OPERATING INSTRUCTIONS

T-EASIC® FTS

Flow sensor

SICK
Sensor Intelligence.

en

Product described

T-Easic® FTS

Manufacturer

SICK AG
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Germany

Legal notes

Original document

This document is an original document published by SICK AG.

Contents

1 About this document

1.1 Information on the operating instructions

These operating instructions provide important information on how to use sensors 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 sensor 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 must be kept 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 any system in which the sensor may be integrated. For information about this, refer to the operating instructions of the particular system.

1.2 Scope

These operating instructions explain how to incorporate a sensor into a customer system. Instructions are given in stages for all actions required.

These instructions apply to all available device versions of the sensor. For more detailed information on identifying your device type, see “3.1.2 Type code”.

Available device versions are listed on the online product page:

▶ **www.sick.com/T-Easic_FTS**

A number of device versions are used as examples for commissioning, based on the default parameter settings for the relevant device.

In this document, the T-Easic® FTS (Flow Thermal Switch) is referred to in simplified form as T-Easic® or FTS, except in cases where it is necessary to make a distinction between device versions due to different technical features or functions. In such cases, the complete type designation is used.

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.

HAZARD

... 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.

IMPORTANT

... 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

NOTE

All the documentation available for the sensor can be found on the online product page at:

www.sick.com

The following information is available for download from this page:

- Model-specific online data sheets for device versions, containing technical data, dimensional drawings, and diagrams
- EU declaration of conformity for the product family
- Dimensional drawings and 3D CAD dimension models in various electronic formats
- These operating instructions, available in English and German, and in other languages if necessary
- Other publications related to the sensors described here (e.g., IO-Link)
- Publications dealing with accessories

1.5 Customer service

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

NOTE

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

2 Safety information

2.1 Intended use

The T-Easic® is a flow sensor for liquids (defined in “11 Technical data”) that operates on the basis of the calorimetric measurement principle. It converts the flow rate and temperature of the medium into an electrical signal.

The information of the flow rate and the medium temperature of the liquid are shown on the OLED display (industrial version only). The flow and temperature information is available over IO-Link, too. Two switching outputs can be set for both flow and temperature control.

The sensor fulfills the requirements of EN 61326-2-3 for industrial environments.

2.2 Improper use

This sensor does not constitute a safety component according to the EC Machinery Directive (2006/42/EC).

The sensor must not be used in explosion-hazardous areas.

It is not permitted to open the T-Easic® housing.

Any use outside of the stated areas, in particular use outside of the technical specifications and the requirements for intended use, will be deemed to be improper use.

If the equipment is used in a manner not specified by this document, the protection provided by the equipment may be impaired.

If the sensor is to be used under other conditions or in different environments, the manufacturer’s service department may issue an operating license in consultation with the customer and in exceptional cases.

2.3 Limitation of liability

Applicable standards and regulations, the latest technological developments 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:

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

With special versions, 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.

2.4 Modifications and conversions

IMPORTANT

Modifications and conversions to the sensor and/or the installation may result in unforeseeable dangers.

Interfering with or modifying the sensor or SICK software will invalidate any warranty claims against SICK AG. This applies in particular to opening the housing, even as part of mounting and electrical installation work.

Before making technical modifications to or expanding the sensor, the prior written approval of the manufacturer must be obtained.

Never install or connect accessories if their quantity and composition are not clearly specified, or if they have not been approved by SICK AG.

2.5 Requirements for skilled persons and operating personnel

WARNING

Risk of injury due to insufficient training.

Improper handling of the sensor 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 device control and operation in the specific application concerned (e.g., conveying line)
Commissioning, configuration	• Basic knowledge of the control system used • Basic knowledge of the design and setup of the described connections and interfaces • Basic knowledge of data transmission
Operation of the device for the specific application	• Knowledge of device control and operation in the specific application concerned (e.g., CIP/SIP system) • Knowledge of the software and hardware environment for the specific application concerned (e.g., CIP/SIP system)

2.6 Operational safety and specific hazards

▶ 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.

2.7 Use at high operating temperatures

When the process temperature is above 50 °C, the sensor housing may get hot.

CAUTION

Risk of burning on sensor housing

- Only touch the hot housing if you are wearing safety gloves.
- Avoid contact of the sensor with flammable substances.

2.8 General safety notes

- Read the operating instructions prior to commissioning.
- These operating instructions are valid for devices from firmware version 1.20.
- The T-Easic® is not a safety component under the EU Machinery Directive.
- Observe national safety and work safety regulations.
- Wiring work and the opening and closing of electrical connections may only be carried out when the power is switched off.
- The sensor must be not power supplied if not installed in the pipe system as described in “5 Mounting”.
- The radiated power is far lower than that from telecommunication equipment. According to current scientific research, the operation of this device can be classified as safe and non-hazardous.
- The sensor has been designed according to the Pressure Equipment Directive Article 3 Paragraph 3 according to good engineering practice.

3 Product description

3.1 Product identification

3.1.1 Information on the housing

Information for identification of the sensor (serial number, part number and type code) and its electrical connection are printed on the label attached on the housing of the sensor.

3.1.2 Type code

T-Easic® FTS	-	I	100	F	1	4	A
1		2	3	4	5	6	7

Position	Description
1	**Product group** T-Easic® FTS (flow sensors)
2	**Version** I: Industrial H: Hygienic
3	**Probe length** 060: 60 mm 100: 100 mm 200: 200 mm
4	**Media** F: Liquids
5	**Display** 0: No 1: Yes (OLED + 3 status LED)
6	**Electrical connection** 4: M12, 4-pin
7	**Electrical output** A: 1 digital output + 1 digital input / output

NOTE

Not all versions of the type code can be combined!

3.2 Product characteristics

3.2.1 Device view

The T-Easic® is available in two versions:

- Industrial version with display operating buttons and VISTAL® housing
- Hygienic version in full stainless steel 1.4404 (316L) housing.

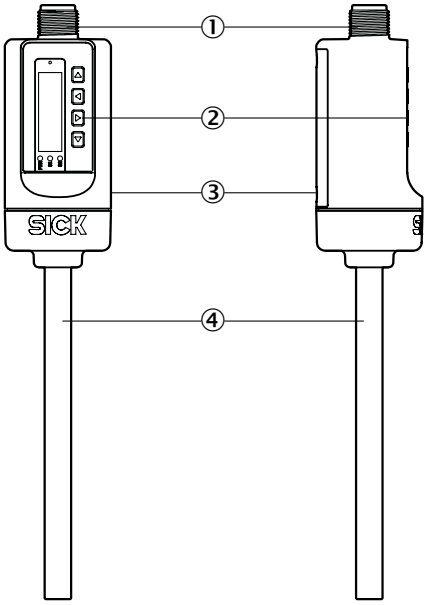


Fig. 1: T-Easic® overview Industrial version

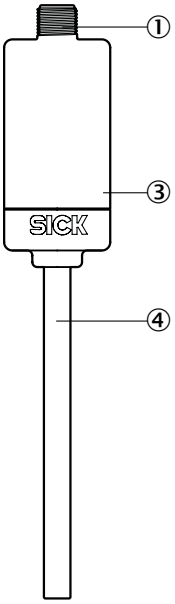


Fig. 2: T-Easic® overview Hygienic version

① M12 electrical connection

② Display with operating buttons and LEDs

③ Housing

④ Measuring probe

3.2.2 Operating buttons (Industrial version only)

The sensor is operated using the display and the operating buttons (Industrial version only).

For a detailed description of the buttons and their functions, see “7.2.1 Display, LEDs and operating buttons (Industrial version only)”.

NOTE

Both versions of the T-Easic® can be programmed with the SICK SOPAS-ET via the IO-Link 1.1 communication interface.

For IO-Link see “7.2.4 IO-Link”.

3.3 Product features and functions

3.3.1 Principle of operation

The T-Easic® FTS (**F**low **T**hermal **S**witch) monitors the flow velocity of liquids (i.e. water, aqueous media, oil, etc.).

The measurement method is based on the calorimetric principle. The sensor measures the cooling effect of the flowing liquid on the heated measuring probe. The higher the flow velocity of the liquid, the higher the cooling effect of the heated probe.

The sensor has two configurable switching outputs (Q1 and Q2) for flow or temperature. Q2 can be selected as digital input.

The switching output Q1 also features an IO-Link interface; see “7.2.4 IO-Link”.

3.3.2 Fields of application

The T-Easic® is especially suitable for measuring tasks regarding cooling water circuits, pumps, heat exchangers, leak monitoring for process lines, dry-run protection for pumps, as well as monitoring of oil in hydraulic system and wind mill lubrication and hydraulic circuits.

4 Transport and storage

4.1 Transport

For your own safety, read and observe the following notes:

IMPORTANT

Damage to the sensor due to improper transport.

- The device must be packaged for transport with protection against shock and damp.
- Recommendation: Use the original packaging as it provides the best protection.
- Transport should be performed by specialist staff only.
- The utmost care and attention is required at all times during unloading and transportation on company premises.
- Note the symbols on the packaging.
- Do not remove packaging until immediately before starting installation work.

4.2 Transport inspection

Immediately upon receipt in goods-in, check the delivery for completeness and for any damage that may have occurred in transit. In the case of transit damage that is visible externally, proceed as follows:

- Do not accept the delivery or only do so conditionally.
- Note the scope of damage on the transport documents or on the transport company's delivery note.
- File a complaint.

Note:

Complaints regarding defects should be filed as soon as these are detected. Damage claims are only valid before the applicable complaint deadlines.

4.3 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- Do not store in an airtight container: this is so that any residual moisture present can escape.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see “11 Technical data”.
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

5.1 Installation conditions

When installing the sensor the system must be not pressurised and the pipe where the sensor has to be installed must be empty.

