FlexChain

SICK
Sensor Intelligence.

Described product

FlexChain

Manufacturer

SICK AG
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Germany
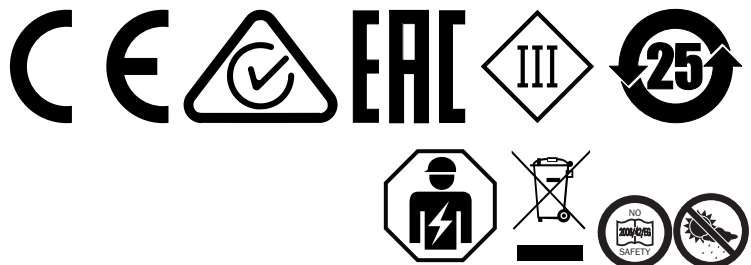
Legal information

Original document

This document is an original document of SICK AG.

Contents

1   About this document

1.1   Information on the operating instructions

These operating instructions provide important information on how to use devices from SICK AG.

Prerequisites for safe work are:

- Compliance with all safety notes and handling instructions supplied
- Compliance with local work safety regulations and general safety regulations for device applications

The operating instructions are intended to be used by qualified personnel and electrical specialists.

NOTE
Read these operating instructions carefully before starting any work on the device, in order to familiarize yourself with the device and its functions.

The instructions constitute an integral part of the product and are to be stored in the immediate vicinity of the device so they remain accessible to staff at all times. Should the device be passed on to a third party, these operating instructions should be handed over with it.

These operating instructions do not provide information on operating the machine in which the device is integrated. For information about this, refer to the operating instructions of the specific machine.

1.2   Scope

These operating instructions serve to incorporate the device into a customer system. Instructions are given in stages for all actions required.

These instructions apply to all listed device variants of the product.

Available device variants are listed on the online product page.

▶   **www.sick.com/FlexChain**

Commissioning is described using one particular device variant as an example.

1.3   Explanation of symbols

Warnings and important information in this document are labeled with symbols. The warnings are introduced by signal words that indicate the extent of the danger. These warnings must be observed at all times and care must be taken to avoid accidents, personal injury, and material damage.

⚠ **DANGER**
... indicates a situation of imminent danger, which will lead to a fatality or serious injuries if not prevented.

⚠ **WARNING**
... indicates a potentially dangerous situation, which may lead to a fatality or serious injuries if not prevented.

CAUTION

... indicates a potentially dangerous situation, which may lead to minor/slight injuries if not prevented.

NOTICE

... indicates a potentially harmful situation, which may lead to material damage if not prevented.

NOTE

... highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

1.4 Customer service

If you require any technical information, our customer service department will be happy to help. To find your agency, see the final page of this document.

NOTE

Before calling, make a note of all type label data such as type code, serial number, etc., to ensure faster processing.

2   Safety information

2.1   Intended use

The FlexChain is a sensor system comprising a central unit (host) and connected guests (sensors) that is used for optical and non-contact detection of objects.

The FlexChain must be mounted and installed according to these operating instructions, and may only be operated according to its intended function.

The FlexChain is not equipped with any direct safety devices. The system designer must provide measures to ensure the safety of persons and systems in accordance with the legal guidelines.

Sick AG assumes no liability for losses or damage arising from the use of the product, either directly or indirectly. This applies in particular to use of the product that does not conform to its intended purpose and is not described in this documentation.

2.2   Limitation of liability

Applicable standards and regulations, the latest state of technological development, and our many years of knowledge and experience have all been taken into account when assembling the data and information contained in these operating instructions. The manufacturer accepts no liability for damage caused by:

- Failure to observe the operating instructions
- Improper use
- Use by untrained personnel
- Unauthorized conversions
- Technical modifications
- Use of unauthorized spare parts, wear and tear parts, and accessories

With special variants, where optional extras have been ordered, or owing to the latest technical changes, the actual scope of delivery may vary from the features and illustrations shown here.

2.3   Requirements for skilled persons and operating personnel

WARNING
Risk of injury due to insufficient training!

Improper handling of the device may result in considerable personal injury and material damage.

- All work must only ever be carried out by the stipulated persons.

The operating instructions state the following qualification requirements for the various areas of work:

- **Instructed personnel** have been briefed by the operating entity about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks assigned to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions to be able to carry out work on electrical systems and to detect and avoid any potential dangers independently. In Germany, electricians must meet the specifications of the BGV A3 Work Safety Regulations (e.g., Master Electrician). Other relevant regulations applicable in other countries must be observed.

The following qualifications are required for various activities:

Activities	Qualification
Mounting, maintenance	- Basic practical technical training - Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	- Practical electrical training - Knowledge of current electrical safety regulations - Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	- Basic knowledge of the design and setup of the described connections and interfaces - Basic knowledge of data transmission - Knowledge of the operation and control of the devices in their particular application
Operation of the devices in their particular application	- Knowledge of the operation and control of the devices in their particular application - Knowledge of the software and hardware environment in the application

2.4 Hazard warnings and operational safety

Please observe the safety notes and the warnings listed here and in other chapters of these operating instructions to reduce the possibility of risks to health and avoid dangerous situations.
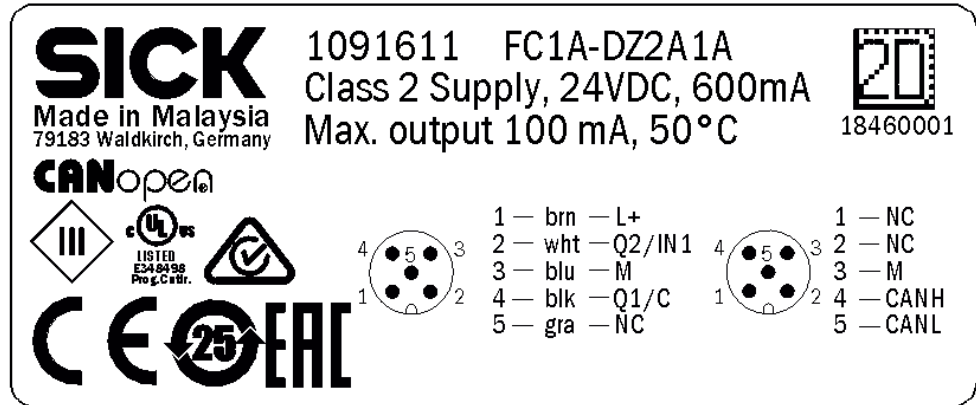
2.5 Repair

The product is a replacement device. The device is not intended to be repaired. Interference with or modifications to the device on the part of the customer will invalidate any warranty claims against SICK AG.

3 Product description

3.1 Product ID

3.1.1 Type labels

3.2 Product features and functions

3.2.1 Device view
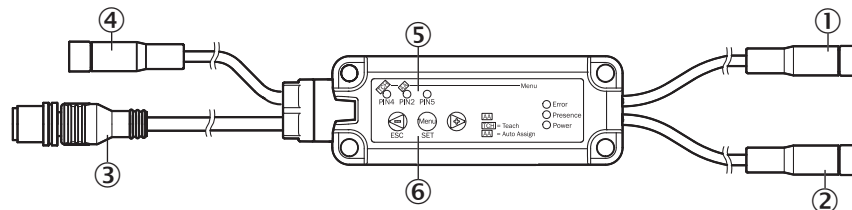
Figure 1: FlexChain host

① Port-A, pigtail M8, 4-pin, female
② Port B, pigtail M8, 4-pin, female
③ PLC, pigtail M12, 5-pin / 8-pin, male
④ USB, pigtail M8, 4-pin, female
⑤ Control panel

Structure

A FlexChain system comprises a host and a number of guests (sensors). As shown in the image below, the system components are connected sequentially (bus topology). A system comprises a host and at least one guest. Up to 60 guests in total can be connected to a host.

Function

The FlexChain system operates similarly to a light grid. That is, each individual channel in the system is processed sequentially. This principle means that only one channel at a time is active. Consequently, there is no possibility of mutual interference within a system, and the guests can be installed arbitrarily close to one another without any interference occurring. Due to this sequential processing, the scan time and the response time of the system depend on the number of connected guests. The total times are short, however, because the processing interval between two channels is in the µs range (see also the technical data).

