify the configuration using the configuration software.
☀ Yellow (2 Hz)	See the Flexi Compact Safety Controller operating instructions (8024573)	
☀ Yellow (lights up every 2 s)	See the Flexi Compact Safety Controller operating instructions (8024573)	

○ LED off. ☀ LED flashes. ● LED illuminates.

Table 8: RUN indications

Display RUN	Description	Measures
○	Gateway is in the EtherCAT® INITIALIZATION status. Gateway is initializing the Sync Manager.	

Display RUN	Description	Measures
☼ Green (2.5 Hz)	Gateway is in the EtherCAT® PRE-OPERATIONAL status. EtherCAT® Mailbox communication available, no PDO communication.	
☼ Green (1 × flashing)	The gateway is in the EtherCAT® SAFE-OPERATIONAL status. Process data can be read by the gateway, but not written.	
● Green	The gateway is in the EtherCAT® OPERATIONAL status. Process data can be read and written.	

○ LED off. ☼ LED flashes. ● LED illuminates.

Table 9: ERR indications

Display ERR	Description	Measures
○	Not an error	
☼ Red (2.5 Hz)	Invalid hardware configuration or configuration not yet transferred.	
☼ Red (1 × flashing)	Local error	▶ Put the gateway in the EtherCAT® INITIALIZATION status.
☼ Red (2 × flashing)	Time overrun	
● Red	Communication error or internal error	

○ LED off. ☼ LED flashes. ● LED illuminates.

Further topics

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9.4 Regular thorough check

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.

10 Maintenance

10.1 Regular thorough check

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.

11 Troubleshooting

11.1 Possible faults

Important information

> **NOTE**
> If a fault response can result in an undesired valid status, you should evaluate the associated status bits in the logic to initiate suitable measures.

Possible faults and their causes

Table 10: Faults in the logic

Fault	Responses	Causes
Voltage supply A1 / A2 of the main module is lower than the operating range	• Safety controller switches to the **No supply voltage** status • **Voltage supply** module status bit = 0 • Status indicators are off	• Fault in the voltage supply • Line break • Interruption due to a fuse
Voltage supply of the main module is higher than the operating range	• Safety controller switches to the critical error status • **Internal error** module status bit = 0	• Fault in the voltage supply • Short-circuit to other voltage-carrying line

Critical error status

Consequences of the critical error status:
• All applications are stopped.
• All safety outputs are switched off.
• All process data = 0
• Evaluation of the process data status bits in the logic is no longer possible.
• Only limited diagnostics can be performed in the critical error status.

Alternatives to resetting the critical error status:
• Restart by switching the voltage supply off and on again
• Software reset using the configuration software

Complementary information

The status indicators and diagnostic messages may provide additional information.

Further topics

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12 Decommissioning

12.1 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.

13 Technical data

13.1 Data sheet

General data

Table 11: General data

Climatic conditions	
Ambient operating temperature	
At altitudes up to 2,000 m above sea level	–25 °C … +55 °C
At altitudes up to 2,000 m above sea level … 3,000 m above sea level	–25 °C … +50 °C
At altitudes 3,000 m above sea level … 4,000 m above sea level	–25 °C … +45 °C
Storage temperature	–25 °C … +70 °C
Air humidity	10% … 95%, non-condensing
Operating altitude	Max. 4,000 m above sea level
Mechanical strength	
Vibration resistance	5 Hz … 200 Hz / 1 g (EN 60068-2-6)
Shock resistance, single shock	15 g, 11 ms (EN 60068-2-27)
Operating data	
Protection class	III (EN 61140)
Immunity to interference	EN 61000-6-2
Emitted interference	EN 61000-6-4
Connections	
Connection type	RJ45 female connectors
Network cable requirements	• Type: 100Base-TX • Cables with RJ45 connections • Twisted pair Ethernet cable, maximum length 100 m in accordance with EN 50173 • Use of wire pairs 1/2 and 3/6 • Shielded cables • Cat 5 STP or higher
Housing	
Enclosure rating	IP20 (EN 60529)
Contamination rating	2 (IEC 61010-1)
Control device type	Open device (IEC 61010-2-201)
Weight (± 5%)	108 g

Voltage supply

Table 12: Voltage supply

Supply voltage U_B	Voltage is supplied from the main module via the backplane bus. See the Flexi Compact operating instructions, part number: 8024573
Max. power loss	3.3 W
Current consumption at nominal voltage	135 mA