The inserted probe must be always completely surrounded by the medium. A minimum insertion depth of ≥ 12 mm should be observed.

The cutting ring of the process connection adapter must be ≥ 25 mm away from the probe tip to avoid damage to the sensing element.

The sensor probe should be positioned in the centre of the pipe and it must not be in contact with the pipe wall.

A minimum distance of ≥ 10 mm from the tip to the pipe wall must be observed.

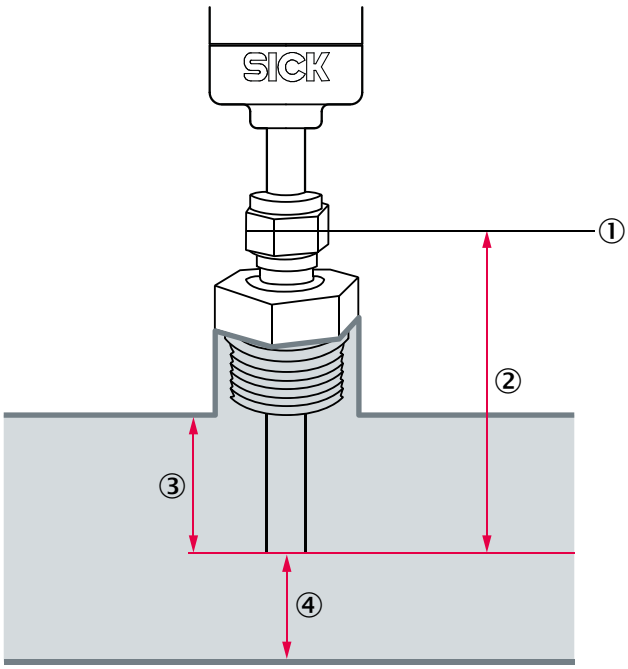


Fig. 3: Minimum installations lengths

① Cutting ring center line

② ≥ 25 mm

③ ≥ 12 mm

④ ≥ 10 mm

The sensor should be installed at least 5 ... 10xDN in front of and 3 ... 5xDN behind valves, T-pieces, curves or cross-sectional alterations.

Installation in the standpipe is recommended for vertically installed pipes. The sensor must not be mounted before or in a downpipe or in an open downpipe.

Horizontal mounting from the bottom is only possible if the pipe is free from build-up.

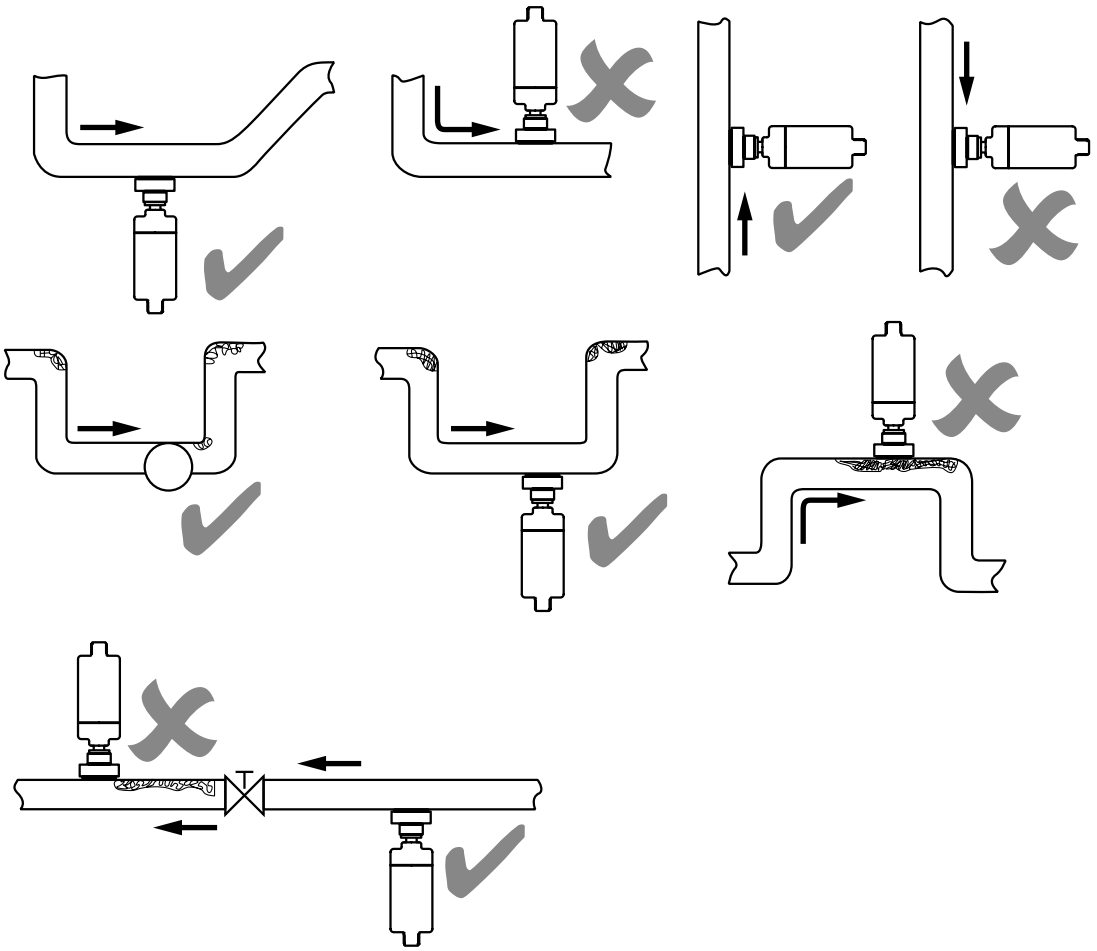


Fig. 4: Installation orientation

5.2 Probe alignment to the flow direction

For optimal accuracy performance make sure that the M12 coding key in the connector is 90° angled with the flow direction.

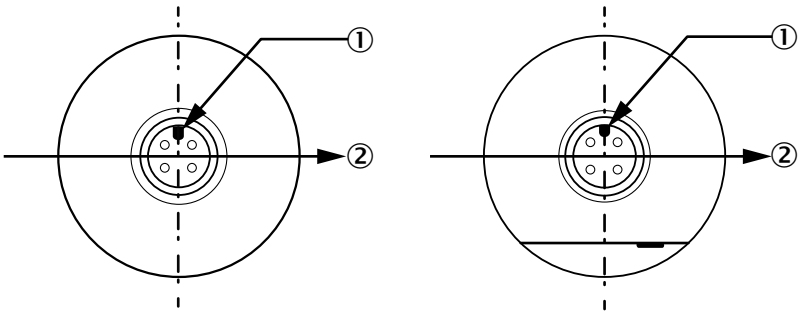


Fig. 5: Orientation of the T-Easic® aligned with flow direction in Hygienic (left) and Industrial (right) version

① M12 coding key

② Flow direction

5.3 Mounting the sensor

1. Stop the flow.
2. Depressurize the system.
3. Empty the pipe where the sensor has to be installed.
4. Install the process connection adapter on the sensor (see “5.4 Mounting the process connection adapter”).
5. Seal the process connection to the pipe.
6. At the mounting point, screw the flow switch in hand-tight.
7. Tighten with a flat spanner.

IMPORTANT

Leaking

- For sealing the process connection to the pipe the operating pressure must be considered while choosing the correct sealing method.

5.4 Mounting the process connection adapter

It is strictly recommended to use only original adapters from SICK. The adapters are not included and have to be ordered separately.

See “14 Accessories” for more detailed information about the process connection adapters.

1. Insert the probe of the sensor into the pipe fitting.
2. Hand-tighten the union nut until the probe no longer turns by hand or can no longer be moved axially in the fitting.
3. Mark the union nut at the 6 o'clock position.
4. Hold the fitting body with a wrench and tighten the union nut to the 9 o'clock position with 1 1/4 turns.

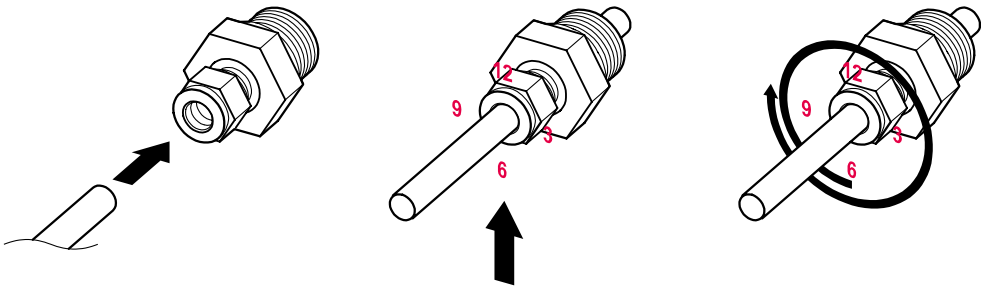


Fig. 6: Mounting the process connector adapter on the sensor probe

For a hygienic solution the adapter must be installed in the same way on the sensor probe as described above and then assembled to the hygienic clamp adapter p/n 2093548.