Host:

– Supplies the guests with current
– Collects the status of each individual channel
– Requests diagnostic data from the individual guests
– Processes the collected data (if desired)
– Forwards the collected and/or processed data via various interfaces

Guest:

– Guests are connected to one another via a standard M8 pigtail
– Guests forward information to the master.
– Can be arranged differently within the system.
– Guests employing different technologies can be integrated into the same system
– Sender & receiver sensors must always be connected to separate ports (port A/ port B).
– Up to 60 sensors can be connected to the system.
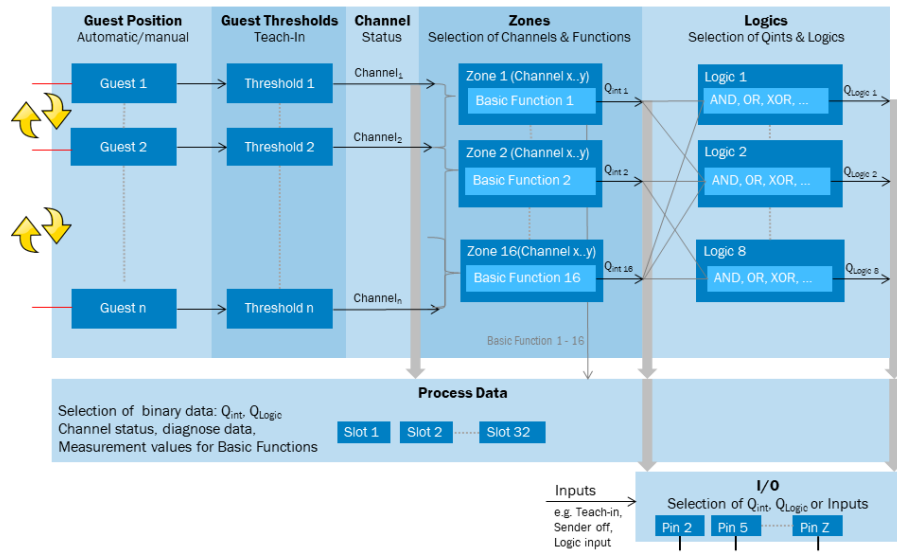
4 Mounting

4.1 Scope of delivery

- FlexChain host with 2x bus terminator
- Quickstart
- Safety notes

The FlexChain guests and mounting accessories are not included in the scope of delivery and need to be purchased separately.

4.2 Installation requirements

- Typical space requirement for the device, see type-specific dimensional drawing, see "Technical data", page 35.
- Comply with technical data, such as the permitted ambient conditions for operation of the device (e.g., temperature range, EMC interference emissions, ground potential).
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- Protect the device from direct sunlight.
- Protect the device from external light sources.
- The device must only be mounted using the pairs of mounting threads/fixing holes provided for this purpose.
- Shock and vibration-free mounting.

4.3 Installing the system

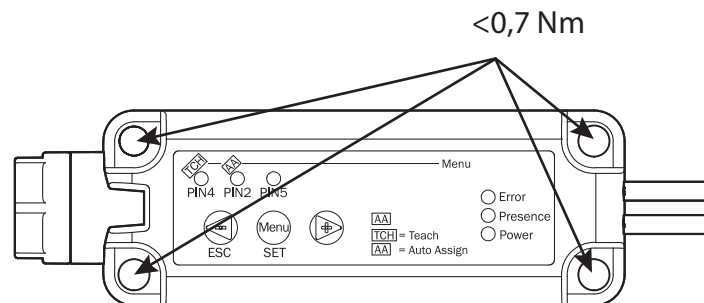**Installing the FlexChain host**

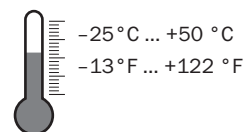*Figure 2: FlexChain host - installation*

Figure 3: FlexChain host - installation

Installing the FlexChain guest

The procedure for installing a guest can vary significantly depending on the device family or device type. See the instructions supplied with the device for installation instructions.

5 Electrical installation

5.1 Notes on electrical installation

> **NOTICE**
>
> **Equipment damage due to incorrect supply voltage!**
>
> An incorrect supply voltage may result in damage to the equipment.
>
> - Only operate the device with safety/protective extra-low voltage (SELV/PELV).
> - The sensor is a device of protection class III.

> **NOTICE**
>
> **Equipment damage due to incorrect supply voltage!**
>
> An incorrect supply voltage may result in damage to the equipment.
>
> - Only operate the device with an LPS (limited power source) in accordance with IEC 60950-1 or an NEC Class 2 power supply unit.

> **NOTICE**
>
> **Equipment damage or unpredictable operation due to working with live parts!**
>
> Working with live parts may result in unpredictable operation.
>
> - Only carry out wiring work when the power is off.
> - Only connect and disconnect electrical connections when the power is off.

> **NOTICE**
>
> **Device damage due to incorrect connection!**
>
> Incorrect connection may result in damage to the FlexChain system or peripheral devices.
>
> - If connection cables are required, use twisted pair connection cables.
> - Standard M8 4-pin connection cables can also be used in many applications.

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be observed when working on electrical systems!**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using extension cables with open ends, ensure that bare wire ends do not come into contact with each other (risk of short-circuit when supply voltage is switched on!). Wires must be appropriately insulated from each other.
- Wire cross-sections in the supply cable from the user's power system must be selected in accordance with the applicable standards.
- Only operate the device with an LPS (limited power source) in accordance with IEC 60950-1 or an NEC Class 2 power supply unit.
- All circuits connected to the device must be designed as SELV/PELV circuits.
- Operation in short-circuit protected network at max. 8 A.

NOTE
Layout of data cables

- Use shielded data cables with twisted-pair wires.
- Implement the shielding design correctly and completely.
- To avoid interference, e.g., from switching power supplies, motors, clocked drives, and contactors, always use cables and layouts that are suitable for EMC.
- Do not lay cables over long distances in parallel with voltage supply cables and motor cables in cable channels.

The IP enclosure rating for the device is only achieved under the following conditions:

- The cables plugged into the connections are screwed tight.

If these instructions are not complied with, the IP enclosure rating for the device is not guaranteed!

5.2 Schematic arrangement

The first guest is connected to the host using the pigtail. It can be connected to either port A or port B. Up to 30 sensors in total can be connected per port.
All guests have an M8 4-pin male connector and an M8 4-pin female connector (pigtail). The pigtail can always be connected to the male connector of the next guest.
The bus terminator must be connected at the end of the system. This is included in the scope of delivery of the FlexChain host.
With regard to the arrangement of the guests on Port A and Port B, there is only one restriction for sender and receiver sensors: the sender and the associated receiver must not be connected to the same port.
If the pigtail cable is insufficiently long, it can be extended using an M8 4-pin cable. Ensure that the total cable length of the system does not exceed 40 m when doing so.
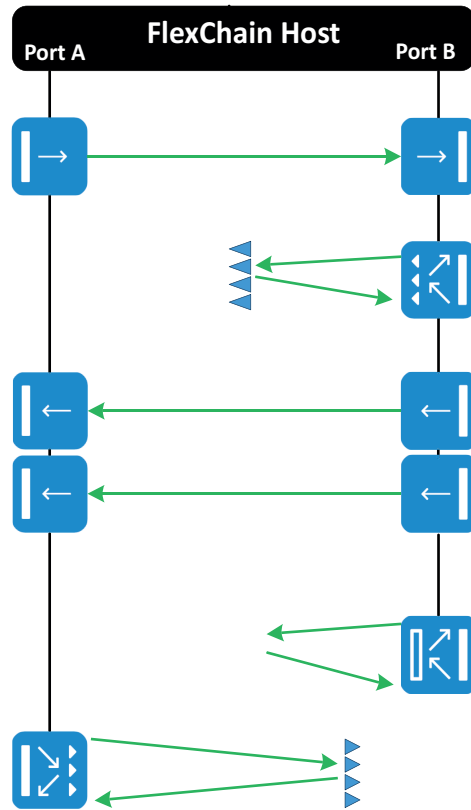
5.3 Pin assignment of the connections

Overview of pin assignment - FlexChain host

Table 1: DC

Flex-Chain host	PLC					USB	Port A/ port B
	Standard IO-Link	Advanced IO-Link	RS485	CANopen			
				System/Q	CAN con-nector		
1	+ (L+)	+ (L+)	+ (L+)	+ (L+)	n.c.	+5 V	CANH
2	Q2 / IN1	Q2 / IN1	Q2 / IN1	Q2 / IN1	n.c.	D-	CANL
3	M	M	M	M	GND	D+	12 Vout
4	Q1 / C	Q1 / C	Q1 / C	Q1 / C	CAN1_H	GND	GND
5	Q3 / In2	Q3 / IN2	n.c.	n.c.	CAN1_L	-	-
6	-	Q4 / IN3	n.c.	-	-	-	
7	-	Q5 / IN4	RS485_A	-	-	-	
8	-	Q6 / IN5	RS485_B	-	-	-	

The system can be configured via the USB interface and SOPAS. An M8->USB-A adapter cable is required to connect the system to a computer (part number: 6051163).

Overview of pin assignment - FlexChain guests

Table 2: DC
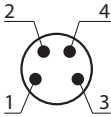
GL6-C	
1	+ (L+)
2	M
3	CAN-High
4	CAN-Low

Table 3: DC
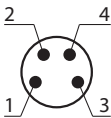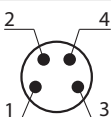
GSE6-C	
1	CAN high
2	CAN low
3	12 V_{out}
4	GND

Table 4: DC

GTB6-C	
1	+ (L+)
2	M
3	CAN high
4	CAN low

5.4 Connecting the supply voltage

! **NOTICE**
Risk of damage to the device!