EtherCAT® fieldbus data

Table 13: EtherCAT® fieldbus data

Fieldbus	EtherCAT®
Connection type	2 × RJ45 female connectors
EtherCAT® application cycle time	1 ms
Process data watchdog time	Default: 100 ms
Process data interface (PDI) watch-dog time	Min.: 2 ms Configurable using the master

13.2 Data exchange in the network

13.2.1 EtherCAT® – standard objects

Table 14: Device type

Index	Subindex	Contents	Data type	Size
0x1000	–	Device type	UDINT	32 bytes

Table 15: Manufacturer device name

Index	Subindex	Contents	Data type	Size
0x1008	–	Manufacturer device name	STRING	16 bytes

Table 16: Manufacturer hardware version

Index	Subindex	Contents	Data type	Size
0x1009	–	Manufacturer hardware version	STRING	8 bytes

Table 17: Manufacturer software version

Index	Subindex	Contents	Data type	Size
0x100A	–	Manufacturer software version	STRING	8 bytes

Table 18: Identity object

Index	Subindex	Contents	Data type	Size
0x1018	00	Number of entries = 4	USINT	8 bytes
	01	Manufacturer ID = 0x01000056	UDINT	32 bytes
	02	Product code = 0x00002351	UDINT	32 bytes
	03	Revision number (depends on the release)	UDINT	32 bytes
	04	Serial number (depends on the module)	UDINT	32 bytes

Table 19: Receive PDO mapping

Index	Subindex	Contents	Data type	Size
0x1600	00	Number of entries = 1	USINT	8 bytes
	01	Mapped objects (subindices from object 0x2001 – output data)	UDINT	32 bytes

Table 20: Transmit PDO mapping

Index	Subindex	Contents	Data type	Size
0x1A00	00	Number of entries = 1	USINT	8 bytes
	01	Mapped objects (subindices from object 0x2000 – output data)[1]	UDINT	32 bytes

[1] The object 0x2000 contains the input data of the gateway to the higher-level control system. Only one subindex at a time can be transmitted.

Table 21: Sync Manager 2 PDO Assignment

Index	Subindex	Contents	Data type	Size
0x1C12	00	Number of entries = 1	USINT	8 bytes
	01	Mapped objects = 0x1607 (for 100 bytes PDO)	UINT	16 bytes

Table 22: Sync Manager 3 PDO assignment

Index	Subindex	Contents	Data type	Size
0x1C13	00	Number of entries = 2	USINT	8 bytes
	01	Mapped objects = 0x1A00 (NewMessageFlag)	UINT	16 bytes
	02	Mapped objects = 0x1A08 (for 100 bytes PDO)	UINT	16 bytes

Table 23: Rx PDO mapping

Index	Subindex	Contents	Data type	Size
0x1607	00	Number of entries = 4	USINT	1 byte
	01	Mapped objects = 0x20010D50 (for 100 bytes Rx PDO)	UINT	4 bytes
	02	Mapped objects = 0x20010EF0 (for 100 bytes Rx PDO)	UINT	4 bytes
	03	Mapped objects = 0x20010FF0 (for 100 bytes Rx PDO)	UINT	4 bytes
	04	Mapped objects = 0x200110F0 (for 100 bytes Rx PDO)	UINT	4 bytes

Table 24: Tx PDO mapping

Index	Subindex	Contents	Data type	Size
0x1A08	00	Number of entries = 4	USINT	1 byte
	01	Mapped objects = 0x2000D50 (for 100 bytes Tx PDO)	UINT	4 bytes
	02	Mapped objects = 0x2000EF0 (for 100 bytes Tx PDO)	UINT	4 bytes
	03	Mapped objects = 0x2000FF0 (for 100 bytes Tx PDO)	UINT	4 bytes
	04	Mapped objects = 0x20010F0 (for 100 bytes Tx PDO)	UINT	4 bytes

13.2.2 EtherCAT® – manufacturer-specific objects

13.2.2.1 Checksums

Table 25: Service data object (SDO) checksums

Index	Subindex	Contents	Data type	Size
0x4000	00	Number of entries = 5	UINT	1 byte
	01	Overall checksum value	BYTE	4 bytes
	02	Safety checksum	BYTE	4 bytes
	03	Standard checksum	BYTE	4 bytes
	04	Reserved	BYTE	4 bytes
	05	Verification checksum	BYTE	4 bytes

13.2.2.2 Module status

Overview

The first 32 bytes contain the module statuses of the CPU. This is followed by 8 byes each for the module statuses of the expansion modules. The order depends on the hardware configuration. The content depends on the type of expansion module.