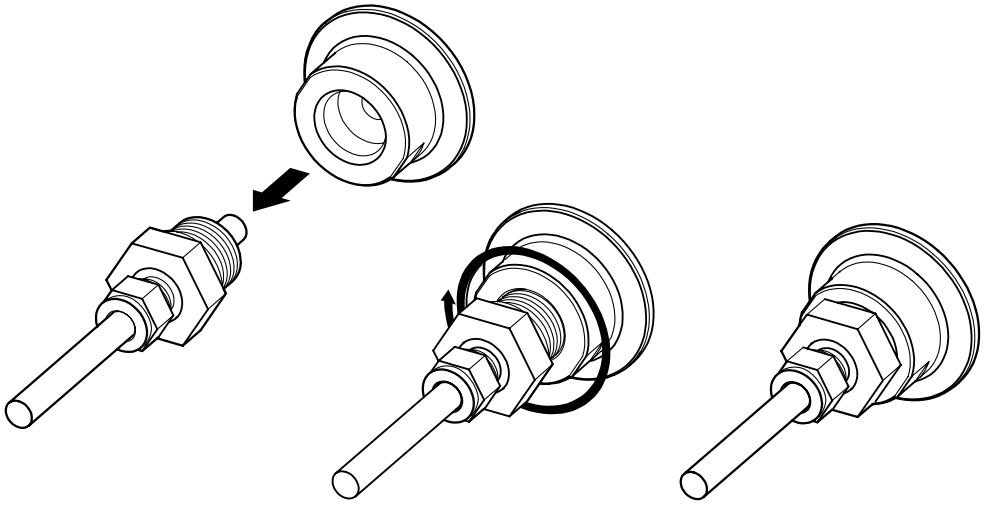


Fig. 7: Mounting the process connector adapter on the hygienic clamp adapter

IMPORTANT

The FKM gasket, part of the clamp adapter p/n 2093548, must be chemically resistant to the process medium.

5.5 Dismounting the process connection adapter

CAUTION

Pressure

Always depressurize the system, stop the flow and empty the pipe before dismounting the sensor.

To dismount the process connection adapter from the probe of the sensor:

1. Before dismantling, mark the pipe at the outer edge of the union nut. Draw a line across the flat face of the union nut and the fitting body.
2. Use this mark to tighten the union nut back to its original position during re-assembly.
3. Insert the probe with the mounted cutting ring in the fitting body until the front cutting ring is seated in the fitting body.
4. Hold the fitting body while tightening the union nut with a wrench to the previous position indicated by the markings on the pipe and flat face. At this point, the resistance increases noticeably. Tighten the union nut slightly.

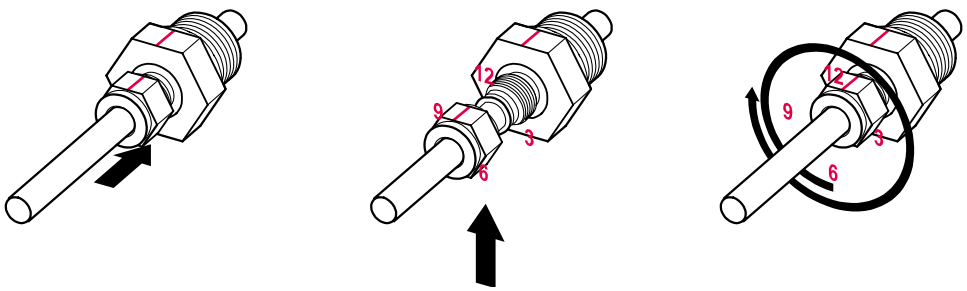


Fig. 9: Dismounting the process connector adapter from the sensor probe

6 Electrical installation

6.1 Safety

6.1.1 Notes on the electrical installation

IMPORTANT

Equipment damage due to incorrect supply voltage!

An incorrect supply voltage may result in damage to the equipment.

- Only operate the device using a protected low voltage and safe electrical insulation as per protection class III.

IMPORTANT

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 met 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 designed in accordance with the applicable standards. In Germany, observe the following standards:
  DIN VDE 0100 (Part 430) and DIN VDE 0298 (Part 4) or DIN VDE 0891 (Part 1).
- Circuits connected to the device must be designed as SELV and PELV circuits (SELV = Safety Extra Low Voltage; PELV = Protected Extra Low Voltage).
- Protect the device with a separate fuse at the start of the supply circuit.

Notes on layout of data cables:

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

The IP67 and/or IP69 enclosure rating for the device is only achieved under the following conditions:

- The cable on the M12 connection has been screwed on.
- The top cover is screwed (no gap between the upper cover and upper housing).

If this is not done, the device does not fulfill any specified IP enclosure rating!

6.2 Electrical connection

6.2.1 Overview of the electrical connections

The sensor is connected using a pre-assembled female cable connector with M12 x 1 plug connector (4-pin). For details about available cables see “14 Accessories”.

With the power switched off, plug the female cable connector into the sensor and screw it tight.

Connect the cable according to its function. After the supply voltage has been applied, the display (Industrial version only) shows the current measured values.

6.2.2 Pin assignment, M12 plug connector, 4-pin

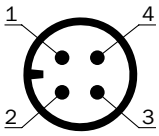


Fig. 10: M12 x 1 plug connector, 4-pins

Contact	Identification	Wire color	Description
1	L+	Brown	Supply voltage
2	Q2	White	Switching output/ push-pull/ digital input
3	M	Blue	Ground
4	C/ Q1	Black	Switching output/push-pull/IO-Link communication

The table above shows only the standard pin assignment. Other pin assignments are possible.

7 Commissioning

7.1 Quick commissioning (with factory settings)

Quick commissioning is used in applications under reference conditions see “5.1 Installation conditions”.

Commissioning

1. Install the sensor in line with the installation conditions in “5 Mounting”. During the T-Easic® installation process, the pipe system must be empty and not pressurized.
2. Switch on the supply voltage.
   The sensor performs a self-test and is then ready for operation (with default settings: see “13 Factory settings”).

   The display (Industrial version only) shows the current measured value.

In the event of problems during commissioning, see “8 Troubleshooting”.

7.2 Operation

The T-Easic® Industrial version is operated using the display and the operating buttons.

For a detailed description of the operating buttons and their functions, see “7.2.1 Display, LEDs and operating buttons (Industrial version only)”.

The T-Easic® (both versions) can be configured via the IO-Link 1.1 communication interface (see “7.2.4 IO-Link”).

7.2.1 Display, LEDs and operating buttons (Industrial version only)

Setting, values, information and error messages are shown on the OLED display. The OLED display switches off after 5 minutes of non-use.

The display is aligned horizontally to the axis of the measurement probe. The display (the figures shown) can be rotated by 180° (see “7.4.12 Display Mode (Industrial version only)”).

Fig. 11: Display (Industrial version only)

To navigate through the menu structure use the arrow buttons and display.

Right and left arrow buttons allow to navigate in the menu and immediately confirm the entry when selecting (nothing has to be confirmed/saved explicitly).

Up and down arrow buttons select options and accept the option directly.

Arrow down button: For changing values and accessing submenu

7.2.2 Information shown on the display (Industrial version only)

The display shows current values regarding flow and temperature. If an additional information or warning occurs the display alternates between current values and message every 3.5 seconds.

If more than one information (or warning/ failure) is present (up to three are possible) the display alternaters sequentially every 2 seconds between the messages and the current values. For more details about messages shown on the display see “8.1 Error message on the display (Industrial version only)”.

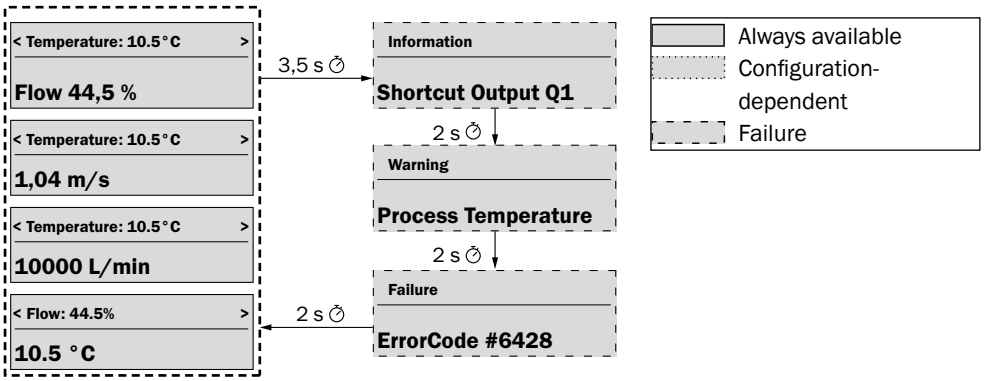


Fig. 12: Homepage and error messages

7.2.3 LEDs (Industrial version only)

On the left side of the display there are three LEDs to indicate:

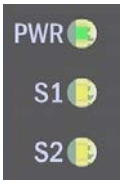


Fig. 13: LEDs on the Indusrial version

LED	Status on	Status off	Status flashing
PWR	operating voltage is applied	operating voltage is not present	Flashes for IO-Link communication
S1	switching output Q1 active	switching output Q1 inactive	-
S2	switching output Q2 active	switching output Q2 inactive	device is in warning state (see displayed message)

IMPORTANT

If the device is in error state, S1 and S2 flash simultaneously (check the displayed message).

7.2.4 IO-Link

For operation via IO-Link, an IODD file, function blocks of common PLCs and a description of the available telegram parameters can be downloaded from www.sick.com.

7.3 Measurement configuration

The sensor can be configured using different measuring parameters.

Firstly it has to be determinded whether the sensor should be operated in **Velocity** mode (**relative** or **absolute**) or **Volume absolute** mode or whether it should be taught.

Secondly it is possible to choose the medium between three different options.

There are several possibilities to configure the **Measurement Mode**:

- **Velocity relative (%)**: the velocity is shown in percentage of the full scale.
- **Velocity absolute**: the velocity is shown as absolute measurement with the unit chosen for the **Unit Velocity** parameter (see “7.4.3 Unit Volume”).
- **Volume absolute**: the volume is shown as absolute measurement with the unit chosen for the **Unit Volume** (see “7.4.3 Unit Volume”).
- **Teach relative (%)**: when the measured medium differs from the preset available media (water, Oil A or Oil B) a teach procedure can be done to optimize the performanc of the sensor. Then the flow velocity is shown as percentage of the flow range between the taught maximum and minimum flow.

If a **Velocity** mode or the **Volume** mode is selected it is possible to choose the type of **Medium** (**Water**, **Oil A** or **Oil B**). The closer the actual medium is to the chosen type the better the performance of the sensor.