The device can become damaged if it is connected to a voltage supply that is already switched on.

- Only connect the device when the supply cable is de-energized.

The device must be connected to a power supply unit with the following properties:

- 24 V voltage supply ± 20% or DC 19.2 V – 28.8 V (SELV/PELV as per currently applicable standards)
- The current consumption depends on the number of connected sensors and is typically 100 mA and maximum 850 mA.

To ensure protection against short-circuits/overload in the customer's supply cables, the wire cross-sections used must be appropriately selected and protected.

5.5   Digital interfaces

The digital interfaces can be configured via SOPAS, or directly via the serial interfaces (except RS-485). Apart from PIN4, every digital interface can be configured as a digital input or digital output.
Furthermore, every digital interface can be assigned a number of different functions (see Configuration via SOPAS).
The signal state (HIGH/LOW) is shown on the FlexChain host display.

6 Commissioning

6.1 Simplified illustration

Perform any other operation with the SOPAS ET user interface. Download at: www.sick.com

1. Connect sensors to port A and port B.
2. Connect the power supply. The Power LED lights up green.
3. Perform AutoAssign
   AutoAssign detects all connected guests. Automated assignment of guest positions and zones, e.g. $A_1 \ldots A_N$, $B_1 \ldots B_M$.
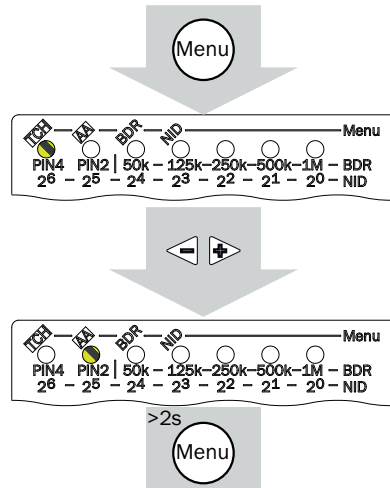
4. Perform teach-in
   Perform teach-in for sensors. Set sensors with potentiometer directly on the sensor.

5. Baud rate (RS485, CANopen)
    Set baud rate for FlexChain host variant with RS485 and CANopen.

6. NodeID (CANopen)
    Set NodeID for FlexChain host with CANopen. A single value or several values can be set or deleted (bit display).
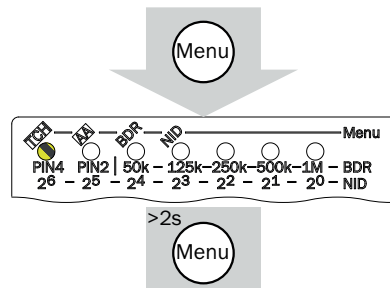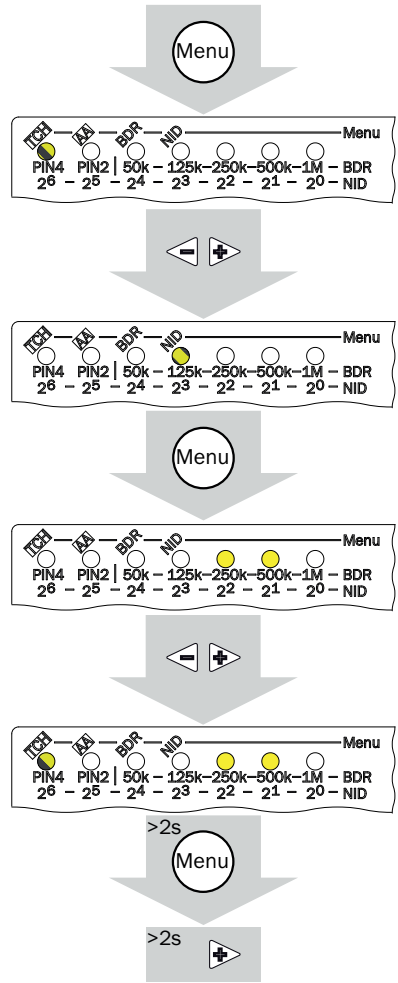
7 Operation

7.1 Configuration via SOPAS ET

To configure the system via SOPAS you will need the SOPAS software, the SOPAS Device Description (SDD), and a USB connection.

> **i** **NOTE**
> The USB interface is intended only for configuring the device and must be unplugged during operation.

The SOPAS screen for FlexChain is divided into a number of tabs (orange). Every tab provides a specific set of parameterization functions. You can easily jump back and forward between the tabs.

7.1.1 Home
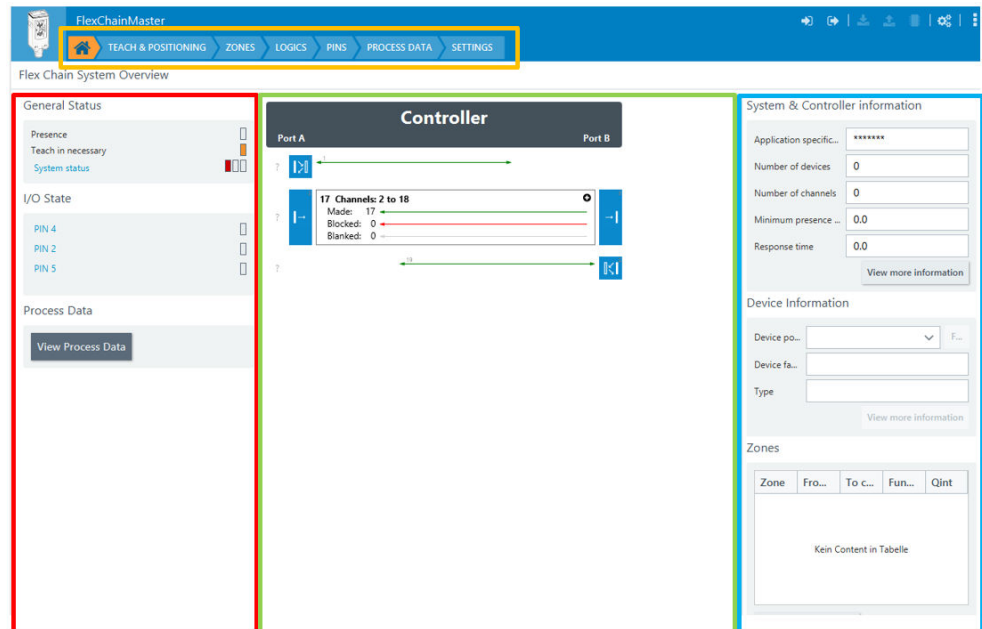
The Home tab does not contain any settings. The purpose of this tab is to provide you with information and status details for the connected FlexChain system.

The Home tab is divided into three areas.
The area on the left (red) shows information about the current status of the system. This includes, for example, the status of the switching input and switching output pins, the system status, the teach-in status, etc.
The middle area (green) provides a live display of the channel status. This area shows which channel is blocked or not blocked by an object. If there is something wrong with a sensor, this is also indicated directly in this display.
The area on the right (blue) lists the technical values and settings. Details such as the response time and the number of connected guests are shown here. Furthermore, you can select a specific guest in the green area by clicking on it. The information for the selected guest then appears in the "Guest Information" area on the right hand side.

7.1.2 Teach & Positioning

The Teach & Positioning tab can be used to teach in the switching threshold of individual guests or all guests at once. The guest position can also be set automatically (automated position assignment) or changed manually.
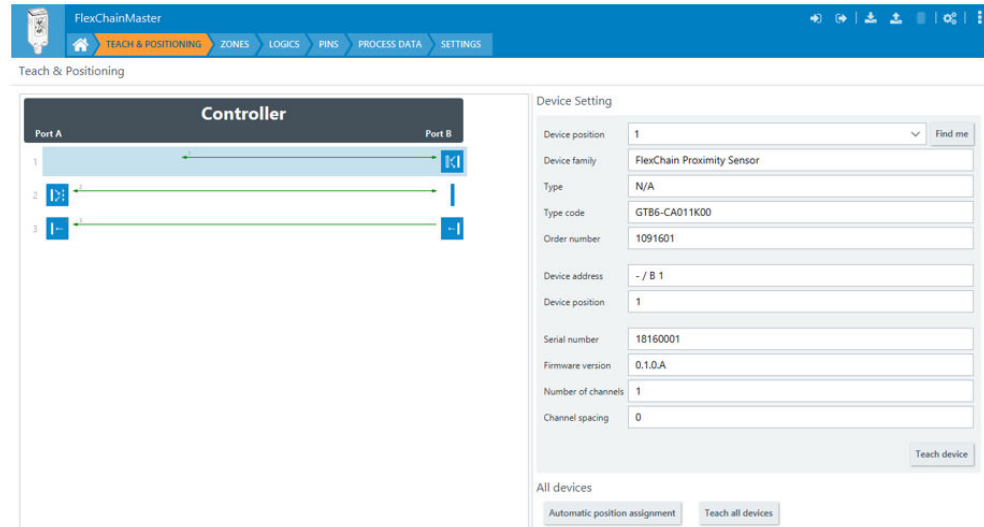
Automated positioning

The "Automated position assignment" method is used to automatically assigned a position to every guest in the FlexChain system. Positions are assigned based on the following rules:

1. The first position is the first guest connected to port A. Further positions are then assigned in increasing numerical order for the guests hanging off port A.
2. All guests on port B are then numbered according to the same principle as in step 1.
3. Sender/receiver sensors are always jointly assigned a position. The receiver serves as the reference during positioning.