Module status

Table 26: Service data object (SDO) module status

Index	Subindex	Contents	Data type	Size
0x4001	00	Number of entries = 16	USINT	1 byte
0x4001	01	CPU status info part 1 of 4	ARRAY of BYTE	8 bytes
0x4001	02	CPU status info part 2 of 4	ARRAY of BYTE	8 bytes
0x4001	03	CPU status info part 3 of 4	ARRAY of BYTE	8 bytes
0x4001	04	CPU status info part 4 of 4	ARRAY of BYTE	8 bytes
0x4001	05	Module status info 1	ARRAY of BYTE	8 bytes
0x4001	06	Module status info 2	ARRAY of BYTE	8 bytes
...				
0x4001	16	Module status info 12	ARRAY of BYTE	8 bytes

Module status bits for main module

Table 27: Module status bits for main module

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved		Voltage supply	Configuration is valid	Reserved	External error	Internal error	operational status 1 = Run 0 = Other
Byte 1 ... 3	Reserved							
Byte 4	User-defined status bit 7 (CPU logic)	User-defined status bit 6 (CPU logic)	User-defined status bit 5 (CPU logic)	User-defined status bit 4 (CPU logic)	User-defined status bit 3 (CPU logic)	User-defined status bit 2 (CPU logic)	User-defined status bit 1 (CPU logic)	User-defined status bit 0 (CPU logic)
Byte 5	User-defined status bit 15 (CPU logic)	User-defined status bit 14 (CPU logic)	User-defined status bit 13 (CPU logic)	User-defined status bit 12 (CPU logic)	User-defined status bit 11 (CPU logic)	User-defined status bit 10 (CPU logic)	User-defined status bit 9 (CPU logic)	User-defined status bit 8 (CPU logic)
Byte 6 ... 7	Reserved							
Byte 8	Reserved	Fast shut off status (all grouped)	Reserved					
Byte 9	Reserved				Status I7, I8 Dual-channel evaluation	Status I5, I6 Dual-channel evaluation	Status I3, I4 Dual-channel evaluation	Status I1, I2 Dual-channel evaluation
Byte 10	Status I8	Status I7	Status I6	Status I5	Status I4	Status I3	Status I2	Status I1

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 11	Status Q4 Short-circuit to Low	Status Q4 Short-circuit to High	Status Q3 Short-circuit to Low	Status Q3 Short-circuit to High	Status Q2 Short-circuit to Low	Status Q2 Short-circuit to High	Status Q1 Short-circuit to Low	Status Q1 Short-circuit to High
Byte 12 ... 16	Reserved							
Byte 17	Reserved				Status I15, I16 Dual-channel evaluation	Status I13, I14 Dual-channel evaluation	Status I11, I12 Dual-channel evaluation	Status I9, I10 Dual-channel evaluation
Byte 18	Status I16	Status I15	Status I14	Status I13	Status I12	Status I11	Status I10	Status I9
Byte 19 ... 24	Reserved							
Byte 25	Reserved						Status I19, I20 Dual-channel evaluation	Status I17, I18 Dual-channel evaluation
Byte 26	Reserved				Status I20	Status I19	Status I18	Status I17
Byte 27 ... 31	Reserved							

Module status bits for XTDI

Table 28: Module status bits for XTDI

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved					External error	Reserved	
Byte 1	Reserved				Status I7, I8 Dual-channel evaluation	Status I5, I6 Dual-channel evaluation	Status I3, I4 Dual-channel evaluation	Status I1, I2 Dual-channel evaluation
Byte 2	Status I8	Status I7	Status I6	Status I5	Status I4	Status I3	Status I2	Status I1
Byte 3 ... 7	Reserved							