Oil A and **Oil B** have the following specifications:

- **Oil A**: viscosity 5 cSt at 26 °C
- **Oil B**: viscosity 49 cSt at 26 °C

If the sensor shows static 0% or 100%, even if the correct media is chosen, the media does not fit. Please teach in the media, see “7.3.2 Configuration of the Measurement Mode based on Teach relative as example”.

7.3.1 Configuration of the Measurement Mode based on Volume absolute as example

1. Select the **Measurement Mode** menu using the arrow pushbuttons (left/right).
2. Select the **Volume absolute** parameter using the arrow pushbuttons (up/down).
3. Select the **Medium** parameter using the right arrow pushbutton.
4. Select **Water**, **Oil A** or **Oil B** using the arrow pushbuttons (up/down).
5. Select the **Pipe Diameter** using the right arrow pushbutton (the unit for the diameter can be selected in the advanced menu settings, see “7.4.1 Unit Pipe Diameter”).
6. Increase or decrease the value using the arrow pushbuttons (up/down).

7.3.2 Configuration of the Measurement Mode based on Teach relative as example

1. Select the **Measurement Mode** menu using the arrow pushbuttons (left/right).
2. Select the **Teach relative (%)** parameter using the arrow pushbuttons (up/down).
3. Access the **Teach** menu using the right arrow pushbutton.
4. Start the system and ensure maximal flow rate in the pipe.
5. Select the **Teach max?** parameter using the up/down arrow pushbutton.
   While the teach cycle is running the message **run ...** is displayed.
   The message **Teach OK** is displayed after a successful teach. Should the teach fail, the message **Teach not OK** is displayed and the steps above must be repeated.
6. Reduce the flow rate to minimum flow rate.
7. Select the **Teach min?** parameter using the arrow pushbuttons (up/down) (parameter is only visible after a successful **Teach max?** procedure).
   While the teach cycle is running the message **run ...** is displayed.
   The message **Teach OK** is displayed after a successful teach. Should the teach fail, the message **Teach not OK** is displayed and the steps above must be repeated.

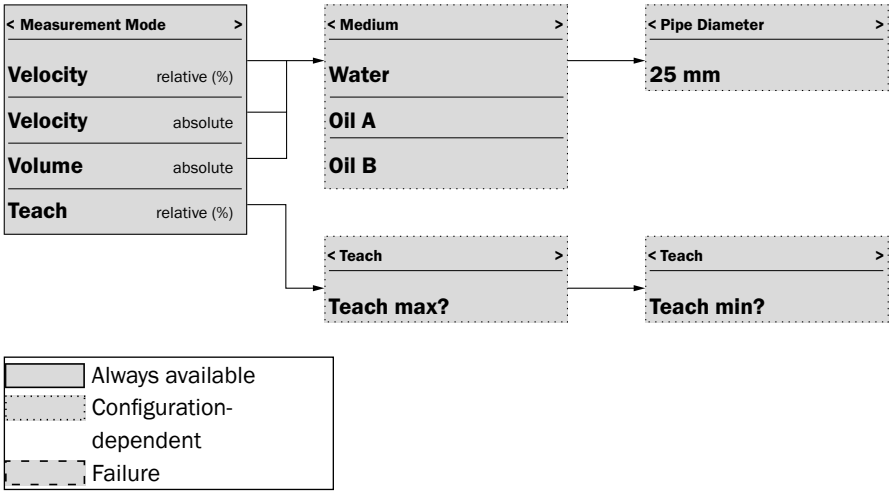


Fig. 14: Configuration Measurement Mode menu structure

7.3.3 Configuration of Q1 and Q2

Q1 and Q2 can be configured as hysteresis output for flow (normally open or normally closed), window output for flow (normally open or normally closed), hysteresis output for temperature (normally open or normally closed) and window output for temperature (normally open or normally closed). Q2 can be disabled (**Off Pin Q2 inactive** selected).

Q2 can be configured as Input in Boolean logic with Q1 (AND or OR).

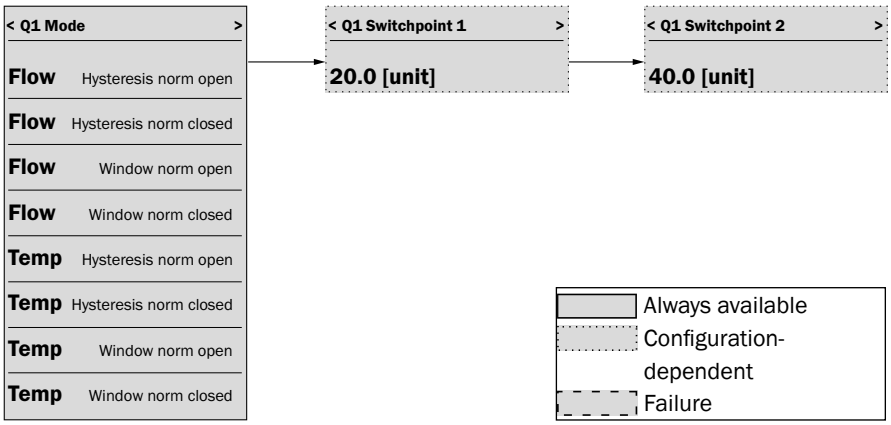


Fig. 15: Q1 Mode menu structure

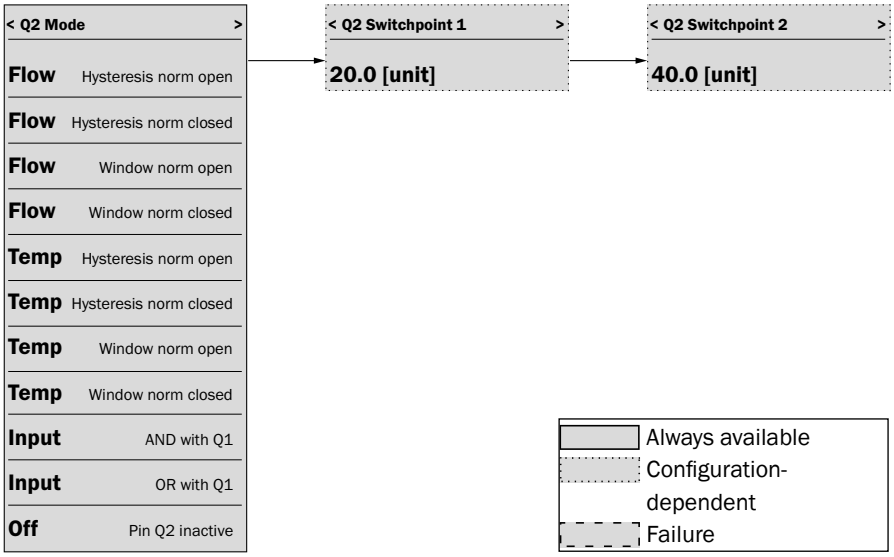


Fig. 16: Q2 Mode menu structure

7.3.4 Configuration of the switching output Q1 and Q2

If the flow (or temperature) is fluctuating around the set value, the hysteresis keeps the switching status of the outputs stable.

When the flow (or temperature) is increasing, the output switches when the respective switching point (SP1) is reached; if the flow (or temperature) sinks again, the output switches back only after the reset switching point (SP2) has been reached.

The window function enables monitoring of a defined range. If the flow (or temperature) is between window high (SP1) and window low (SP2), the output will be active (normally open) and/or inactive (normally closed).

The error status of the measuring device reflects the cable break monitoring. During an error status, the measuring device switches to the safe state; the safe state of the electronic is in pull-down configuration.

As far as the downstream signal evaluation is concerned, this corresponds to a cable break.

7.3.5 Normally open with configurable hysteresis

Configuration (based on Q1 for flow as an example)

1. Select **Q1 Mode** using the arrow pushbuttons (left/right).
2. Select **Flow Hysteresis norm open** using the arrow pushbuttons (up/down).
3. Select **Q1 Switchpoint 1** (SP1) using the right arrow pushbutton.
4. Increase or decrease the value using the arrow pushbuttons (up/down).
5. Select **Q1 Switchpoint 2** (SP2) using the right arrow pushbutton.
6. Increase or decrease the value using the arrow pushbuttons (up/down).
7. Configure the delay mode and time (see “7.4.7 Delay Mode Q1”).

Switching output behavior

Flow / temperature

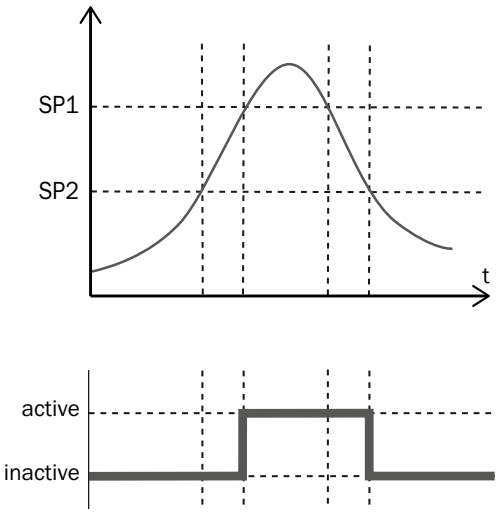


Fig. 17: Normally open with configurable hysteresis

7.3.6 Normally closed with configurable hysteresis

Configuration (based on Q1 for flow as an example)

1. Select **Q1 Mode** using the arrow pushbuttons (left/right).
2. Select **Flow Hysteresis norm closed** using the arrow pushbuttons (up/down).
3. Select **Q1 Switchpoint 1** (SP1) using the right arrow pushbutton.
4. Increase or decrease the value using the arrow pushbuttons (up/down).
5. Select **Q1 Switchpoint 2** (SP2) using the right arrow pushbutton.
6. Increase or decrease the value using the arrow pushbuttons (up/down).
7. Configure the delay mode and time (see “7.4.7 Delay Mode Q1”).

