OPERATING INSTRUCTIONS

# UFW

## Fork sensor

SICK
Sensor Intelligence.

### Described product

UFW

### Manufacturer

SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
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

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

The operating instructions are an integral part of the product and should remain accessible to the personnel at all times. When handing this product over to a third party, include these operating instructions.

These operating instructions do not provide information on the handling and safe operation of the machine or system in which the product is integrated. Information on this can be found in the operating instructions for the machine or system.

## 1.2 Scope

These operating instructions serve to incorporate the device into a customer system. Step-by-step instructions are given for all required actions.

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

Available device variants are listed on the online product page.

► http://www.sick.com/UFW

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

**Simplified device designation in the document**

In the following, the sensor is referred to in simplified form as “UFW” or “device”.

## 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 Further information

You can find the product page with further information via the SICK Product ID: pid.sick.com/{P/N}/{S/N}
(see "Product identification via the SICK product ID", page 9).

**The following information is available depending on the product:**

- This document in all available language versions
- Data sheets
- Other publications
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Software
- Accessories

## 1.5 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 UFW fork sensor is an ultrasonic sensor with a transmitter and a receiver that functions according to the through-beam principle.

It is used for contactless web guidance of sound-impermeable materials, such as foil and paper.

## 2.2 Improper use

- The device does not constitute a safety-relevant device according to the EC Machinery Directive (2006/42/EC).
- The device must not be used in explosion-hazardous areas.
- Any other use that is not described as intended use is prohibited.
- Any use of accessories not specifically approved by SICK AG is at your own risk.

The device is not suitable for the following applications (this list is not exhaustive):

- As a safety device to protect persons, their hands, or other body parts
- Underwater
- In explosion-hazardous areas
- Outdoors, without additional protection

**NOTICE**

**Danger due to improper use!**

Any improper use can result in dangerous situations.

Therefore, observe the following information:

► The device should be used only in line with intended use specifications.
► All information in these operating instructions must be strictly complied with.

## 2.3 Qualification of personnel

Any work on the product may only be carried out by personnel qualified and authorized to do so.

Qualified personnel are able to perform tasks assigned to them and can independently recognize and avoid any potential hazards. This requires, for example:

- technical training
- experience
- knowledge of the applicable regulations and standards

## 2.4 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.

## 2.5 Repair

The product is replaced if defective. 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 description

### 3.1.1 Product identification

#### 3.1.1.1 Product identification via the SICK product ID

**SICK product ID**

The SICK product ID uniquely identifies the product. It also serves as the address of the web page with information on the product.

The SICK product ID comprises the host name pid.sick.com, the part number (P/N), and the serial number (S/N), each separated by a forward slash.

For many products, the SICK product ID is displayed as text and QR code on the type label and/or on the packaging.


*Figure 1: SICK product ID*

### 3.1.2 Product characteristics

#### 3.1.2.1 Overview of the product

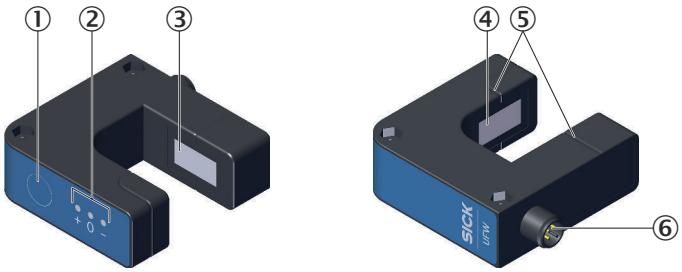



*Figure 2: Overview UFW*

① Tech-in button
② LEDs
③ Receiver
④ Sender
⑤ Material positioning marking
⑥ Connection

The position of the web material inside the fork is indicated by the three LEDs.

*Table 1: Teach-in button functions*

| Function | Teach-in button | Description |
|---|---|---|
| Two point adjustment | 3 s | Adjustment based on two reference points: Empty fork and fork transmitter completely covered by web-material. |
| One point adjustment | 6 s | Adjustment based on one reference point: 50% of the fork transmitter covered by the web material. |
| Analogue output | 13 s | Switch analogue output between current and voltage. |
| Key Lock | 3 s | While pressing the teach-in button turn the supply voltage on. |

| Function | Teach-in button | Description |
|---|---|---|
| Factory reset | 13 s | While pressing the teach-in button turn the supply voltage on. |

### 3.1.2.2 Status indicators


*Figure 3: Status indicators*

*Table 2: LEDs position indicators*

| Case | Description |
|---|---|
|  | Web material is running in the optimal middle position. |
|  | Web material is deviated and covering a higher portion of the sound path. |
|  | Web material is deviated and covering a lower portion of the sound path. |

*Table 3: LEDs behaviour (while LED 0 blinks)*

| LED | Analogue output | Conduct |
|---|---|---|
|  | 0-10 V | rising |
|  | 0-10 V | falling |
|  | 4-20 mA | rising |
|  | 4-20 mA | falling |

### 3.1.2.3 Product characteristics

The UFW has the following features and fields of application:

#### Features

Fork sensors operate according to the through-beam principle. Transmitter and receiver are combined in one housing by means of the fork design. Ultrasonic fork sensors for web edge detection are robust against dusty environments and can detect materials such as paper, plastic, and metal films independent of its transparency level.

#### Fields of application

Fork sensors for web edge guiding are used to continuously detect the material edge and maintain the correct position of the web, ensuring that the material stays into a desirable range.

Example industries: Printing industry, Packaging, Food industry.

# 4 Mounting

## 4.1 Scope of delivery

- Device in the version ordered
- Safety notes

## 4.2 Mounting requirements

- For the typical space requirements for the device, see the type-specific dimensional drawing, see "Technical data", page 28.
- 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.
- Shock and vibration resistant mounting.