The transmitted process data word also varies according to the position of the guest. For example, the first channel of the guest at position 1 is represented by the first bit in the process data word. This means that the sequence within the process data word depends directly on the guest positions.

Note when changing the number of guests: if a guest is removed or a new guest connected, this guest is not taken into consideration when using the "Automated position assignment" positioning method. You need to either use the "Confirm chain change" method beforehand, or perform the "Auto assign" method (see below).

Manual positioning

The position of each guest can be individually configured via the serial interface and/or via SOPAS. This option was implemented because the automated positioning may not always represent the actual physical position in the application. The manual positioning option was therefore created for simpler organization or easier interpretation of the process data word.

A comparison of the addressing, the automated positioning, and the desired positioning is shown in Figure 3.

Automatic Addressing
RED = Address, used for positioning
Black = Address, not be used for positioning

Automatic position assignment
The order of the process data is depending of the guest position.
Only red guest are relevant for the process data

Manual assignment
Actual mechanical sensor arrangement of the application. By Drag & Drop sensor position can be easily adapted to wanted order. The order of the process data will be arranged in the same way.

Using SOPAS, the position of a guest can be easily changed via drag & drop (see Figure 4). Note that the sequence number in the process data word also changes depending on the positioning.
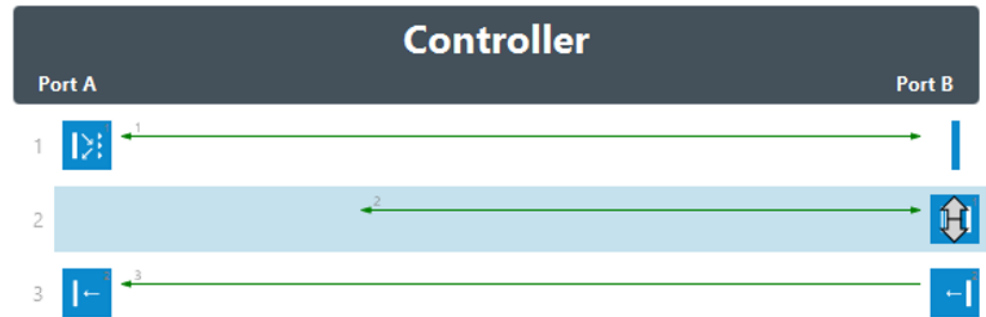
To ensure the correct guest has been selected, detailed information about the selected guest is shown on the right hand side. There is also a "Find Me" function for easily locating a guest. After selecting a specific guest and pressing the Find Me button, the LEDs on the selected guest light up.

> **NOTE**
>
> 1   Find Me can also be activated during process data operation (PD = valid). Note, however, that this will have a periodic effect (500 ms) on the cycle time.
> 2   The Find Me function is automatically deactivated by the device for certain commands/configurations (Factory reset, Teach-in, Confirm chain change, Automated assignment, Automated position assignment, Change position, or Teach-in position).

Device Setting

Device position	2
Device family	FlexChain Proximity Sensor
Type	N/A
Type code	GTB6-CA011K00
Order number	1091601
Device address	- / B 1
Device position	2

7.1.2.1   Confirm chain change

The total number of connected guests and their respective threshold values are stored in the host. If the number of guests changes at a later time, a warning message is displayed. Confirm chain change is used to confirm the new total guest count and store it in the host. The warning message is no longer displayed.

7.1.2.2   Automated assignment

Automated assignment performs the three methods "Confirm chain change", "Automated position assignment", and "Automated zone assignment" (see also the Zone tab).

7.1.2.3   Teach

There are a number of different teach modes available.

– Teach all guests
   Sets the threshold value for all centralized and teachable guests
– Teach guest
   Sets the threshold value for the selected guest.
– Auto teach-in
   If the option is selected, teach-in is carried out automatically whenever the voltage supply is interrupted. There must have been no changes to the sensors, otherwise an AutoAssign must be performed.

There are sensors where the threshold value can only be set manually directly on the sensor. A teach in via the host is not possible in this case.
The teach-in status should be queried after a teach-in. This returns a response for each individual slave position.

IOLink307SlaveTeachInStatus can have the following values:

– Teach-in Necessary (0)
   is set if the slave at the relevant position has been replaced (serial number has changed), provided the slave is actually teachable, a teach-in has not already been carried out at that position, an Automatic assignment, Confirm chain change, Factory reset or DataStorage download has been performed.
– OK (1) (the last teach-in was successful)
– Fail (2) (the last teach-in failed, e.g., poor alignment)
   This is an immediate teach-in response. It is also retained after a restart, and does not become a "Teach-in Necessary".

–   Local Adjustment at Device (optional) (3) (e.g., GTB with local pot)
–   Not Available (4) (Slave does not have a teach-in function, for example a sender, or is completely masked (user mask))

7.1.3 Zones
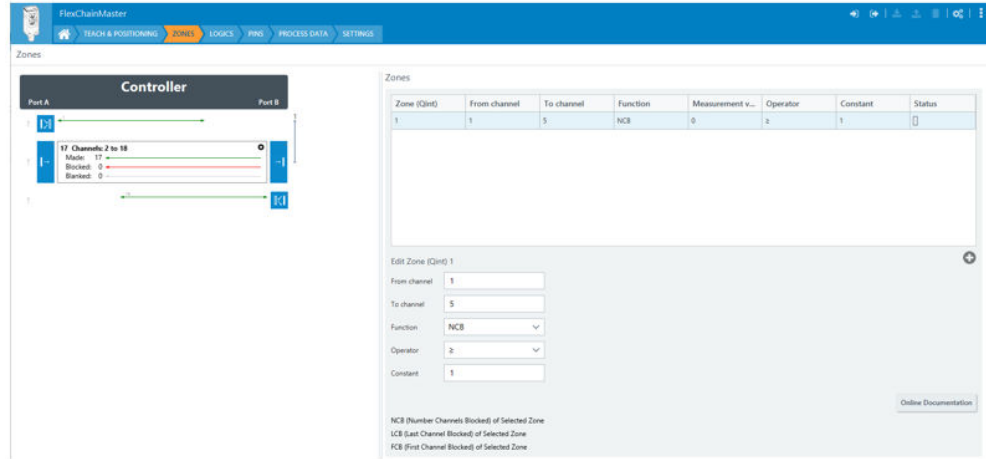
The Zones tab can be used to define multiple areas or zones. Up to 16 zones can be defined.

The zones are displayed, on the one hand, in a table on the right hand side. You can configure the zones there. The zones are also shown in the system schematic (on the left).

Specific measurement functions can be defined within each zone. The result is passed on as an internal output state, which in turn can be used as input for further functions, or directly outputted via an output. The measurement results of a zone can also be outputted via the serial interface (see also PROCESS DATA).

7.1.3.1 Zone definition

Automated zone assignment

The "Automated zone assignment" function is performed by "Automated zone assignment" or "Auto assignment". When performed, every guest in the zone is assign the NCB>=1 (number of channels blocked greater than or equal to 1) function. NCB>=1 means that if at least one channel in the zone is blocked, the internal output state is set to "High".
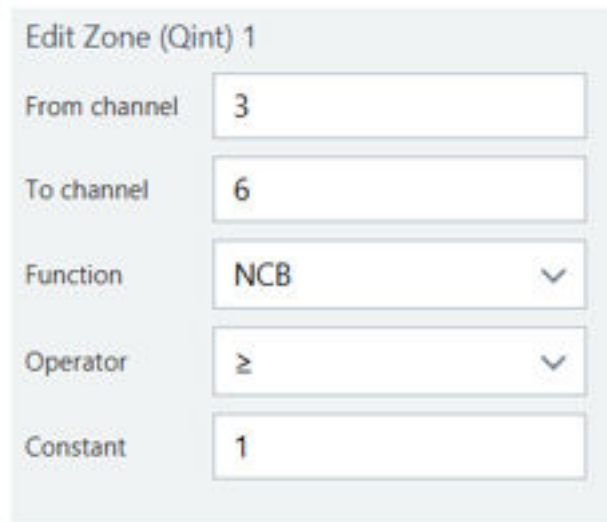
The exception to this is zone 1. It is initially defined as the first channel to the last channel. If more than 16 guests are connected and the "Automated zone assignment" function is performed, the last zone is assigned from Guest16 to Guestmax.