Switching output behavior

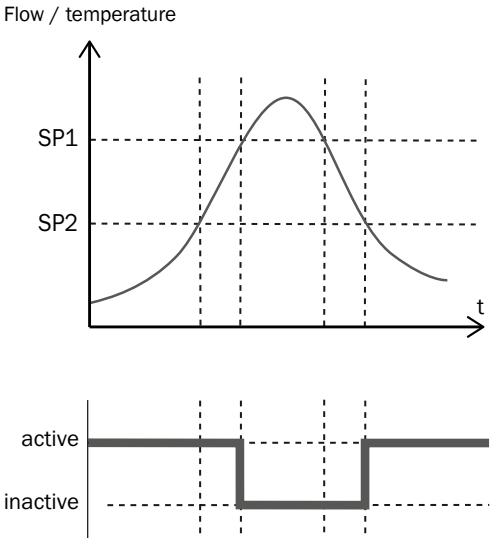


Fig. 18: Normally closed with configurable hysteresis

7.3.7 Normally open with window function

Configuration (based on Q1 for flow as an example)

1. Select **Q1 Mode** using the arrow pushbuttons (left/right).
2. Select **Flow window norm open** using the arrow pushbuttons (up/down).
3. Select **Q1 Switchpoint 1** (SP1) using the right arrow pushbutton.
4. Increase or decrease the value using the arrow pushbuttons (up/down).
5. Select **Q1 Switchpoint 2** (SP2) using the right arrow pushbutton.
6. Increase or decrease the value using the arrow pushbuttons (up/down).
7. Configure the delay mode and time (see “7.4.7 Delay Mode Q1”).

Switching output behavior

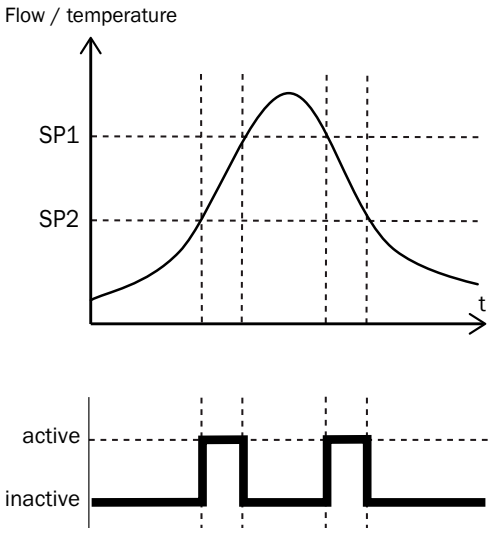


Fig. 19: Normally open with window function

7.3.8 Normally closed with window function

Configuration (based on Q1 for flow as an example)

1. Select **Q1 Mode** using the arrow pushbuttons (left/right).
2. Select **Flow window norm closed** using the arrow pushbuttons (up/down).
3. Select **Q1 Switchpoint 1** (SP1) using the right arrow pushbutton.
4. Increase or decrease the value using the arrow pushbuttons (up/down).
5. Select **Q1 Switchpoint 2** (SP2) using the right arrow pushbutton.
6. Increase or decrease the value using the arrow pushbuttons (up/down).
7. Configure the delay mode and time (see “7.4.7 Delay Mode Q1”).

Switching output behavior

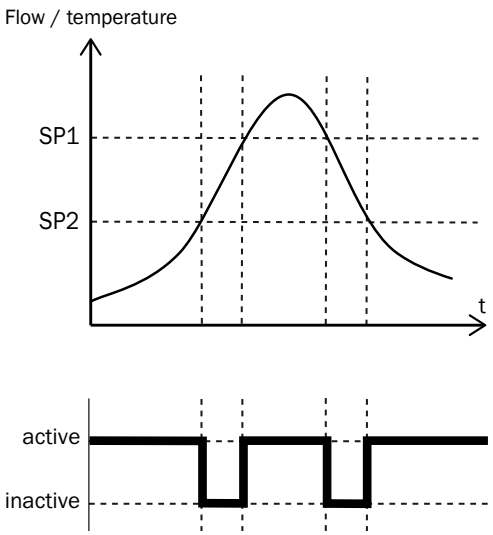


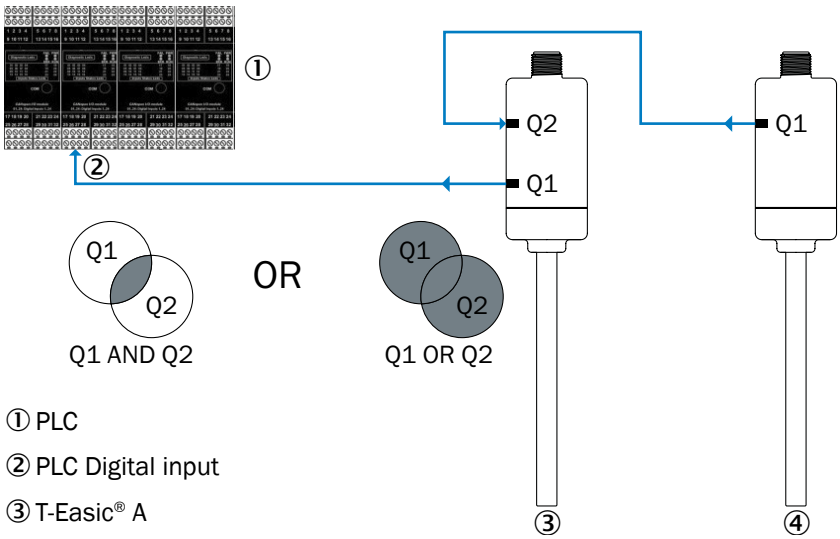
Fig. 20: Normally closed with window function

7.3.9 Configuration of the digital input Q2

There are two selectable logics for Q2 input in the **Q2 Mode** menu:

- **Input AND with Q1**
- **Input OR with Q1**

This feature can be used (e.g.) to create a control logic with the signals coming from two T-Easic® and using only one PLC digital input. In this case Q1 output of T-Easic® B is used as Q2 digital input on T-Easic® A and the Q1 output of T-Easic® A is connected to the PLC.



① PLC

② PLC Digital input

③ T-Easic® A

④ T-Easic® B

Fig. 21: Example of application using the digital input for Boolean logic with digital output

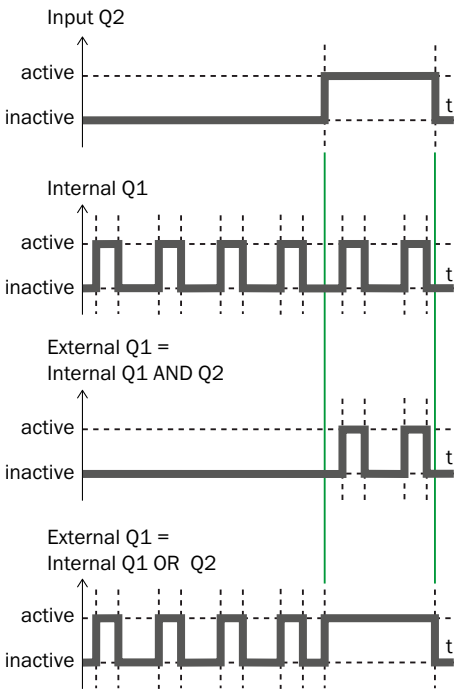


Fig. 22: Digital input Q2 and Boolean logic explanation

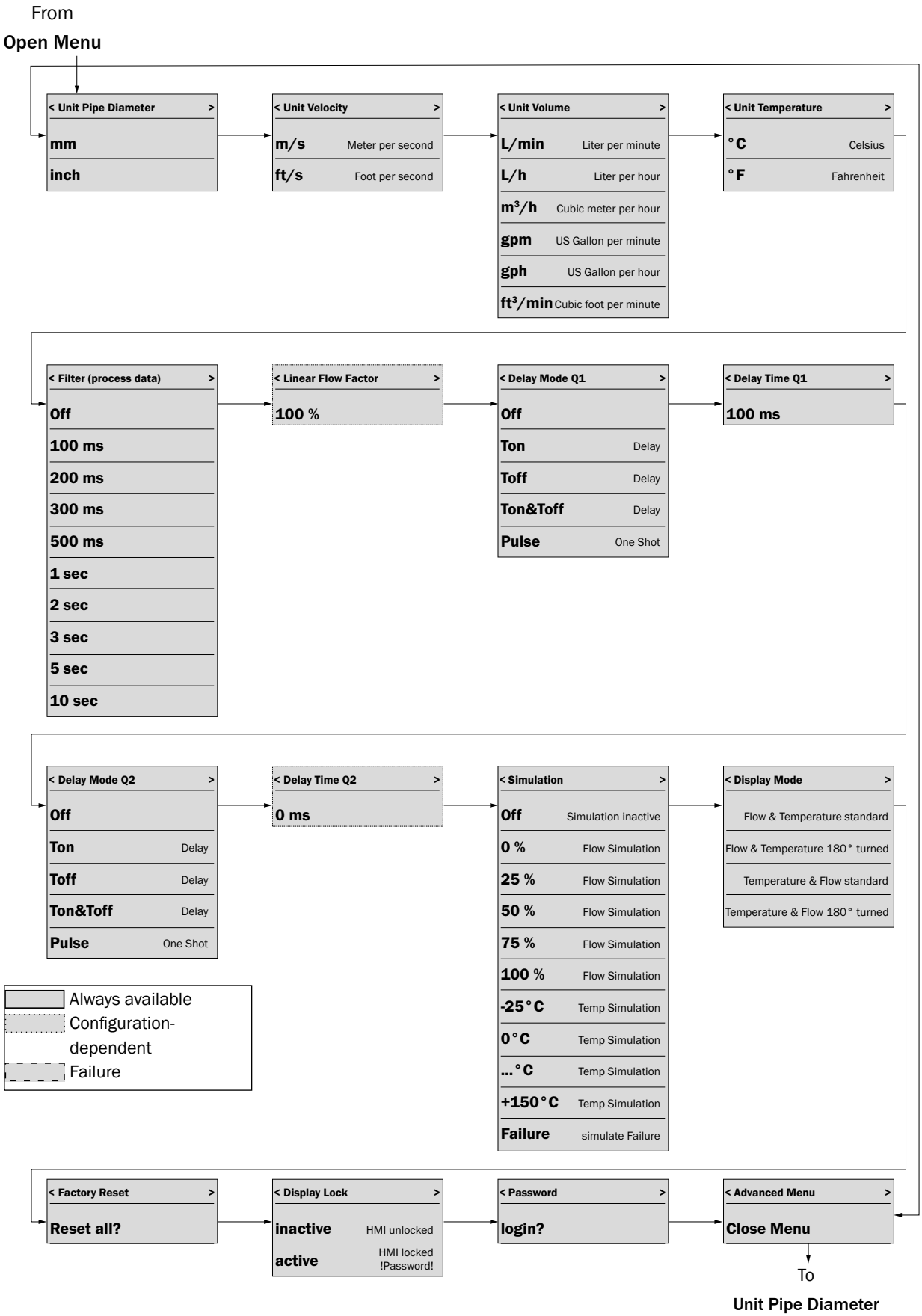
7.4 Advanced menu (advanced settings)