## 4.3 Mounting the device

**Alignment**

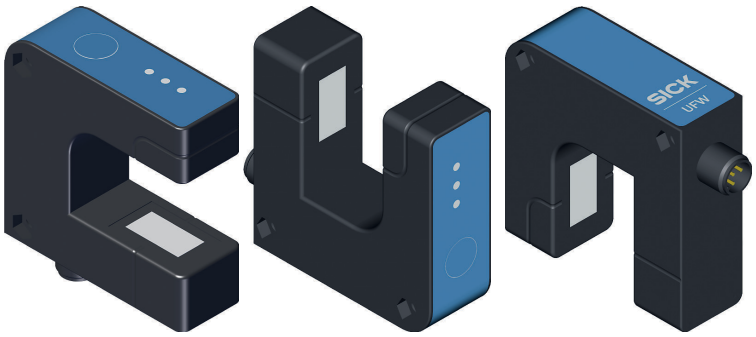
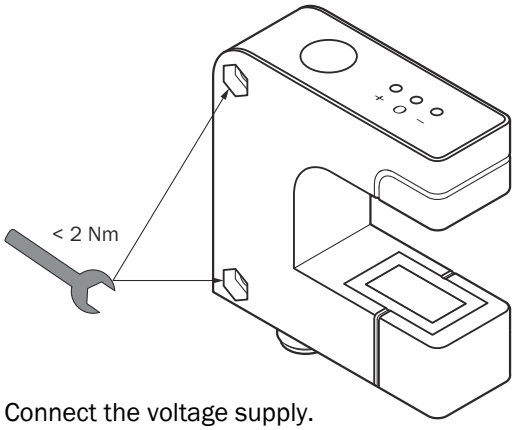


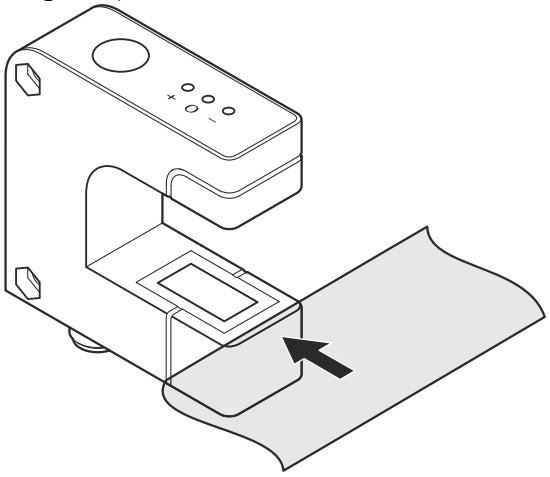

*Figure 4: Sensor alignment*

### Mounting

1. Mount the sensor on a flat surface via the fixing holes using 2x M4 screws.




2. Connect the voltage supply.
3. Guide tensioned material through the fork opening. For better results, keep the web material at an equal distance between the sender and receiver, within a range of +/-5 mm.



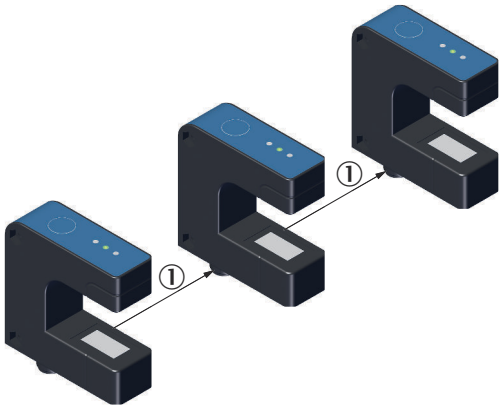



*Figure 5: Distance between sensors*

**NOTE**

If the distance between sensors (①) is less than

- 40 mm for UFW3 or
- 50 mm for UFW6,

use internal synchronization mode or multiplex operation mode to prevent interference. These modes are not supported under IO-Link.

### Synchronization mode in SIO-Mode

In synchronization mode, all sensors measure at exactly the same time. A maximum of 10 sensors can be synchronized using pin 5.

To synchronize the sensors:

1 Electrically connect the sensors (up to 10) via pin5.
2 Activate the synchronization mode by changing the value on Index 350 Subindex 1 to 1.
3 Synchronize the operation by setting Index 350 Subindex 2 to 0.

### Multiplex operation mode in SIO-Mode

Each sensor is given a unique multiplex address from 1 to 10. The sensors sequentially measure in ascending order of address. Each sensor only receives signals from its own transmission, ensuring there is no mutual interference.

To configure this mode:

1 Electrically connect the sensors (up to 10) via pin 5.
2 Assign a different address to each sensor on Index 350 Subindex 2.
3 Set the number of sensors that are connected on Index 350 Subindex 3.

# 5 Electrical installation

## 5.1 Notes on electrical installation

**NOTICE**
**Radio interference when used in residential areas**

The device complies with the Radio Safety Requirements (EMC) for the industrial sector (Radio Safety Class A). It may cause radio interference if used in a residential area.

**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 62368-1 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.

- **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 62368-1 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.

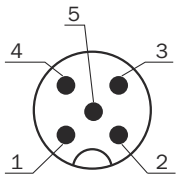
If these instructions are not complied with, the IP enclosure rating for the device is not guaranteed!

## 5.2 Pin assignment of the connections

### 5.2.1 Pin assignment

$U_B$: 20 ... 30 V DC III

*Table 4: Pin assignment*

| UFW | |
|---|---|
| 1 = BN | L+ |
| 2 = WH | Qa |
| 3 = BU | M |
| 4 = BK | Q/C |
| 5 = GY | MF |
| |  $I_N$ = 2 A |

### 5.2.2 Switching output

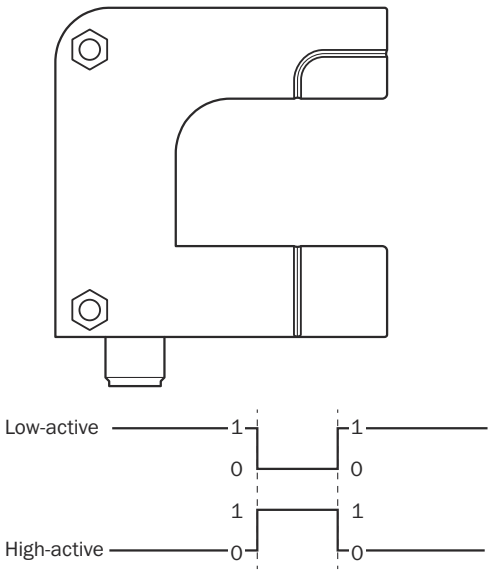



*Figure 6: Switching logic*

*Table 5: Factory settings Switching logic:*

| Switching output | High-active around the 50% mark |
|---|---|
| Analogue output | Rising voltage output (0 V at maximum coverage) |