Module status bits for XTDO

Table 29: Module status bits for XTDO

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved	Fast shut off status (all grouped)	Auxiliary voltage supply	Reserved		External error	Reserved	
Byte 1	Reserved				Status I7, I8 Dual-channel evaluation	Status I5, I6 Dual-channel evaluation	Status I3, I4 Dual-channel evaluation	Status I1, I2 Dual-channel evaluation
Byte 2	Status I8	Status I7	Status I6	Status I5	Status I4	Status I3	Status I2	Status I1
Byte 3	Status Q4 Short-circuit to Low	Status Q4 Short-circuit to High	Status Q3 Short-circuit to Low	Status Q3 Short-circuit to High	Status Q2 Short-circuit to Low	Status Q2 Short-circuit to High	Status Q1 Short-circuit to Low	Status Q1 Short-circuit to High
Byte 4 ... 6	Reserved							
Byte 7	Status Q8 Short-circuit to Low	Status Q8 Short-circuit to High	Status Q7 Short-circuit to Low	Status Q7 Short-circuit to High	Status Q6 Short-circuit to Low	Status Q6 Short-circuit to High	Status Q5 Short-circuit to Low	Status Q5 Short-circuit to High

Module status bits for gateway

Table 30: EtherCAT® gateway module status bits

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved	Reserved	Data valid Network → Gateway	Reserved		External error	Reserved	
Byte 1 … 7	Reserved							

Complementary information

- The module status bits have the following meanings:
  - 0 = Error
  - 1 = No error
- If a module is not present, all bits of the module are set to logical 1.
- Bits reserved for future use are always logical 1.
- The status bytes of each module are transmitted as a 32-bit word in big endian format, i.e. the most significant byte (MSB = byte 3) is transmitted first and the least significant byte (LSB = byte 0) last.

13.2.2.3 Product codes

Overview

Product codes are 4-byte coded device type codes.

The product codes of the individual safety controller modules are available in an ARRAY.

- The first 4 bytes contain the product code of the CPU.
- The second 4 bytes contain the product code of the SmartPlug.
- The subsequent 4 byte segments contain the product codes of the expansion modules.

Product codes

Table 31: Service data object (SDO) product codes

Index	Subindex	Contents	Data type	Size
0x4003	00	Number of entries = 66	UINT	1 byte
0x4003	01 … 66	Product codes	UINT	66 x 4 bytes = 264 bytes

Description of the product codes

Table 32: Product codes

Product codes	Description
0x30 01 00 00	CPUc1 main module
0x31 01 00 00	CPUc2 main module
0x00 05 00 00	EtherCAT gateway expansion module
0x00 06 00 00	PROFINET gateway expansion module
0x00 07 00 00	CANopen gateway expansion module
0x30 0B 00 00	XTDI IO expansion module
0x30 0C 00 00	XTDO IO expansion module
0x30 FF 00 00	SmartPlug

13.2.2.4   Project data

Overview

Contains the project data from the configuration software of the safety controller.

Project data

Table 33: Service data object (SDO) project data

Index	Subindex	Contents	Data type	Size
0x4004	00	Number of entries = 5	UINT	1 byte
0x4004	01	Device name	STRING	64 bytes
0x4004	02	Project name	STRING	64 bytes
0x4004	03	Application name	STRING	64 bytes
0x4004	04	User name (optional)	STRING	64 bytes
0x4004	05	Description	STRING	100 bytes

Complementary information

- Unused characters in the STRING are padded with blanks.

13.2.2.5   Output and input data

Output data

Only one PDO at a time can be transmitted.

Table 34: Output data of the higher-level control system

Index	Subindex	Contents		Data type	Size
0x2001	00	Number of entries = 16		USINT	1 byte
	01	10 bytes output data	Higher-level con-troller Gateway	BYTE	10 bytes
	02	20 bytes output data		BYTE	20 bytes
	03	30 bytes output data		BYTE	30 bytes
	04	40 bytes output data, part 1		BYTE	10 bytes
	05	40 bytes output data, part 2		BYTE	30 bytes
	06	50 bytes output data, part 1		BYTE	20 bytes
	07	50 bytes output data, part 2		BYTE	30 bytes
	08	60 bytes output data, part 1		BYTE	30 bytes
	09	60 bytes output data, part 2		BYTE	30 bytes
	10	80 bytes output data, part 1		BYTE	20 bytes
	11	80 bytes output data, part 2		BYTE	30 bytes
	12	80 bytes output data, part 3		BYTE	30 bytes
	13	100 bytes output data, part 1		BYTE	10 bytes
	14	100 bytes output data, part 2		BYTE	30 bytes
	15	100 bytes output data, part 3		BYTE	30 bytes
	16	100 bytes output data, part 4		BYTE	30 bytes

Input values

Only one subindex at a time can be transmitted.