From the **Advanced Menu** you can access the advance settings.

1. Select **Advanced Menu** using the arrow pushbuttons (left/right).
2. Select **Open menu** using the arrow pushbuttons (up/down).
3. Select the desired parameter using the arrow pushbuttons (left/right).

The following parameters are now accessible:

- **Unit Pipe Diameter**
- **Unit Velocity**
- **Unit Volume**
- **Unit Temperature**
- **Filter (process data)**
- **Linear Flow Factor**
- **Delay Mode Q1**
- **Delay Time Q1**
- **Delay Mode Q2**
- **Delay Time Q2**
- **Simulation**
- **Display Mode**
- **Factory Reset**
- **Display Lock**
- **Password**
- **Close Config**


From
Open Menu
< Unit Pipe Diameter >
mm
inch
< Unit Velocity >
m/s Meter per second
ft/s Foot per second
< Unit Volume >
L/min Liter per minute
L/h Liter per hour
m³/h Cubic meter per hour
gpm US Gallon per minute
gph US Gallon per hour
ft³/min Cubic foot per minute
< Unit Temperature >
°C Celsius
°F Fahrenheit
< Filter (process data) >
Off
100 ms
200 ms
300 ms
500 ms
1 sec
2 sec
3 sec
5 sec
10 sec
< Linear Flow Factor >
100 %
< Delay Mode Q1 >
Off
Ton Delay
Toff Delay
Ton&Toff Delay
Pulse One Shot
< Delay Time Q1 >
100 ms
< Delay Mode Q2 >
Off
Ton Delay
Toff Delay
Ton&Toff Delay
Pulse One Shot
< Delay Time Q2 >
0 ms
< Simulation >
Off Simulation inactive
0 % Flow Simulation
25 % Flow Simulation
50 % Flow Simulation
75 % Flow Simulation
100 % Flow Simulation
-25°C Temp Simulation
0°C Temp Simulation
...°C Temp Simulation
+150°C Temp Simulation
Failure simulate Failure
< Display Mode >
Flow & Temperature standard
Flow & Temperature 180° turned
Temperature & Flow standard
Temperature & Flow 180° turned
Always available
Configuration-dependent
Failure
< Factory Reset >
Reset all?
< Display Lock >
inactive HMI unlocked
active HMI locked !Password!
< Password >
login?
< Advanced Menu >
Close Menu
To
Unit Pipe Diameter

7.4.1 Unit Pipe Diameter

In this submenu you can configure the inner pipe diameter. This value is necessary to calculate the correct flow volume.

You can configure the unit of the diameter. The following units are available:

- **mm**
- **inch**

7.4.2 Unit Velocity

In this submenu you can define the measuring unit of the velocity. The following units are available:

- **m/s**
- **ft/s**

7.4.3 Unit Volume

In this submenu you can define the measuring unit of the volume. The following units are available:

- **L/min**
- **L/h**
- **m^3/h**
- **gpm**
- **gph**
- **ft^3/min**

7.4.4 Unit Temperature

In this submenu you can define the measuring unit of the temperature. The following units are available:

- **°C**
- **°F**

7.4.5 Filter (process data)

Smoothing of the measured value, e.g., if flow is irregular (e.g. when pumps are starting and stopping). For fast changes, the average of the measured values over a predefined number of seconds is output.

The following values are available:

- **100 ms**
- **200 ms**
- **300 ms**
- **500 ms**
- **1 s**
- **2 s**
- **3 s**
- **5 s**
- **10 s**
- **Off**

If the value **Off** is selected, the filter function is disabled.

7.4.6 Linear Flow Factor

With **Linear Flow Factor** the sensor can be adjusted to a reference flow in the application.

This menu is available only if **Velocity relative (%)** or **Velocity absolute** or **Volume absolute** is selected in **Measurement Mode** menu.

The specific adjustment allows changing the slope of the curve of measured values. The slope is given in percentage. The values of this factor can be chosen between 50 % and 150 %. The factory setting is 100%.

The **Linear Flow Factor** influences the process data. It is not visible after a flow teach-in procedure.

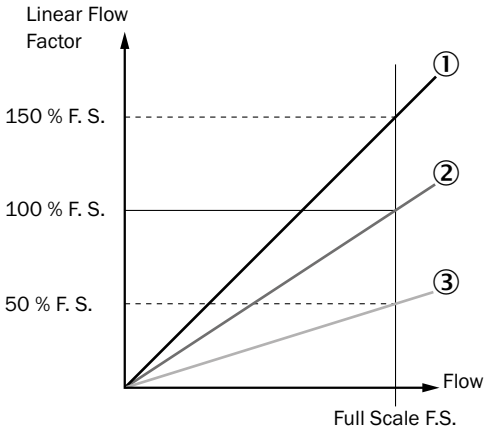


Fig. 23: Linear Flow Factor examples

① Curve with adjustment 1

② Factory setting curve

③ Curve with adjustment 2

7.4.7 Delay Mode Q1

This parameter defines the delay mode applied to Q1. The following parameters are available:

Parameter	Function
Off	No delay applied on Q1 status change.
Ton Delay	When the **Q1 Switchpoint 1** is reached, the status of Q1 will not switch till the **Delay time Q1** (see “7.4.8 Delay Time Q1”) is expired.
Toff Delay	When the **Q1 Switchpoint 2** is reached, the status of Q1 will not switch till the **Delay time Q1** (see “7.4.8 Delay Time Q1”) is expired.
Ton&Toff Delay	When the **Q1 Switchpoint 1** is reached, the status of Q1 will not switch till the **Delay time Q1** (see “7.4.8 Delay Time Q1”) is expired. When the **Q1 Switchpoint 2** is reached, the status of Q1 will not switch till the **Delay time Q1** (see “7.4.8 Delay Time Q1”) is expired.

Parameter	Function
Pulse One Shot	When the **Q1 Switchpoint 1** is reached, the status of Q1 will switch and when the **Delay time Q1** is expired (see “7.4.8 Delay Time Q1”) Q1 will switch back to the previous status.

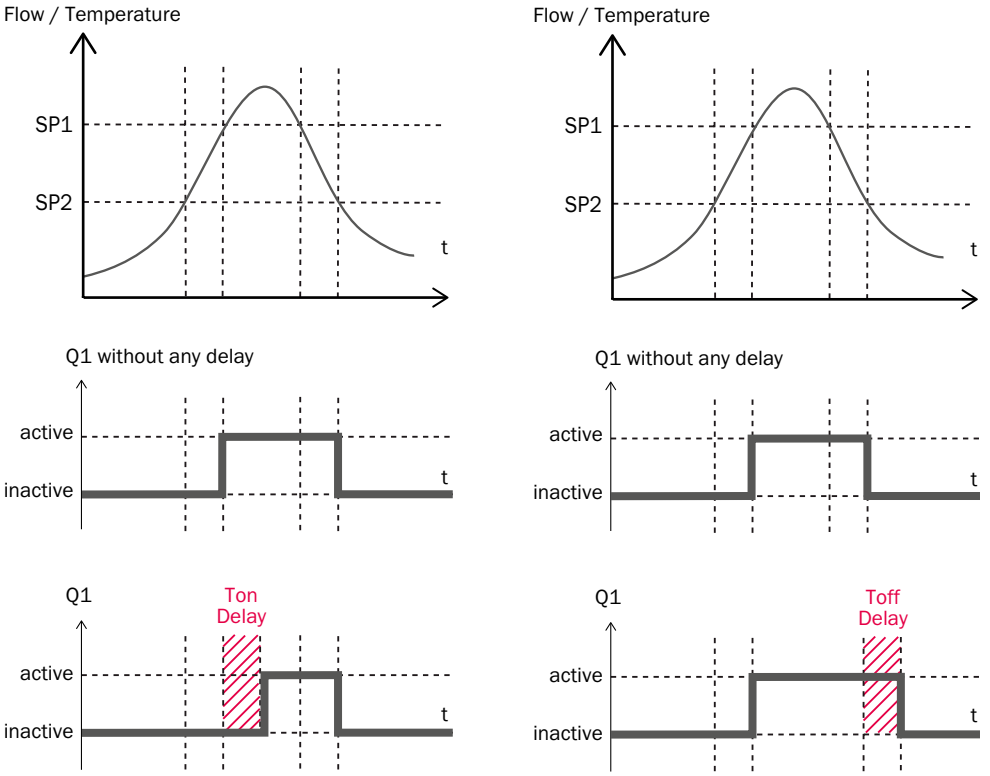


Fig. 24: Delay Mode Q1 set as Ton Delay / Hysteresis - Normally open (left) and Delay Mode Q1 set as Toff Delay / Hysteresis - Normally open (right)