## 5.3 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:

- Supply voltage DC 10.8 V – 26.4 V (SELV/PELV as per currently valid standards)
- Electricity source with at least 3 W power

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

## 5.4 Process data structure

**Process data structure data length 4 bytes**

*Table 6: Process data structure*

| Byte | Bit | Description | Data type | Value range |
|---|---|---|---|---|
| 1 | 0 | Switching signal channel (SSC) Status | Boolean | 0 = inactiv<br>1 = activ |
| 2 | 8-15 | MDC Scale | Int8 | 0 |
| 3-4 | 16-31 | MDC-Measured value | Int16 | 0-4.095 = Measured value<br>32.764 = no measured data<br>-32.760 = Outside the detection range (-)<br>32.760 = Outside the detection range (+) |

# 6 Operation

## 6.1 Sensor adjustment

The UFW supports two adjustment modes of the web edge

- Two point adjustment
  Adjustment based on two reference points: Fork transmitter free of any web material and fork transmitter completely covered by web-material. This adjustment shall always be preferred.
- One point adjustment
  Adjustment based on one reference point: 50% of the fork transmitter covered by the web material. This adjustment method shall only be used if it is absolutely impossible to clear the fork sensor of the web material. Great care shall be placed to match the 50% marking, and ensure that a proper empty adjustment has been performed beforehand.

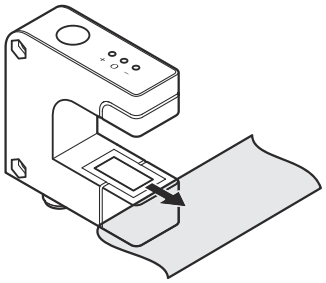
The adjustment process can be carried out via

- Adjustment via the button - Manual operation (One Point and Two Point Adjustment)
- Externally adjustment via the MF connection (One Point and Two Point Adjustment)
- SOPAS (One Point and Two Point Adjustment)

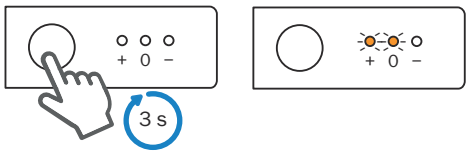
## 6.2 Adjustment via the button

### 6.2.1 Two Point Adjustment

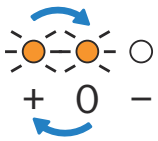
1. Ensure that the fork mouth is empty and without any obstruction.



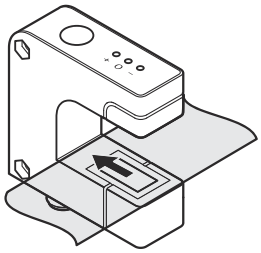
2. Press and hold the teach-in button for 3 s until the LEDs ”0” and “+” flash simultaneously.



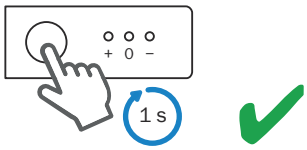

3. Wait until the LEDs “0” and “+” flash alternately.



4. Completely cover the fork mouth with web material.



5. Press and hold the teach-in button for 1 s.



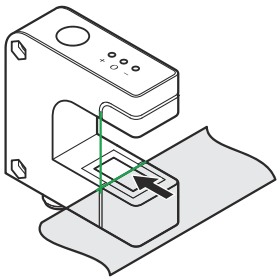

### 6.2.2 One Point Adjustment

**NOTE**

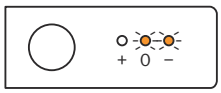
A One Point Adjustment shall be used only when it is completely impossible to free the fork sensor from the web material. It is always preferable to perform a two point adjustment.

A proper empty calibration must have been carried beforehand, and the web must be as exact as possible aligned with the 50% mark. The result of the one point adjustment is used to correct the parameters for the full and empty state of the fork sensor. If the web edge is not propertly aligned with the 50% mark, these parameters will deteriorate with each further adjustment.

1. Align the web edge with the 50% mark.



2. Press the button for 6 s, until the LEDs "0" and "-" flash simultaneously.

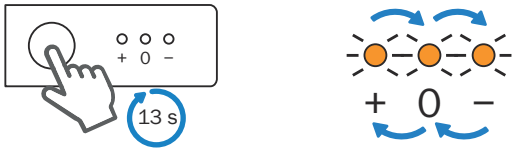



**NOTE**

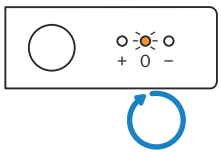
If as a result, the LEDs "0" and "-" flash fast and alternatively, the adjustment was not successful. A Two Point Adjustment must be performed.

### 6.2.3 Adjustment analog output

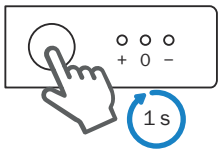
1. Press the button for 13 s until the LED "0" and the LEDs "+"/"-" flash alternately.



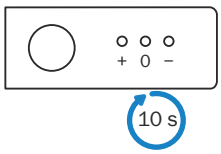

2. Wait until LED "0" flashes.




3. Press the teach-in button for 1 s until the desired analog output adjustment is reached according to the table 3.




4. Wait 10 s.

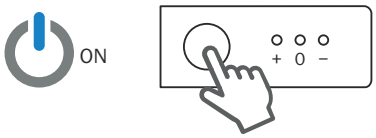



### 6.2.4 Key lock

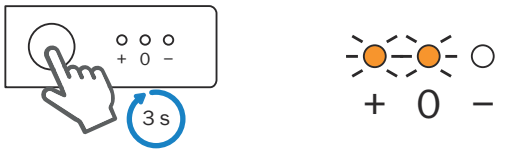
The key lock can be used to prevent unintentional changing of the settings.