Manual zone assignment

You can individually select each zone in the right hand area of the screen, and configure the zone in the bottom area. The "Status" column shows whether the internal output state Qint is active or not.

Zone (Qint)	From channel	To channel	Function	Measurement...	Operator	Constant	Status
1	1	2	NCB	0	≥	1	☐
2			NCB	0	≥	1	☐

Figure 4: Overview of the settings for each zone

Figure 5: Zone configuration options

The zone range can be set in the parameterization area (e.g., from Channel 3 – Channel 6). It is also possible to define different measurement functions within each zone. These include:

1   NCB: for object detection or width classification
Example 1: NCB>=1 for object detection (Qint active if at least 1 channel is blocked)
Example 2 (see graphic): NCB=2 for width classification (Qint active if exactly 2 channels in a zone are blocked)

Breitenmessung mit NCB
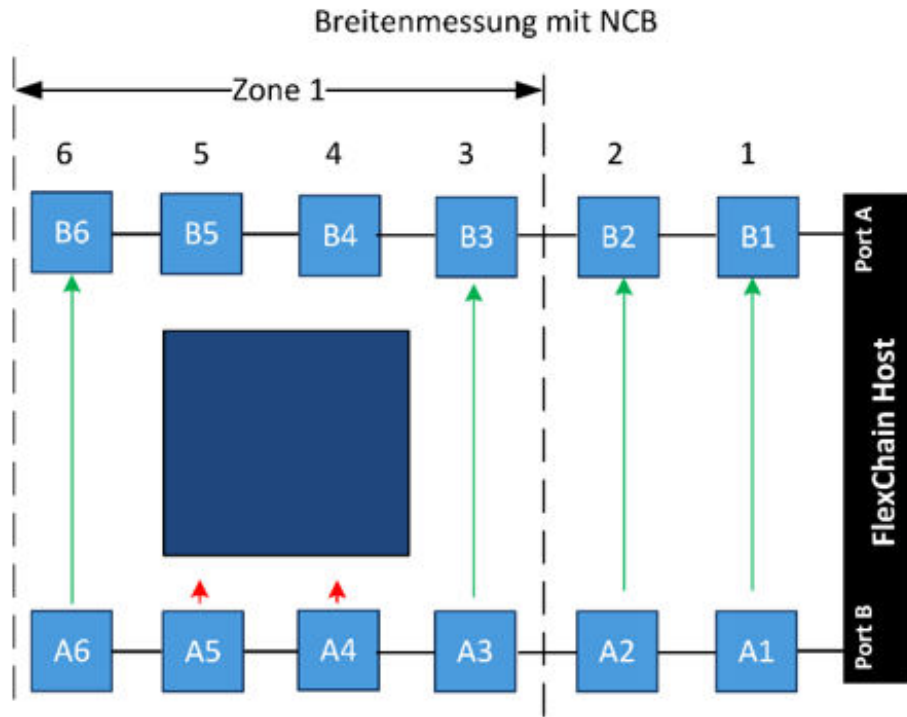
2   LCB/FCB: for height or position determination
FCB: first channel blocked. This is the blocked channel in the zone that is located closed to the host.
LCB: last channel blocked. This is the blocked channel in the zone that is located furthest from the host.
Example: Zone1 extends from channel 1 to 6
LCB >=2: if the last channel blocked in the zone is channel 2 or higher, the internal output state Qint1 is activated. (right side of graphic)
FCB >=2: if the first channel blocked in the zone is channel 5 or lower, the internal output state Qint1 is activated. (left side of graphic).
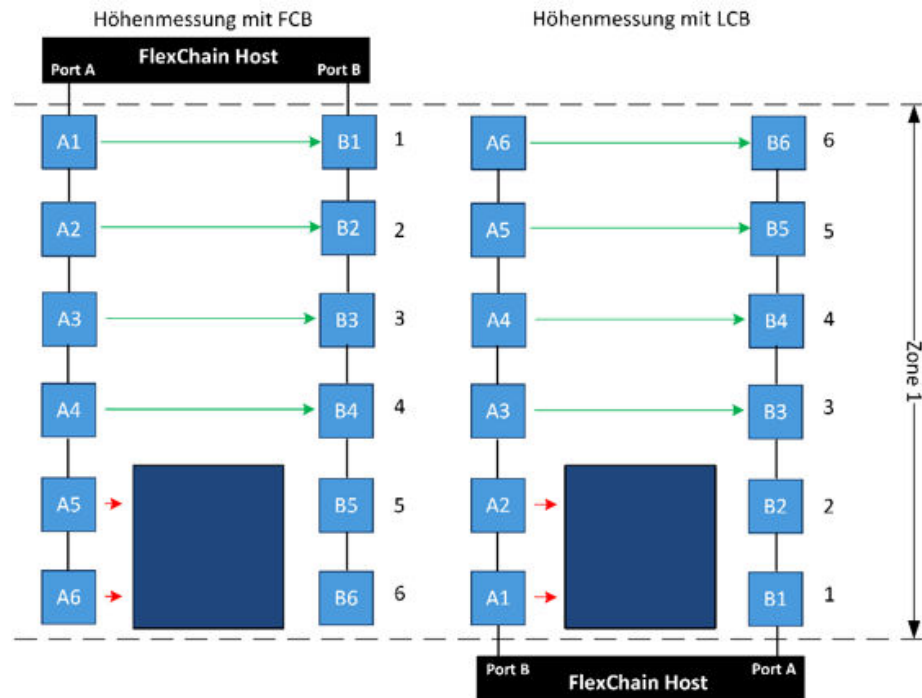
7.1.4 Logics

The Logic tab can be used to further process the individual Qint internal output states or external signals using logic functions (AND, OR,...). A total of 8 logics are available, whereby Logixn-x (x>=1 and x<n) can also be used as an input signal for Logicn. The logic state can be outputted via the switching output or via the serial interface.

Figure 6: Logics tab with two logics

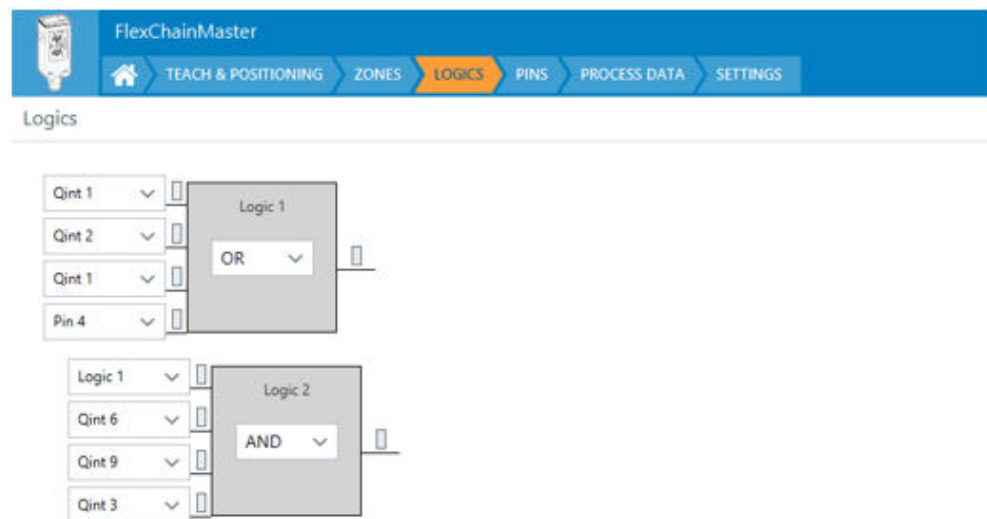If all logic inputs of a gate are "Not Used", the result will differ depending on the logic function selected. This fact can also be used to produce a constant 0 or 1.

Logic function	Result
AND	1
OR	0
XOR	0

Logic function	Result
NAND	0
NOR	1
XNOR	1

An input that is "Not Used" is not actually removed but instead replaced with a value that does not change the result, i.e. 1 for AND and NAND, otherwise 0.

The XOR function is not generally defined for more than two inputs.

The following definitions were selected for the FlexChain implementation:

Eingänge			Ausgänge	
IN1	IN2 NXOR	IN3	XOR	NXOR
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

7.1.5 PINS

The PINS tab can be used to configure which information is assigned to, or should be outputted for a pin.

Possible output signals
1 Qint
Outputs the Qint statuses of the zones
2 Logic
Outputs the configured logics
3 Masked System Status
A system status bit. You can configure when, and for which warnings and error messages this signal should be high.

Possible input signals
1 Teach-In Trigger
For performing an external teach-in.
2 Logic In
The input signal can be used for the logics.
3 Blocked Channel Hold
While this signal is high, the process data are stored in the host. When the signal becomes low, the highest value (e.g., largest measured height) is transmitted.