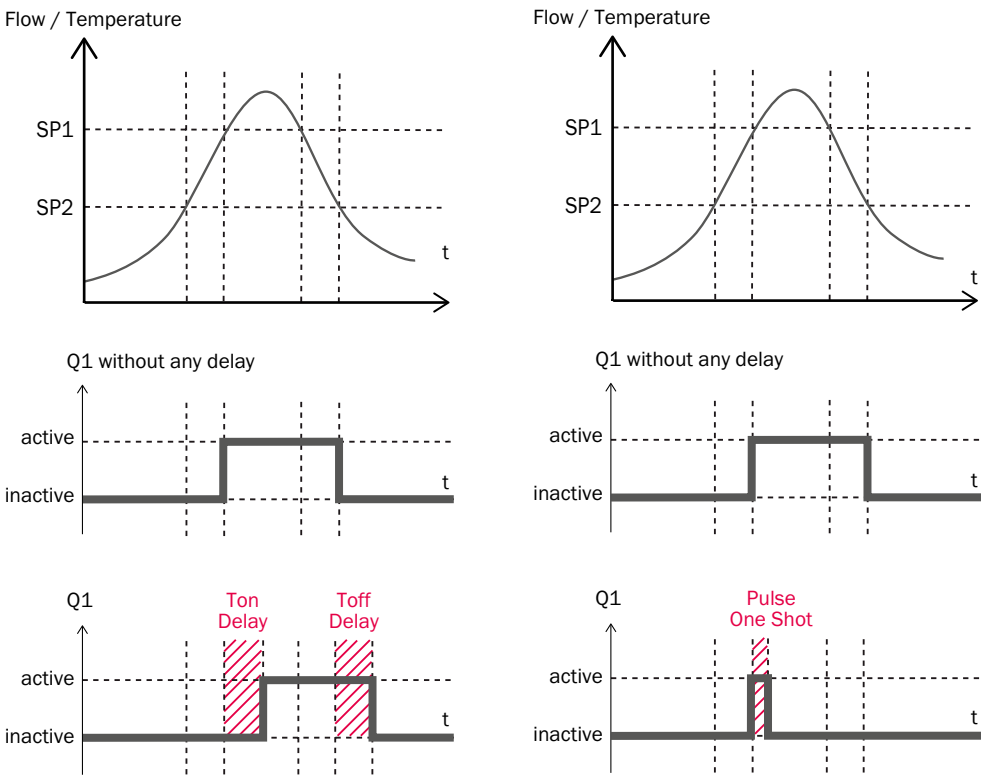


Fig. 25: Delay Mode Q1 set to Ton&Toff Delay / Hysteresis - Normally open (left) and Delay Mode Q1 set to Pulse One Shot / Hysteresis - Normally open (right)

7.4.8 Delay Time Q1

In this submenu you can define the time applied to the delay of Q1 accordingly to the mode defined under **Delay Mode Q1** (see "7.4.7 Delay Mode Q1").

7.4.9 Delay Mode Q2

This parameter defines the delay mode applied to Q2. The following parameters are available:

Parameter	Function
Off	No delay applied on Q2 status change.
Ton Delay	When the **Q2 Switchpoint 1** is reached, the status of Q2 will not switch till the **Delay Time Q2** is expired (see "7.4.10 Delay Time Q2").
Toff Delay	When the **Q2 Switchpoint 2** is reached, the status of Q2 will not switch till the **Delay Time Q2** is expired (see "7.4.10 Delay Time Q2").
Ton&Toff Delay	When the **Q2 Switchpoint 1** is reached, the status of Q2 will not switch till the **Delay Time Q2** is expired (see "7.4.10 Delay Time Q2") and when the **Q2 Switchpoint 2** is reached, the status of Q2 will not switch till the **Delay Time Q2** is expired (see "7.4.10 Delay Time Q2").

Parameter	Function
Pulse One Shot	When the **Q2 Switchpoint 1** is reached, the status of Q2 switch and when the **Delay Time Q2** is expired (see “7.4.10 Delay Time Q2”) Q2 will switch back to the previous status.

7.4.10 Delay Time Q2

In this submenu you can define the time applied to the delay of Q2 accordingly to the mode defined under **Delay Mode Q2** (see “7.4.9 Delay Mode Q2”).

7.4.11 Simulation

Even if there is no liquid in the measurement channel yet, it is possible to select a flow or temperature in the menu in order to test the sensor configuration. You can also simulate a failure status (safe-state simulation).

▶ Set the desired value for flow or temperature using the arrow pushbuttons (up/down).

The following parameters are available:

- **Off**
- **Sim Flow 25 %**
- **Sim Flow 50 %**
- **Sim Flow 75 %**
- **Sim Flow 100 %**
- **Sim Temp -25 °C**
- **Sim Temp 0 °C**
- **Sim Temp +25 °C**
- **Sim Temp +50 °C**
- **Sim Temp +75 °C**
- **Sim Temp +100 °C**
- **Sim Temp +125 °C**
- **Sim Temp +150 °C**
- **Failure**

When a simulated condition is activated the display shows cyclically the message **Info Simulation is active**. If a simulated failure condition is activated the display shows cyclically the message **Failure Failure Simulation is active**.

7.4.12 Display Mode (Industrial version only)

In this submenu you can define the information shown on the display when operating. The following parameters are available:

Parameter	Function
Flow & Temp Standard	The flow is shown in the lower part of the display and the temperature is shown in the upper part.

Parameter	Function
Flow & Temperature 180° turned	The flow is shown in the lower part of the display and the temperature is shown in the upper part but the display is fully rotated of 180° compared to the previous setting.
Temp & Flow Standard	The temperature is shown in the lower part of the display and the flow is shown in the upper part.
Temp & Flow 180° turned	The temperature is shown in the lower part of the display and the flow is shown in the upper part but the display is fully rotated of 180° compared to the previous setting.

7.4.13 Factory Reset

In this submenu you can reset all parameters to factory settings. The following value is available:

– **Reset All?**

▶ Reset to factory settings using the arrow pushbuttons (up/down).

7.4.14 Display Lock (Industrial version only)

To avoid setting changes, the display of the Industrial version can be locked. When the display is locked an unlocking code must be entered before applying any changes.

The code to unlock the display and buttons is **000387**.

7.4.15 Password

This submenu is reserved for SICK service only.

7.4.16 Advanced Menu (Close Menu)

This submenu closes the advanced configuration menu. The following value is avaible:

– **Close Menu**

▶ Go back to the main menu using the arrow pushbuttons (up/down).

After you left the advanced menu **Advanced menu - Open Menu** is displayed.

7.5 Information

In this menu you can check information relevant to the sensor.

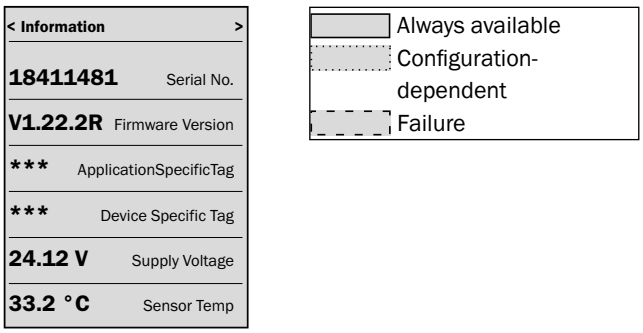


Fig. 26: Information menu structure

The following parameters are available:

Parameter	Function
Serial No	Serial number of the device
Firmware	Firmware version installed in the sensor
ApplicationSpecificTag	Specific application name belonging to the sensor
Device Specific Tag	Indication of the device tag given to the sensor
Supply Voltage	Actual supply voltage of the device
Internal Temp	Indication of the temperature of the printed circuit card of the sensor

8 Troubleshooting

8.1 Error message on the display (Industrial version only)

On the display are shown up to three error messages with highest priority. The messages that can appear on the display are listed in the following table.

Message	Level	Cause	Solution
Supply Voltage too low	Warning	The minimum supply voltage is too low.	Check the supply voltage and if necessary adjust according the specifications (see “11 Technical data”).
Supply Voltage too high	Failure	The maximum supply voltage is too high.	Check the supply voltage and if necessary adjust according the specifications (see “11 Technical data”).
Low Voltage IO-Link	Info	The supply voltage is < 16 V thus the IO-Link communication is no longer possible.	Check the supply voltage and if necessary adjust according the specifications (see “11 Technical data”).
Simulation is active	Info	The simulation function is active. State of the outputs does not correspond to the actual measured flow or temperature in the process.	Deactivate the Simulation function if necessary.
Failure Simulation is active	Info	The “safe-state” simulation of the sensor is active. State of the outputs corresponds to the safe state of the device.	Deactivate the Simulation function if necessary.
MemoryInvalid	Failure	Device memory contains invalid configuration. The sensor goes into safe state.	Contact SICK.
Outputdriver Error	Failure	Overload of the driver oft he switching output. The sensor goes into safe state.	Reduce the load of the output to the maximum values according to the specifications (see “11 Technical data”).
Q1 Shortcut	Info	Short circuit or overload on Q1.	Reduce the load of the output to the maximum values according to the specifications (see “11 Technical data”).
Q1: Switchpoint out of Range	Warning	Switch point of Q1 is outside the set measuring range	Check settings and correct if necessary.
Q1: Distance SP1 to SP2 too small	Warning	Switchpoint1 of Q1 is too close to the Switchpoint2 of Q1. The settings may lead to unwanted sensor behaviour.	Check settings and correct if necessary.
Q2 Shortcut	Info	Short circuit or overload on Q2.	Reduce the load of the output to the maximum values according to the specifications (see “11 Technical data”).
Q2: Switchpoint out of Range	Warning	Switch point of Q2 is outside the set measuring range.	Check settings and correct if necessary.
Sensor shows a static value of 0% or 100%		Media does not fit to the teached or chosen media of the sensor	Teach-in of the media (see “7.3 Measurement configuration 22”)
Q2: Distance SP1 to SP2 too small	Warning	Switchpoint1 of Q2 is too close to the Switchpoint2 of Q2. The settings may lead to unwanted sensor behaviour.	Check settings and correct if necessary.
Ambient Temperature too high	Warning	Ambient temperature is too high.	Reduce the ambient temperature according to the specifications (see “11 Technical data”).