1. Switch off the operating voltage.

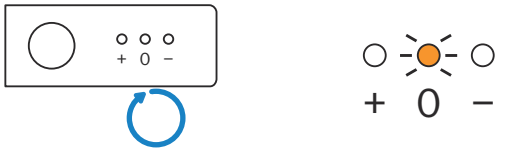

2. Switch on the operating voltage while pressing the teach-in button.



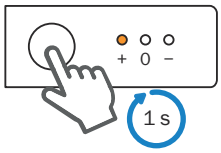

3. Keep the button pressed for 3 s until the LEDs "0" and "+" flash simultaneously.



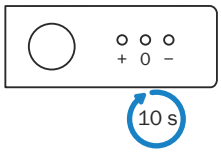

4. Wait until the LED "0" flashes and "-" is off.



5. Press the button for 1 s to activate/deactivate the key lock.
   LED "+" on: Sensor is unlocked
   LED "+" off: Sensor is locked




6. Wait for 10 s.




### 6.2.5 Reset to factory settings

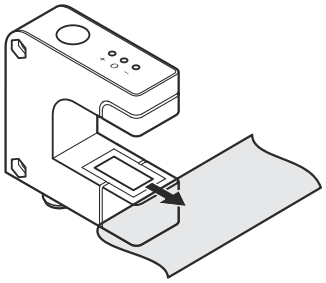
1. Switch off the operating voltage.
2. Switch on the operating voltage while pressing the teach-in button.
3. Keep the button pressed for 13 s until the LED "0" flashes quickly.
4. Release the teach-in button within the following 10 s.

## 6.3 External adjustment

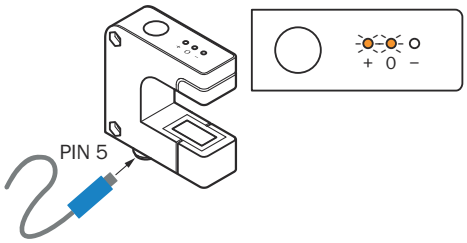
The MF connection can be used for an external adjustment.

### 6.3.1 Two Point Adjustment

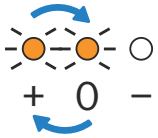
1. Ensure that the fork mouth is empty and without any obstruction.



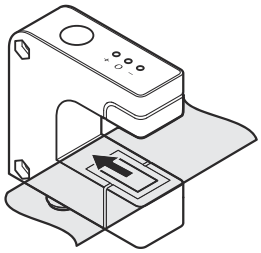
2. Apply L+ to pin5 for 3 s until the LEDs ”0” and “+” flash simultaneously.




3. Wait until the LEDs “0” and “+” flash alternately.



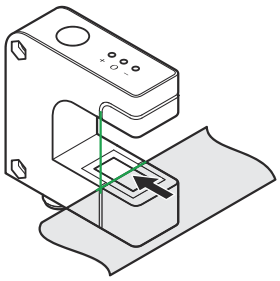
4. Completely cover the fork mouth with web material.



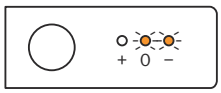
5. Apply L+ to pin 5 for 1 s.

### 6.3.2 One Point Adjustment

1. Align the web edge with the 50% mark.



2. Apply L+ to pin 5 for 6 s, until the LEDs "0" and "-" flash simultaneously.




**NOTE**

If as a result, the LEDs "0" and "-" flash fast and alternatively, the adjustment was not successful. A Two Point Adjustment must be performed.

### 6.3.3 Adjustment analog output

1. Apply L+ to pin 5 for 13 s until the LED "0" and the LEDs "+"/"-" flash alternately.
2. Wait until LED "0" flashes.
3. Apply L+ to pin 5 for 1 s to change the analog output. Repeat the step until the desired analog output adjustment is reached according to the table 3.
4. Wait 10 s.

### 6.3.4 Key lock

The key lock can be used to prevent unintentional changing of the settings.

1. Switch off the operating voltage.
2. Switch on the operating voltage while supplying pin 5 with M.
3. Keep pin 5 connected to M for 3 s until the LEDs "0" and "+" flash simultaneously.
4. Wait until the LED "0" flashes and "-" is off.
5. Supply pin 5 with M for 1 s to activate/deactivate the key lock.
   LED "+" on: Sensor is unlocked
   LED "+" off: Sensor is locked
6. Wait for 10 s.

### 6.3.5 Reset to factory settings

1. Switch off the operating voltage.
2. Switch on the operating voltage while supplying pin 5 with M.

3. Keep pin 5 connected to M for 13 s until the LED "0" flashes quickly.
4. Stop supplying pin 5 with M within the following 10 s, while operating voltage is on.

## 6.4 Faulty adjustment

A faulty adjustment is indicated by rapid alternatively flashing LED "0" and "-".

To correct the faulty adjustment, a new adjustment must be performed.

## 6.5 Further setting and diagnostic options via SOPAS

**NOTE**

The SOPAS ET software can be downloaded from the following link:
**https:// www.sick.com/de/en/sopas-engineering-tool-2018/p/p367244**

The driver for this product can be found at
**http://www.sick.com/UFW**.

### 6.5.1 Adjustment via SOPAS

The adjustment mode can be selected and run on the “Configuration > Basic settings” tab.

- Two Point Adjustment consists of two steps:
  An empty adjustment followed by a full adjustment (see figure 7, page 23).
- One Point Adjustment is only recommended if the sensor cannot be completely freed of web material (see figure 8, page 23).

In addition to the adjustment modes, the monitor also displays the filter type applied to the measured signal (none, averaging filter or median filter) , the Synchronization of multiple devices, temperature compensation and the activation state of the physical interfaces.
The averaging filter carries out a moving averaging of the measured values. It is suitable for smoothing a noisy signal diagram, which improves the repeatability of the measurement.
The median filter sorts the measured values according to their size and selects the middle value from a sequence. It is suitable for excluding individual outliers from the calculation of an average value. Adjusting filter settings typically demands experience and is usually unnecessary for standard applications.