4 RS-485 Trigger
Sends data as soon as a signal is high.

5 Sender Off
Test function for simulating object detection: The sender LEDs can be deactivated via the input. This can be used to test whether the associated receiver LED responds.

7.1.6 Process data

The FlexChain process data word has a length of 32 bytes. Each of these bytes can be individually populated with the desired data.
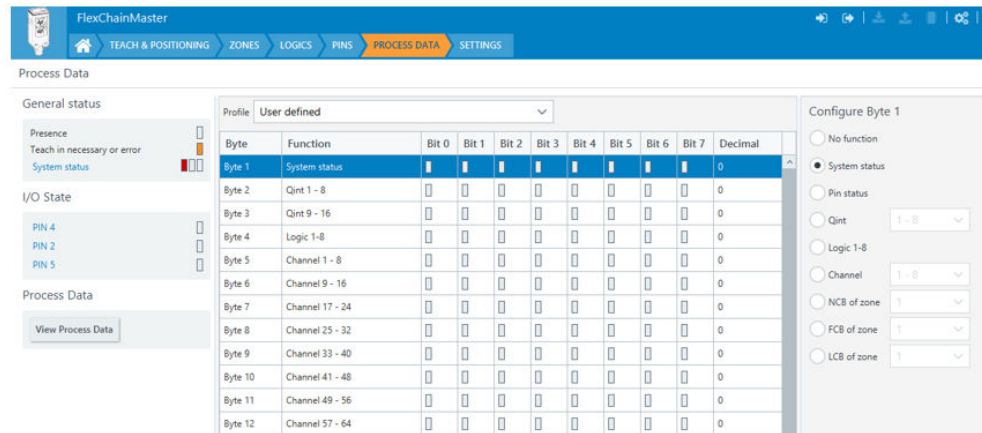
Figure 7: Overview of the Process Data tab

Loading process data via profiles

A number of pre-defined process data profiles are available that can be selected to populate the process data word.
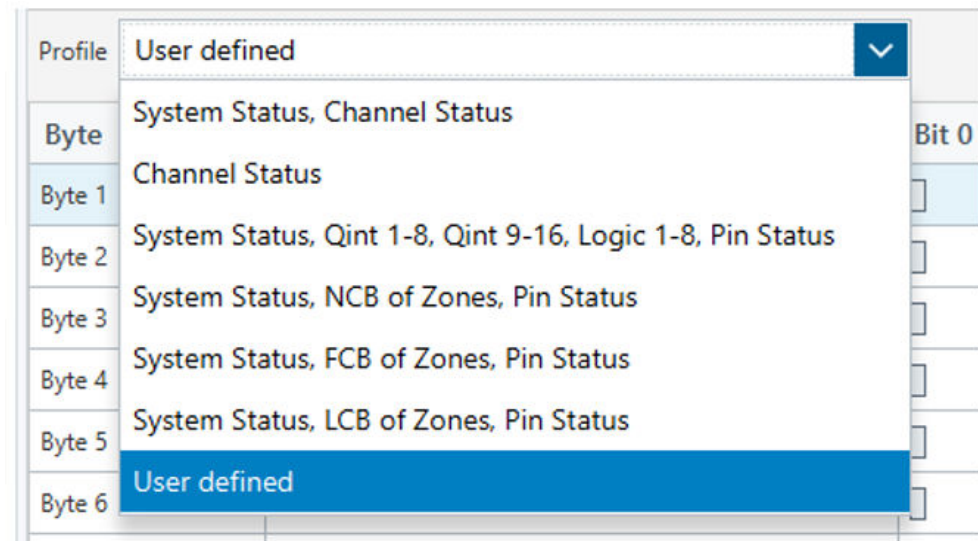
Figure 8: Loading process data via a profile

Manually customizing the process data

Each individual byte of the process data can be customized. After clicking on a byte, a drop-down list of information that can be assigned to the byte is displayed. The length of each "information block" is limited to one byte (8 bits). A single byte can therefore be used, for example, to transmit 8 channel states.

The available information is shown in figure 14. NCB, FCB and LCB are the actual measured values. For example, NCB transmits how many channels in the zone are blocked.
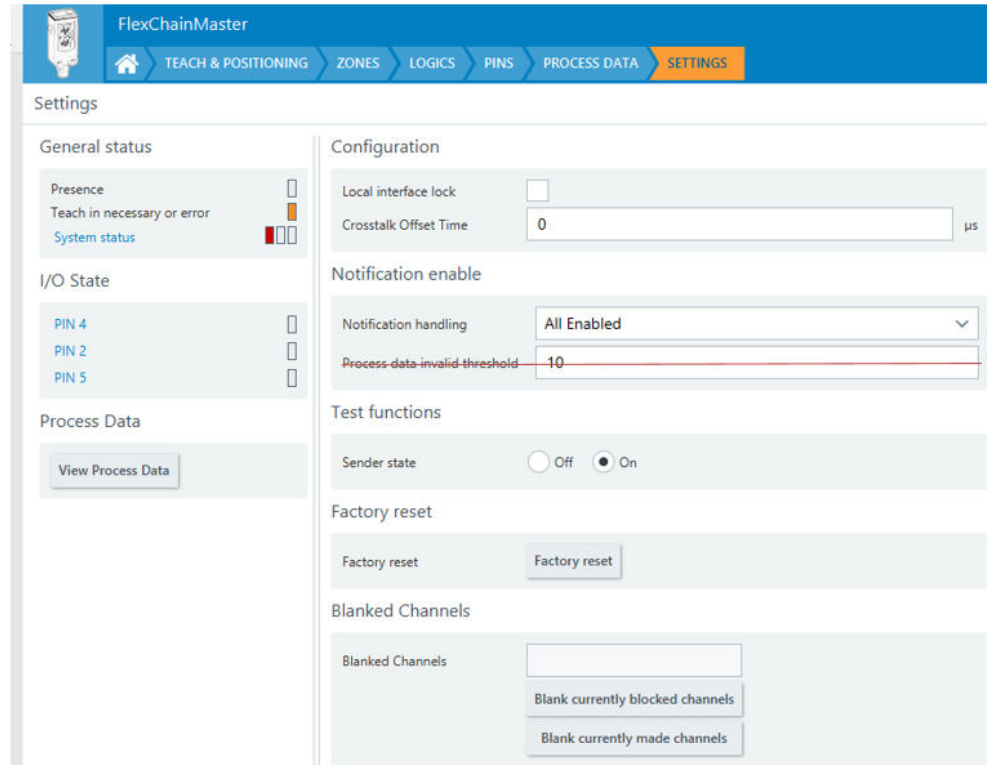
7.1.7   Settings

Figure 9: Settings tab

The following settings can be configured in the Settings tab:

1. Local interface lock: Locks the buttons on the display
2. Crosstalk Offset Time: If two identical FlexChain systems are operated in close proximity to one another, there is a possibility of mutual interference. The Crosstalk Offset Time changes the cycle time of the FlexChain system. The two systems can then no longer interfere with one another due to the different cycle time and the standard 2-bit processing.
3. "Notification handling" can be used to activate or deactivate events. Various events such as overtemperature, overvoltage, etc. can be selected. PDinvalid means invalid process data.
4. Test functions: Deactivates the sender LED. This is used to check whether the receiver is responding.
5. Factory reset: Restores all settings to the factory defaults. If there are guests connected to the system, these need to be reassigned using "Automated assignment", and then taught in again using "Teach all devices".
6. Blanked channels: The "blank all currently made/blocked channels" functions can be used to hide all free or currently blocked beams. This function is useful if there is a static object in the light path (e.g., light grid). The channels can also be individually hidden using Ctrl-left mouse button. Channels that are hidden are no longer included in the process data.

8 Troubleshooting

LED indicator/fault pattern	Cause	Measures
red error LED lights up	Short-circuit	Check connections
Yellow TCH LED flashes yellow presence LED flashes	Teach-in faulty	Check the alignment of all guests Perform TeachIn
Yellow LED AA flashes Red LED Error flashes	Position or zones inconsistent.	Check connection of all guests and alignment of the sensors Perform AutoAssign Perform TeachIn

9 Maintenance

9.1 Maintenance

During operation, the device works maintenance-free.

Depending on the assignment location, the following preventive maintenance tasks may be required for the device at regular intervals:

Table 5: Maintenance schedule

Maintenance work	Interval	Implementation
Clean housing and front screen	Cleaning interval depends on ambient conditions and climate	Specialist
Check screw connections and plug connectors	Every 6 months	Specialist

10 Decommissioning

10.1 Disassembly and disposal

Disassembling the device

1. Switch off the supply voltage to the device.
2. Detach all connecting cables from the device.
3. If the device is being replaced, mark its position and alignment on the bracket or surroundings.
4. Detach the device from the bracket.