Table 35: Input values

Index	Subindex	Contents		Data type	Size
0x2000	00	Number of entries = 16		USINT	1 byte
	01	10 bytes input data	Gateway Higher-level controller	BYTE	10 bytes
	02	20 bytes input data		BYTE	20 bytes
	03	30 bytes input data		BYTE	30 bytes
	04	40 bytes input data, part 1		BYTE	10 bytes
	05	40 bytes input data, part 2		BYTE	30 bytes
	06	50 bytes input data, part 1		BYTE	20 bytes
	07	50 bytes input data, part 2		BYTE	30 bytes
	08	60 bytes input data, part 1		BYTE	30 bytes
	09	60 bytes input data, part 1		BYTE	30 bytes
	10	80 bytes input data, part 1		BYTE	20 bytes
	11	80 bytes input data, part 2		BYTE	30 bytes
	12	80 bytes input data, part 3		BYTE	30 bytes
	13	100 bytes input data, part 1		BYTE	10 bytes
	14	100 bytes input data, part 2		BYTE	30 bytes
	15	100 bytes input data, part 3		BYTE	30 bytes
	16	100 bytes input data, part 4		BYTE	30 bytes

13.3 Dimensional drawings
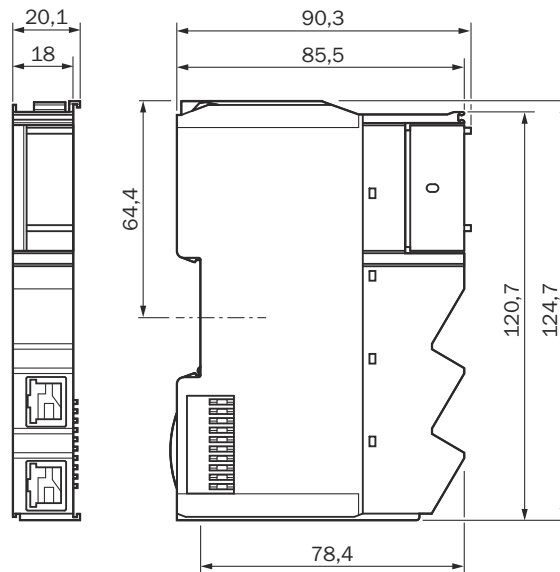
Figure 7: Dimensional drawing

14 Ordering information

14.1 Scope of delivery

- Expansion module - gateway
- Operating instructions for download: www.sick.com

14.2 Ordering information for main module

Table 36: Ordering information for main module

Part	Type code	Part number
CPUc1 main module • 20 safety capable inputs • 8 test outputs • 4 safety outputs	FLX3-CPUC100	1085349
CPUc2 main module • 20 safety capable inputs • 8 test outputs • 4 safety outputs • Ethernet interface (female RJ45 Ethernet connector) for Modbus® TCP	FLX3-CPUC200	1085351

14.3 Ordering information for expansion module

Ordering information for IO expansion module

Table 37: Ordering information for IO expansion module

Part	Type code	Part number
Expansion module XTDI1 • 8 safety capable inputs • 8 test outputs	FLX3-XTDI100	1085353
Expansion module XTDO1 • 8 safety capable inputs • 8 safety outputs	FLX3-XTDO100	1085354

Ordering information for gateway expansion module

Table 38: Ordering information for gateway expansion module

Part	Type code	Part number
GPNT1 PROFINET-IO gateway	FLX0-GPNT100	1085356
GETC1 EtherCAT® gateway	FLX0-GETC100	1085357
The GCAN1 CANopen gateway	FLX0-GCAN100	1085363

14.4 Ordering information for accessories

Table 39: Ordering information for accessories

Part	Type code	Part number
Front connector with opening for SmartPlug • 16 spring terminals	FLX0-ACC0300	6069666
Front connector • 18 spring terminals	FLX0-ACC0200	6066285

Part	Type code	Part number
SmartPlug	FLX3-SMPL100	2106852
Housing end cap	FLX0-ACC0400	5340579

15 Annex

15.1 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).

15.1.1 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

15.1.2 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

16   List of figures

17   List of tables

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