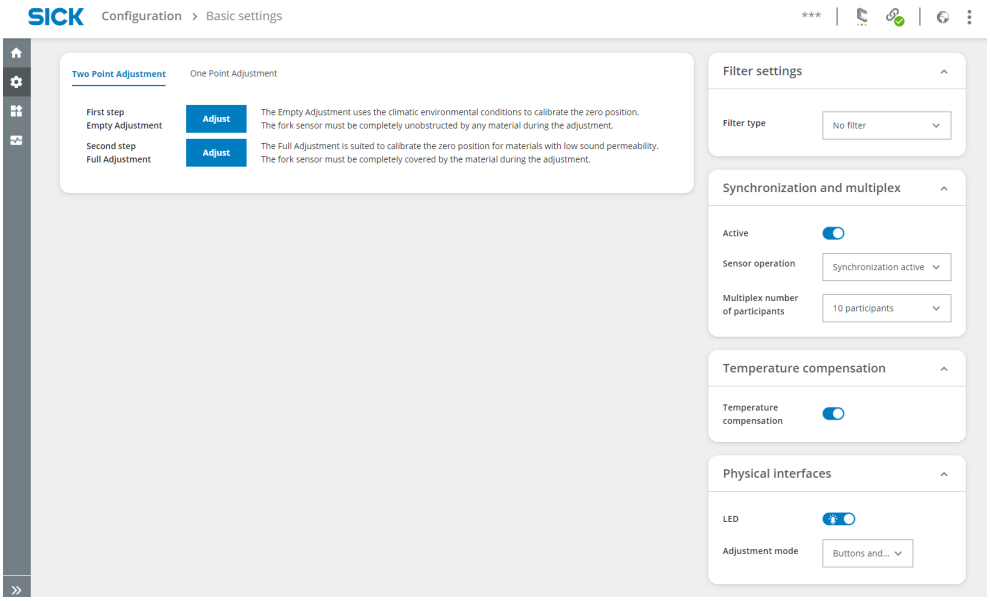



*Figure 7: Two Point Adjustment*

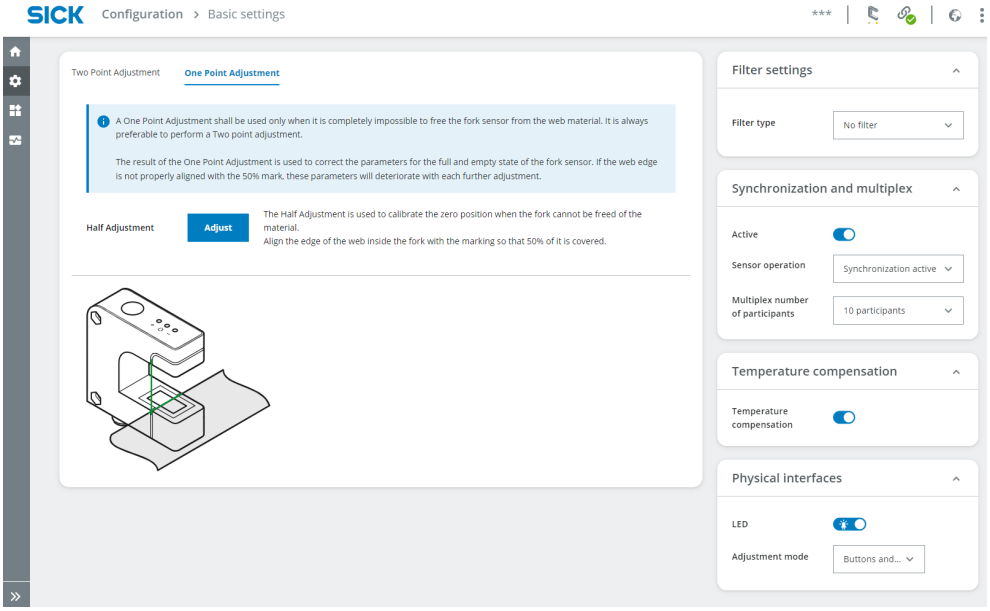



*Figure 8: One Point Adjustment (Half adjustment)*

### 6.5.2 Adjusting the analog output

The analog output can be adjusted on the “Application> Enhanced Sensing” Tab.

Window mode is suitable for applications of web edge dection. The output can be configured between current and voltage, with a falling or rising curve.

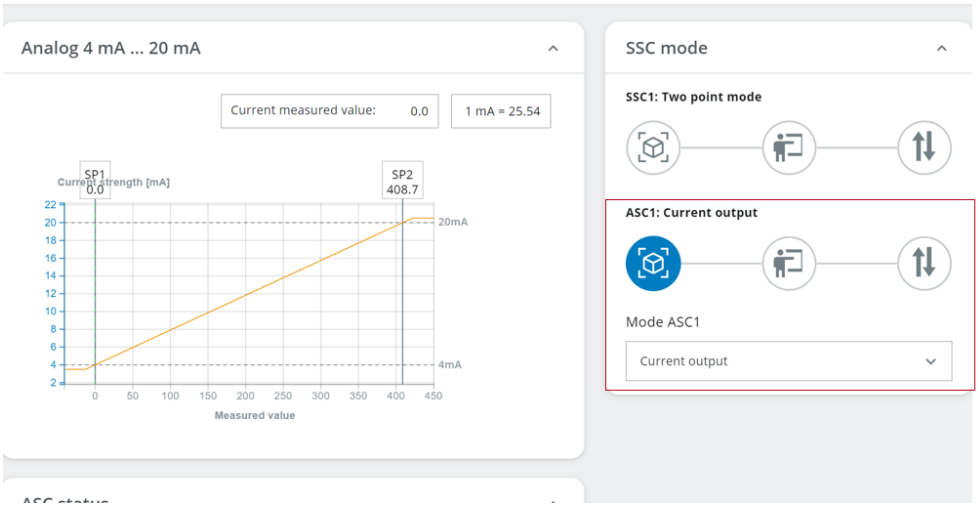



*Figure 9: Adjusting the analog output*

### 6.5.3 Adjusting the digital output

The digital output can be adjusted on the “Application> Enhanced Sensing” Tab.

Window mode is suitable for applications of web edge detection.