Disposing of the device

Any device which can no longer be used must be disposed of in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. As it is categorized as electronic waste, the device must never be disposed of with household waste!

10.2 Returning devices

▶ Do not dispatch devices to the SICK Service department without consultation.

NOTE
To enable efficient processing and allow us to determine the cause quickly, please include the following when making a return:

- Details of the contact person
- Description of the application
- Description of the fault that occurred

11 Technical data

11.1 Host performance

Attribute	Value
Number of connectable guests	max. 60 (max. 30 / port)
Number of Channels	max. 255
Max. total cable length	40 m/port[1]
Max. sensor to sensor or sensor to host cable length	30 m

[1] For > 25 guests/port: Total length plus additional extension cables ≤ 10 m/port

11.2 Host interfaces

Attribute		IO-Link 5Pin	IO-Link 8Pin	CAN	CANopen	RS485
No. of IOs (push-pull switching mode)		1xQ 2xI/O	1xQ 5xI/O	1xQ 1xI/O	-	1xQ 1xI/O
Serial process data interface		IO-Link	IO-Link	IO-Link CANopen	-	IO-Link RS485
Parameterization interface		Membrane keyboard IO-Link USB	Membrane keyboard IO-Link USB	Membrane keyboard IO-Link USB CANopen	-	Membrane keyboard IO-Link USB
Data transmission rate		COM3 (230.4 kbit/s)		-	50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s, 1Mbit/s	9.6 kbit/s, 38.4 kbit/s, 11.52 kbit/s, 230.4 kbit/s, 460.8 kbit/s
Connection type (control) Pigtail length 0.5 m (except CANopen)	PIN	M12, 5-pin, male	M12, 8-pin, male	M12, 8-pin, male	M12, 5-pin, male Pigtail length 0.3 m	M12, 8-pin, male
	1	L+ (BN)	L+ (BN)	L+ (BN)	n.c. (BN)	L+ (BN)
	2	Q2 / IN1 (WH)	Q2 / IN1 (WH)	Q2 / IN1 (WH)	n.c. (WH)	Q2 / IN1 (WH)
	3	M (BU)	M (BU)	M (BU)	GND (BU)	M (BU)
	4	Q1 / C (BK)	Q1 / C (BK)	Q1 / C (BK)	CAN1_H (VT)	Q1 / C (BK)
	5	Q3 / IN2 (GY)	Q3 / IN2 (GY)	n.c. (GY)	CAN1_L (OG)	n.c. (GY)
	6	-	Q4 / IN3 (PK)	-	-	n.c. (PK)
	7	-	Q5 / IN4 (VT)	-	-	RS485_A (VT)
	8	-	Q6 / IN5 (OG)	-	-	RS485_B (OG)

Attribute		IO-Link 5Pin	IO-Link 8Pin	CAN	CANopen	RS485
Connection type (USB)	PIN	Pigtail length 0.3 m M8, 4-pin, female				
	1	+5 V USB Supply (BN)				
	2	USB Data - (WH)				
	3	USB Data + (BU)				
	5	USB GND (BK)				
Connection type (guests)		Port A and port B Pigtail length 1.5 m each Pigtail M8, 4-pin, female				
	!	**NOTICE** Do not connect a USB otherwise the USB port of the PC could be damaged.				

1   For > 25 guests/port: Total length plus additional extension cables ≤ 10 m/port

11.3   Host software features

Attribute	Value
Host software features	Sensor parameterization Zone definition Measurement functions, logic gates Interface parameterization Service data

11.4   System response time

Attribute	Value
Scan time T_{scan}	$$T_{FC\_Scan} = \sum_{i=1}^{N} T_{FC\_Guest_i}$$ $T_{FC\_GTB6} = 185\ \mu s$ $T_{FC\_GL6} = 185\ \mu s$ $T_{FC\_GSE6} = 210\ \mu s$
Minimum presence time	2x T_{scan}
Response time	3x T_{scan} +500 µs

11.5   Mechanics/electronics/host

Attribute	Value
Supply voltage V_S	24 V ±20%
Maximum current consumption (at maximum number of guests)	600 mA @ 24 V
Output current	max. 100 mA
Logic level	Active 15 V to 30 V Inactive 0 V to 5 V
Capacitive output load	max. 100 nF

Attribute	Value
Inductive output load	max. 1 H
Required overcurrent protection	Operation in short-circuit protected network max. 8 A
Dimensions in mm	118 x 35 x 25 (without cables)
Housing material	Plastic, ABS
Enclosure rating	IP65 / IP67
Electrical protection class	III
Circuit protection	Reverse polarity protected UV connections Output Q, short-circuit protected Interference pulse suppression
Storage temperature	-25° C to 70° C
Operating temperature	Guests -25° C to 55° C Host -25° C - 50° C
Vibration/shock resistance of host	Single shock: 30 g, 11 ms, 6 each axis DIN EN 60068-2-27 Continuous shock: 25 g, 6 ms, 1,000 each axis DIN EN 60068-2-27 Vibration: 10 grms 20 Hz to 2,000 Hz, 2 h each axis IEC 60068-2-64
Vibration/shock resistance of G6 guest	Single shock: 30 g, 11 ms, 6 each axis DIN EN 60068-2-27 Continuous shock: 25 g, 6 ms, 1,000 each axis DIN EN 60068-2-27 Vibration: 10 grms 20 Hz to 2,000 Hz, 2 h each axis IEC 60068-2-64
Vibration/shock resistance of SLG-2 guest	Shock: 10 g 16 ms DIN EN 60068-2-27 Vibration: 5 g 10 Hz to 55 Hz IEC 60068-2-64
Electromagnetic compatibility	61000-6-2 immunity / 61000-6-3 emission
MTBF	> 50,000 h
Weight of host	5-pin IO-Link: 154 g 8-pin O-Link, RS485: 161 g CANopen: 170 g
Weight of G6 guests	23 g (GTB, GL, GS, GE)
Initialization time	< 1 s
Synchronization of port A/port B	Cable

11.6 Technical data guests

11.6.1 General data GL6-C

Attribute	Value
Sensing range RW max. (with PL80A reflector)	0,03 … 7,2 m
Light spot diameter/distance	8 mm / 350 mm

Attribute	Value
Enclosure rating	IP67
Protection class	III
Circuit protection	A, B, D[1]
Ambient operating temperature	-25° C - 55°C

[1] A = U_V-connections reverse polarity protected
   B = inputs and output reverse-polarity protected
   C = Interference suppression
   D = outputs overcurrent and short-circuit protected

11.6.2 General data GSE6-C

Attribute	Value
Sensing range RW max. (with PL80A reflector)	0 ... 15 m
Light spot diameter/distance	375 mm / 12 m
Enclosure rating	IP67
Protection class	III
Circuit protection	A, B, D[1]
Ambient operating temperature	-25° C - 55°C

[1] A = U_V-connections reverse polarity protected
   B = inputs and output reverse-polarity protected
   C = Interference suppression
   D = outputs overcurrent and short-circuit protected

11.6.3 General data GTB6-C

Attribute	Value
Sensind range (with 90 % remission)	5 ... 250 mm
Light spot diameter/distance	6 mm / 100 mm
Enclosure rating	IP67
Protection class	III
Circuit protection	A, B, D[1]
Ambient operating temperature	-25° C - 55°C

[1] A = U_V-connections reverse polarity protected
   B = inputs and output reverse-polarity protected
   C = Interference suppression
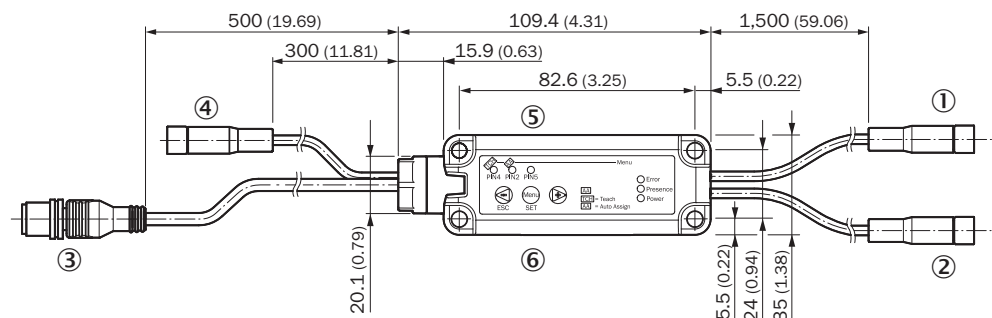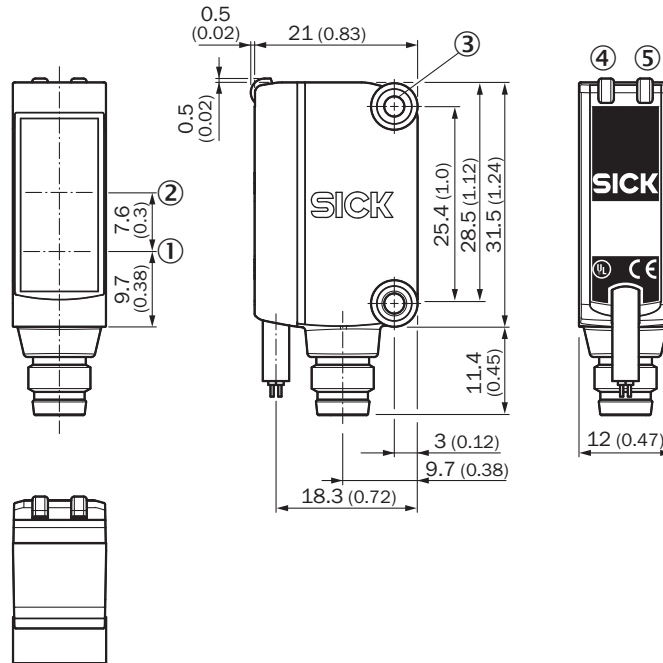   D = outputs overcurrent and short-circuit protected

11.7 Dimensional drawings

Figure 10: Dimensional drawing - FlexChain host

① Port-A, pigtail M8, 4-pin, female

②   Port B, pigtail M8, 4-pin, female

③   PLC, pigtail M12, 5-pin / 8-pin, male

④   USB, pigtail M8, 4-pin, female

⑤   Control panel

Figure 11: Dimensional drawing - FlexChain GL6-C

①   Center of optical axis, sender

②   Center of optical axis, receiver

③   M3 threaded mounting hole

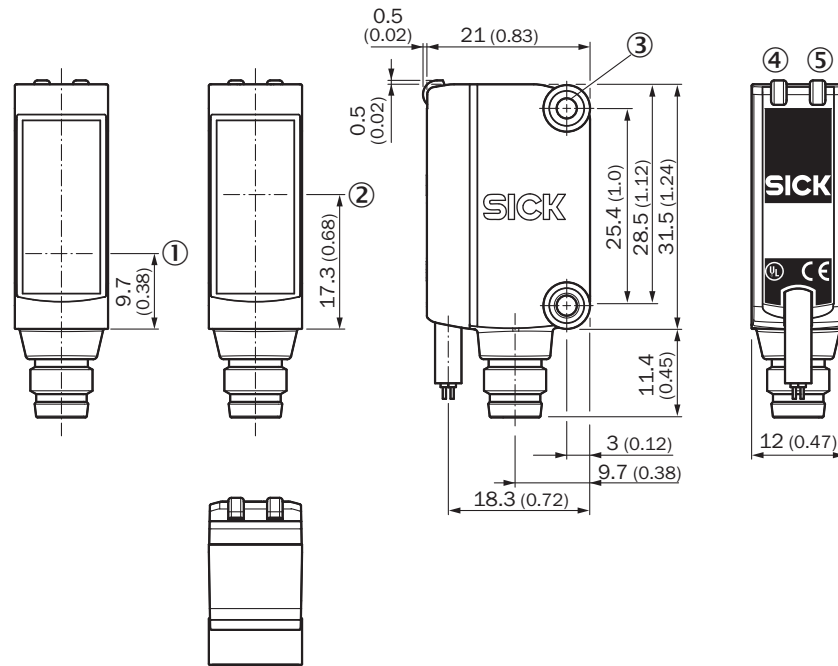④   LED indicator yellow

⑤   LED indicator green

Figure 12: Dimensional drawing - FlexChain GSE6-C

①   Center of optical axis, sender
②   Center of optical axis, sender
③   M3 threaded mounting hole
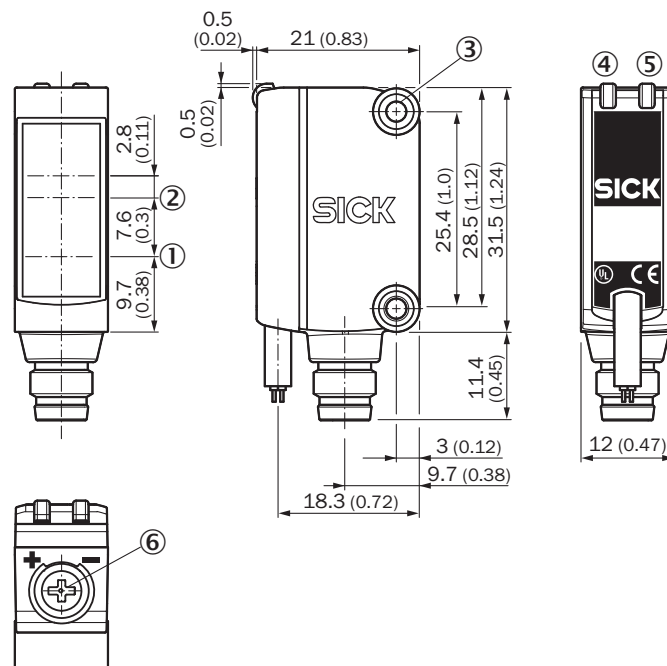④   LED indicator green
④   LED indicator yellow

Figure 13: Dimensional drawing - FlexChain GTBE6-C

①   Center of optical axis, sender
②   Center of optical axis, receiver
③   M3 threaded mounting hole
④   LED indicator green

⑤	LED indicator yellow
⑥	Potentiometer: adjusting the sensing range

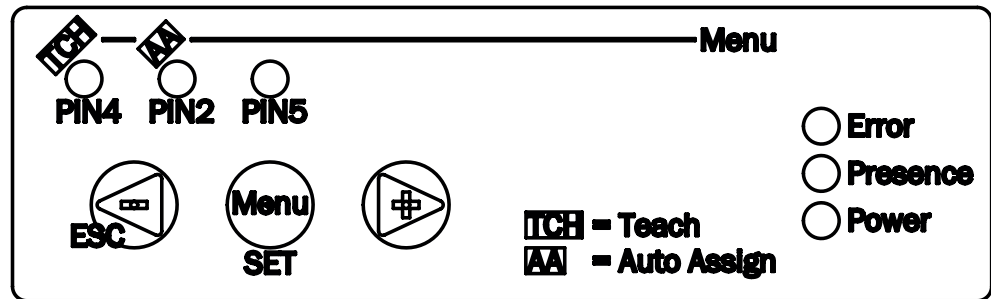## 11.8 FlexChain host membrane keyboards

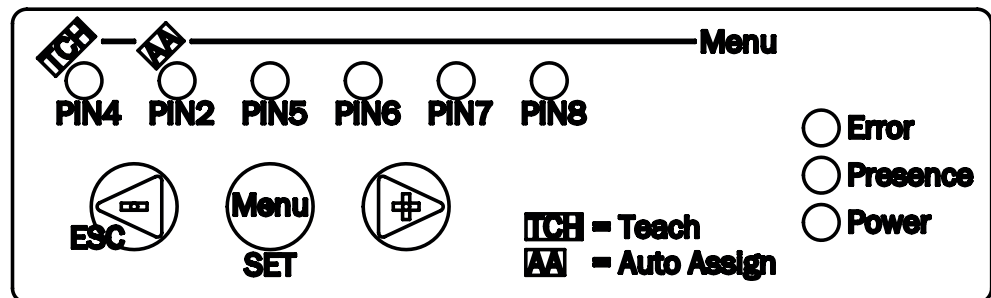*Figure 14: FlexChain host membrane keyboard - standard IO-Link*

Figure 15: FlexChain host membrane keyboard - advanced IO-Link

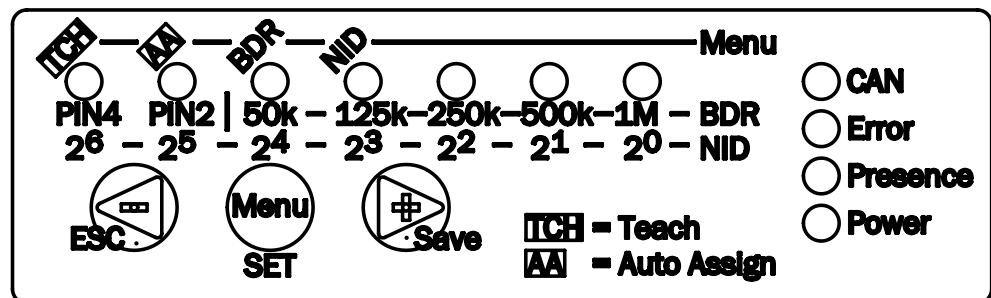*Figure 16: FlexChain host membrane keyboard - RS485 / CANopen*

12 Accessories

> **NOTE**
> Accessories can be found on the online product page at:
>
> ▶ **www.sick.com/FlexChain**

13   Annex

13.1   EU declaration of conformity and certificates

The EU declaration of conformity and other certificates can be downloaded from the Internet at:

▶   **www.sick.com/FlexChain**

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