The output can be configured between

- high-active (the digital output is active when the measured value is located within the window)
- low-active (the digital output is active when the measured value is located outside the window).

Factory settings is high-active.

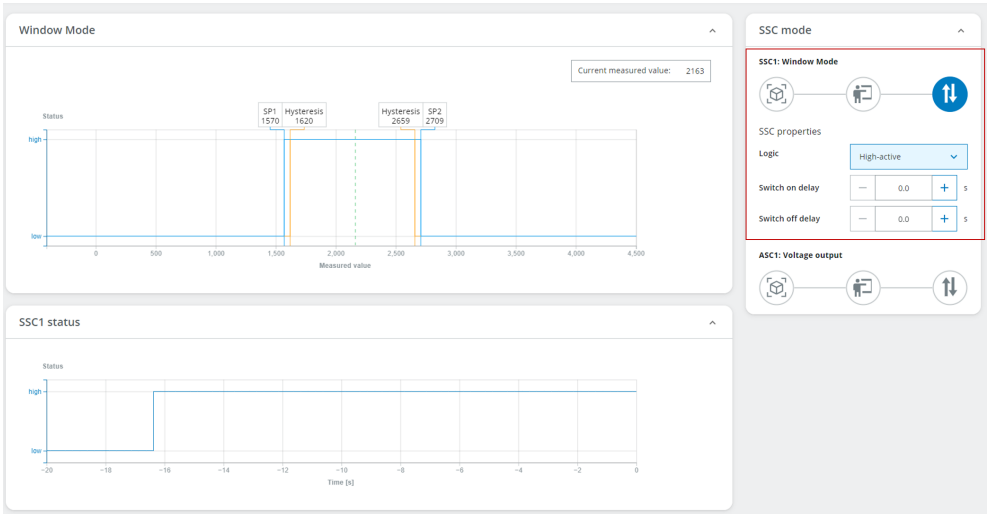



*Figure 10: Adjusting the digital output*

# 7 Troubleshooting

| LED/fault pattern | Cause | Measures |
|---|---|---|
| Sensor does not respond to commands, such as teach-in | Sensor is locked | Unlock the sensor, following the instructions see "Key lock", page 19 |
| Fast alternatively flashing from LED "0" and "-" | Faulty adjustment | Repeat the two point adjustment |
| One point adjustment is failing | The edge of the web material is not perfectly aligned with the 50% mark. | An adjustement of the empty fork sensor must be performed. Then, align the material exactly to the 50% mark and repeat the 1-point adjustment.<br>A two point adjustment is strongly recommended. |

# 8 Maintenance

## 8.1 Maintenance

During operation, the device is maintenance-free.

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

*Table 7: Maintenance schedule*

| Maintenance work | Interval | Procedure |
|---|---|---|
| Check device and connecting cables for damage at regular intervals. | Cleaning interval depends on the ambient conditions | Specialist |
| Check screw connections and plug connectors | Depends on the place of use, ambient conditions or operating requirements. Recommended: At least every 6 months. | Specialist |

## 8.2 Cleaning the device

Check the device for contamination at regular intervals (e.g., weekly). This is especially important in harsh operating environments (dust, abrasion, moisture, etc.).

**NOTICE**
**Device damage due to improper cleaning!**

Improper cleaning may result in device damage.

- Only use suitable cleaning agents.
- Never use sharp objects for cleaning.

### Cleaning the housing

In order to ensure that the heat produced by the internal power loss is adequately dissipated, the housing surface must be kept clean.

# 9 Decommissioning

## 9.1 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 off in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations.

**NOTE**

**Disposal of batteries, electric and electronic devices**

- According to international directives, batteries, accumulators and electrical or electronic devices must not be disposed of in general waste.
- The owner is obliged by law to return this devices at the end of their life to the respective public collection points.
-  This symbol on the product, its package or in this document, indicates that a product is subject to these regulations.

## 9.2 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

# 10 Technical data

## 10.1 Technical specifications

The “Technical specifications” section contains only an extract of the technical specifications of the sensor.

The complete technical specifications can be found on the homepage www.sick.com under the part number of the sensor.

*Table 8: Technical specifications*

| Attribute | UFW3 | UFW6 |
|---|---|---|
| Functional principle | Ultrasonic detection principle | |
| Dimensions (W x H x D) | 23,5 mm x 67 mm x 67,5 mm | 23,5 mm x 97 mm x 97,5 mm |
| Housing design | Fork shaped | |
| Fork width | 30 mm | 60 mm |
| Fork depth | 43 mm | 73 mm |
| Detection area | 12 mm | 40 mm |
| Repeatability | ± 0.1 mm | ± 0.1 mm |
| Resolution | 0.01 mm | 0.01 mm |
| Adjustment | Teach-in button, cable<br>(One point adjustment; Two point adjustment; analog output: current/voltage, rising/falling) | |
| Teach-in mode | One point adjustment, Two point adjustment | |

### Communication interface

*Table 9: Technical specifications Communication interface*

| Attribut | Value |
|---|---|
| **IO-Link** | ✓ |
| Data transmission rate | COM3[1)] |
| **Analog output** | $Q_A$ |
| Number | 1 |
| Type | Current output/voltage output |
| Current | 4 mA ... 20 mA [2)] |
| Voltage | 0 V ... 10 V |

1) 230,4 kBaud
2) 3.5 mA / 20.5 mA outside the detection area

**NOTICE**

The UFW is an IO-Link device compliant with the IO-Link Interface and System Specification, V1.1.3 (June 2019), and the IO Device Description, V1.1.3 (January 2021). With the following exception:

- The standard command “Locate Device” is not terminated by “Restore factory setting.”

For more details, please refer to the Manufacturer’s Declaration of Conformity at: http://www.sick.com/UFW

## Mechanical/electrical

*Table 10: Technical specifications mechanical/electrical*

| Attribut | UFW3 | UFW6 |
|---|---|---|
| Supply voltage $U_B$ | 20 V DC ... 30 V DC[1] | |
| Ripple | < 10%[2] | |
| Current consumption | 60 mA[3] | |
| Ultrasonic frequency | 170 kHz | 310 kHz |
| Response time | 5.1 ms | 6 ms |
| Repeatability | ±0.1 mm | |
| Resolution | 0.01 mm | |
| Switching output | Push/Pull: PNP/NPN | |
| Switching output (voltage) | Push/Pull: PNP/NPN High = UV - ≤3 V / Low: ≤3 V | |
| Output current Imax. | $I_{max}$ 100 mA | |
| Initialization time | ≤300 ms | |
| Connection type | Male connector M12, 5-pin | |
| Protection class | III[4] | |
| Circuit protection | UV connections, reverse polarity protected<br>Output Q short-circuit protected<br>Interference pulse suppression | |
| Enclosure rating | IP65 (UFW3-43B717IZZ )<br>IP67 (UFW3-43B717ZZZ ) | IP65 (UFW6-73B717IZZ )<br>IP67 (UFW6-73B717ZZZ ) |
| Weight | approx. 190 g | approx. 280 g |
| Housing material | Zinc diecast, PBT | |
| Indication | LED green: material edge aligned with the material positioning marking<br>LED yellow: material edge not aligned with the material positioning marking or outside detection area | |

1) reverse polarity protected
2) May not exceed or fall below $U_B$ tolerances
3) without load
4) Reference voltage DC 50 V

## Ambient data

*Table 11: Technical specifications Ambient data*

| Attribut | Wert |
|---|---|
| Ambient operating temperature | +5 °C ... +60 °C |
| Ambient temperature, storage | –40 °C ... +85 °C |
| Shock load | Nach EN 60068-2-27 |
| EMC | EN 60947-5-2[1] |
| UL File No. | NRKH.E191603<br>NRKH7.E191603 |

1) The sensor complies with the Radio Safety Requirements (EMC) for the industrial sector (Radio Safety Class A)

## 10.2 Dimensional drawings

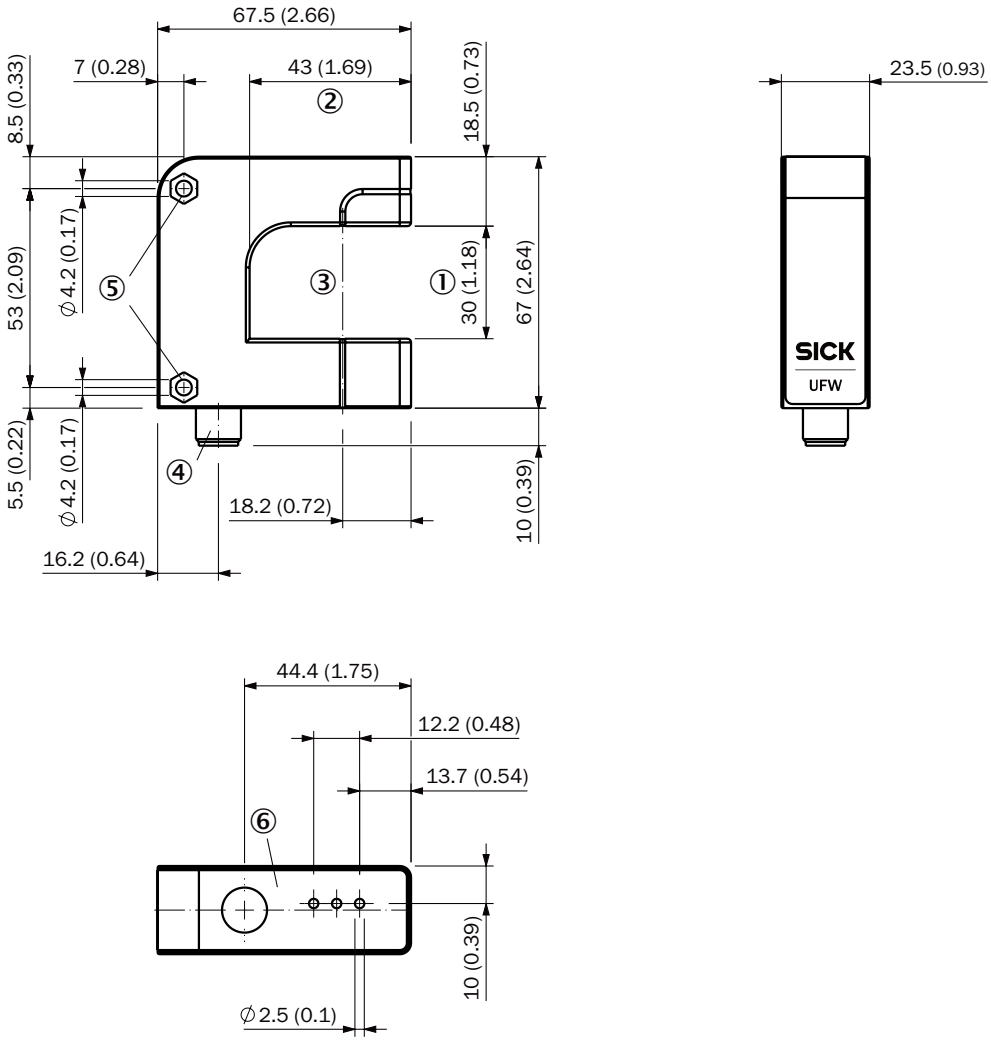



*Figure 11: Dimensioned drawing for UFW3-43x7x7xxx*

① Fork width
② Fork depth
③ Detection axis
④ Plug, M12, 5-pin
⑤ Fixing hole
⑥ Display and setting elements

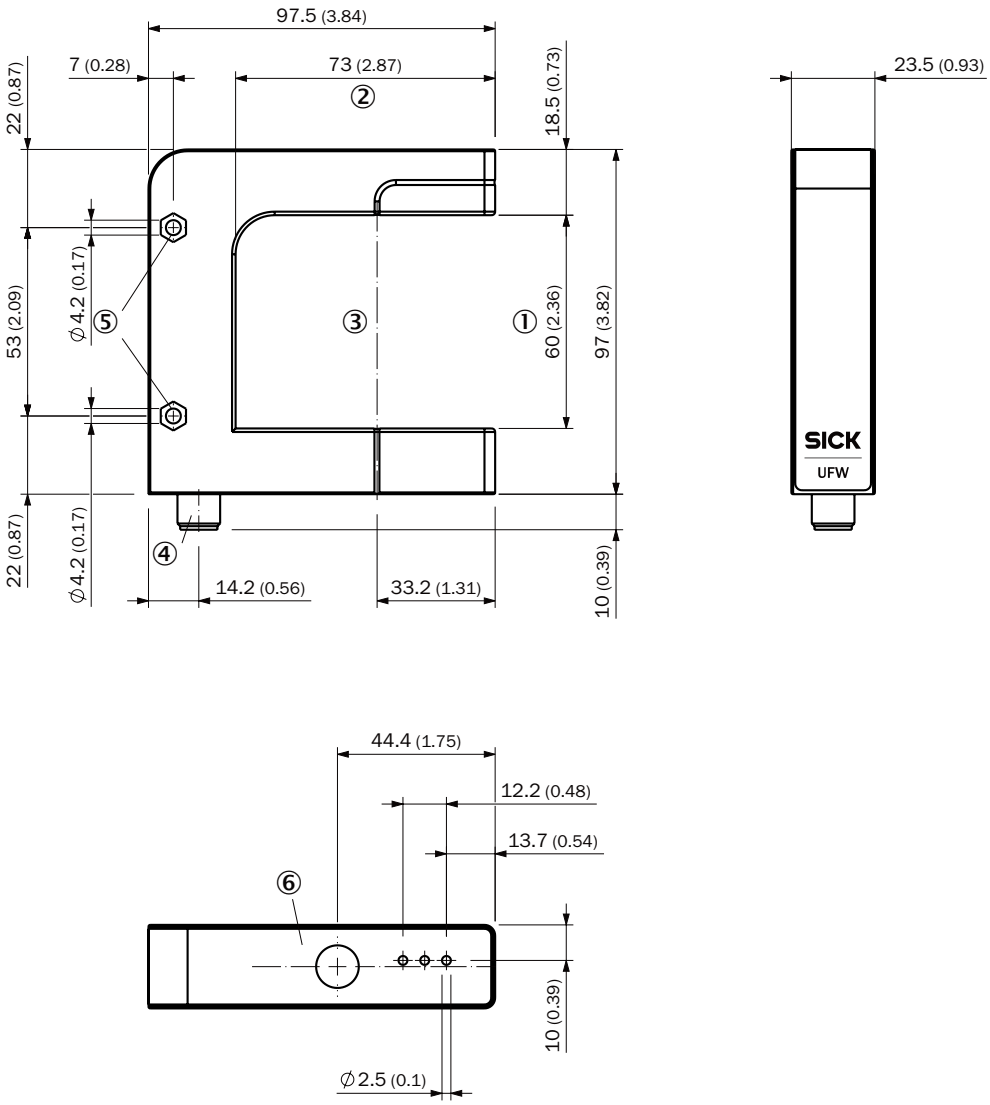



*Figure 12: Dimensioned drawing for UFW6-73x7x7xxx*

① Fork width
② Fork depth
③ Detection axis
④ Plug, M12, 5-pin
⑤ Fixing hole
⑥ Display and setting elements

# 11 Accessories

**NOTE**

Accessories can be found on the online product page at:

► http://www.sick.com/UFW

# 12 Annex

## 12.1 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).

## 12.2 Certification according to UL60947-5-2

The UFW is certified in accordance with UL60947-5-2 if it is supplied with power by LPS or Class 2 power supply units.

The certification is only valid with corresponding device identification on the type label of the respective device.

## 12.3 Licenses

SICK uses open-source software. This software is licensed by the rights holders using the following licenses among others: the free licenses GNU General Public License (GPL Version2, GPL Version3) and GNU Lesser General Public License (LGPL), the MIT license, zLib license, and the licenses derived from the BSD license.

This program is provided for general use, but WITHOUT ANY WARRANTY OF ANY KIND. This warranty disclaimer also extends to the implicit assurance of marketability or suitability of the program for a particular purpose.

More details can be found in the GNU General Public License. For complete license texts, see www.sick.com/licensetexts. Printed copies of the license texts are also available on request.

# 13 Glossary

| | |
|---|---|
| **Detection range** | The detection range describes the maximum physical range in which the sensor can determine a position. The detection range is max. +30 mm and - 30 mm around the physical zero position. |
| **IO-Link** | IO-Link is a non-proprietary internationally standardized communication technology, which makes it possible to communicate with sensors and actuators in industrial environments (IEC 61131-9). IO-Link devices communicate with higher-level control systems via an IO-Link master. The IO-Link devices are connected to these via a point-to-point connection.<br><br>IO-Link enables communication between controllers, sensors and actuators and allows the parameterization and reading-out of devices to be centrally managed. |
| **Out-of-Range display** | The **Out-of-Range** display is used to display the analog position output when the magnet has left the measuring range. If 11 V is output, the magnet has left the measuring range in the positive direction (on the side of the sensor fixing screw). If 10.5 V is output, the magnet has left the measuring range in the negative direction (on the cable side of the sensor). |
| **Repeatability** | Repeatability is defined as any move to a preset position from the same direction in every case.<br><br>MPS-G with analog output: The repeatability depends on the drive on which the sensor is mounted and is typically 0.05 mm.<br><br>MPS-G with 2/3 digital switching points and IO-Link (up to 16 switching points): The repeatability is typically 0.05 mm and depends on the drive on which the sensor is mounted. |
| **Resolution** | The sensor resolution describes the minimum, specifiable magnet route change as output by the sensor. |
| **Response time** | The response time specifies the maximum amount of time that elapses from when an event triggers the sensor to when a signal is present at the output. |
| **SOPAS ET** | **SICK Engineering Tool for configuring IO-Link devices**<br><br>Software with a graphical user interface and convenient visualization for configuring and parameterizing IO-Link devices.<br><br>Corresponding visualization files (SDD = **SOPAS Device Description**) are available for all devices so that you can operate the IO-Link devices using SOPAS ET.<br><br>You can download SOPAS ET and the device-specific SDDs directly and free of charge from the SICK homepage: www.sick.com. |

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