Message	Level	Cause	Solution
Ambient Temperature too low	Warning	Ambient temperature is too low.	Increase the ambient temperature according to the specifications (see “11 Technical data”).
Medium Temperature too high	Warning	Process temperature of the medium is too high.	Reduce the process temperature according to the specifications (see “11 Technical data”).
Medium Temperature too low	Warning	Process temperature of the medium is too low.	Increase the process temperature according to the specifications (see “11 Technical data”).
Internal Error	Failure	Internal device error. The sensor goes into safe state.	Contact SICK.
Sensor is not teached	Warning	The sensor is in teach mode but there is no valid teach. The flow rate is 0%. The outputs are set accordingly.	Carry out correct Teach-Max and Teach-Min.

8.2 Outputs

Error	Cause	Solution
Switching output does not behave as expected	Configuration incorrect.	Perform configuration of the switching output (see “7.3 Measurement configuration”).
	An error is pending; the sensor outputs are in the safe state.	Remove the cause of the error.
	Line break.	Check cable.

9 Repair

Repair work on the sensor may only be performed by qualified and authorized personnel from SICK AG. Interference with or modifications to the sensor on the part of the customer will invalidate any warranty claims against SICK AG.

9.1 Maintenance

The T-Easic® is maintenance-free. We recommend performing the following actions regularly:

- Checking the measurement probe for deposits or build-up and abrasion.
- Checking the screw connections and plug-in connections.

Repair work on the sensor may only be performed by qualified and authorized personnel from SICK AG. Interference with or modifications to the sensor on the part of the customer will invalidate any warranty claims against SICK AG.

9.2 Returns

Rinse off and/or clean removed devices before returning them in order to protect our employees and the environment from dangers posed by residue from measured materials. Faulty devices can only be examined when accompanied by a completed return form. This form includes information about all materials which have come into contact with the device, including those which were used for testing purposes, operation, or cleaning. The return form is available from our website (www.sick.com).

10 Disposal

Dispose of device components and packaging materials in compliance with applicable country-specific waste treatment and disposal regulations for the region of use.

11 Technical data

11.1 Features

Measuring principle	Calorimetric measurement method for determining the flow
Media	Aqueous and oil-based media
Range of selectable inner pipe diameter	From 25 mm [1]
Operating range	Water 3 cm/s ... 150 cm/s Oil 3 cm/s ... 300 cm/s
Maximum process pressure	100 bar 16 bar (with clamp adapter p/n 2093548)
Process temperature	-40 °C ... +150 °C [2]
IO-Link 1.1	✓ COM3 (230,4 kbit/s)
Temperature measurement	via IO-Link

[1] The probe tip must be in the center of the pipe to have the best accuracy performances

[2] For medium temperatures > 100 ° C, the distance from the bottom of the housing and the top of the mounting adapter must be at least 25 mm. Probe length variant of 60 mm is not possible if process temperature > 100 °C

11.2 Performance

Minimum flow velocity	≥ 3 cm/s (water and oil)
Maximum flow velocity	≤ 150 cm/s (water) ≤ 300 cm/s (oil)
Inlet zone	5 x DN
Outlet zone	3 x DN
Accuracy flow	± 10 % of F.S. [1]
Reproducibility flow	< 1 cm/s [1]
Resolution flow (over IO-Link)	velocity: 0.01 m/s; Volume: 0.1 L/min; Relative: 0.1 %
Temperature drift (flow)	< 0.5 cm/(s*K) [1]
Response time (flow)	< 2.5 s (filter off)
Accuracy temperature	± 1 °C
Resolution	< 0.1 °C
Response time temperature (T90 time)	< 6 s [2]
Operating mode	Velocity relative (%) Velocity absolute Volume absolute Teach relative (%)

[1] Reference conditions: pipe inner diameter 25 mm, water, vertical installation in the pipe, tip in the center of the pipe, probe alignment to the flow as per §5.2, fully filled pipe without air bubbles, velocity from 10 cm/s to 100 cm/s, inlet zone > 30 cm, outlet zone < 30 cm, 26 °C ± 1 °C, 2 bar ± 1 bar

[2] Under reference conditions as in [1] but only flow rate = 100 cm/s

11.3 Mechanics/materials

Process connection	Without process connection (adapter needed for installation)
Wetted parts	Stainless steel 1.4404 / 316L
Housing material	Industrial version: VISTAL®/Polyester Hygienic version: stainless steel 1.4404 /316L
Gasket material (only clamp adapter p/n 2093548)	FKM
Probe diameter	8 mm
Probe length	60 mm, 100 mm, 200 mm (tolerance ±1 mm)
Probe roughness [1]	Ra ≤ 0.8 µm
Enclosure rating (DIN EN 60529)[2] [3]	Industrial version: IP67 Hygienic version: IP67/IP69
Minimum inner pipe diameter	25 mm in centric installation
Minimum insertion length	12 mm
Minimum distance probe tip to pipe wall	10 mm
Weight	Industrial version: 77 gr Hygienic version: 195 gr

[1] *welding seams excluded*

[2] *only with M12 plug tightened*

[3] *not UL evaluated*

11.4 Ambient conditions

Ambient temperature, operation[1]	-40 °C ... +70 °C
Ambient temperature, storage	-40 °C ... +80 °C

[1] *According to UL listing: degree of contamination 3 (UL61010-1: 2012-05); air humidity: 80 % at temperatures up to 31 °C; installation height: max. 3,000 m above sea level*

11.5 Electrical connections

Supply voltage U_V [1)]	9 V DC ... 30 V DC
Power consumption	< 2 W at 24 V DC (without any load on outputs) < 8 W at maximum load
Initialization time	≤ 5 s (IO-Link < 10 s)
Protection class	III
Connection type	Round connector M12 x 1, 4-pin
Output signal	2 Push-Pull digital outputs (Q2 selectable as digital input) for flow and temperature
Output current	≤ 100 mA (per each output)
Signal voltage HIGH	> U_V - 2 V
Signal voltage LOW	≤ 2 V
Inductive load	1 H
Capacitive load	100 nF (2.5 nF, IO-Link mode)
Limits of digital input	HIGH state voltage: it depends on Uv LOW state voltage < 4.0 V
EMC	EN 61326-1, EN 61326-2-3
MTTF	> 200 years

[1)] *All connections are reverse polarity and overcurrent protected. Q1 and Q2 are short-circuit protected.*

Use an energy-limited circuit for power supply as per UL61010-1 3rd Ed.

12 Dimensional drawings

All dimensions are provided in mm (inches).

12.1 Industrial version

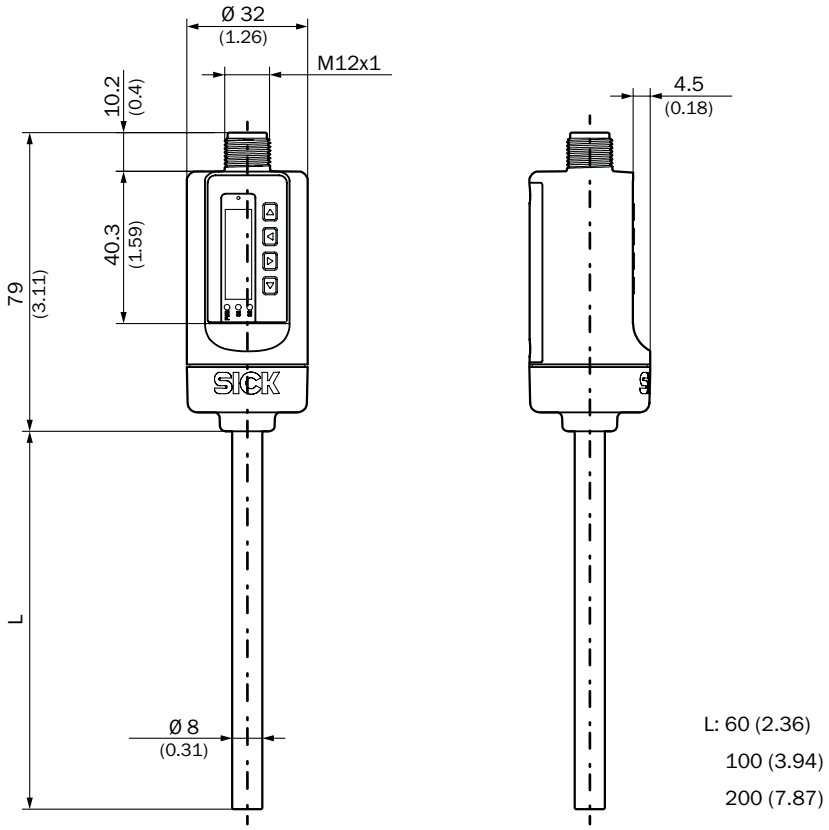


Fig. 27: Dimensional drawing Industrial version

12.2 Hygenic version

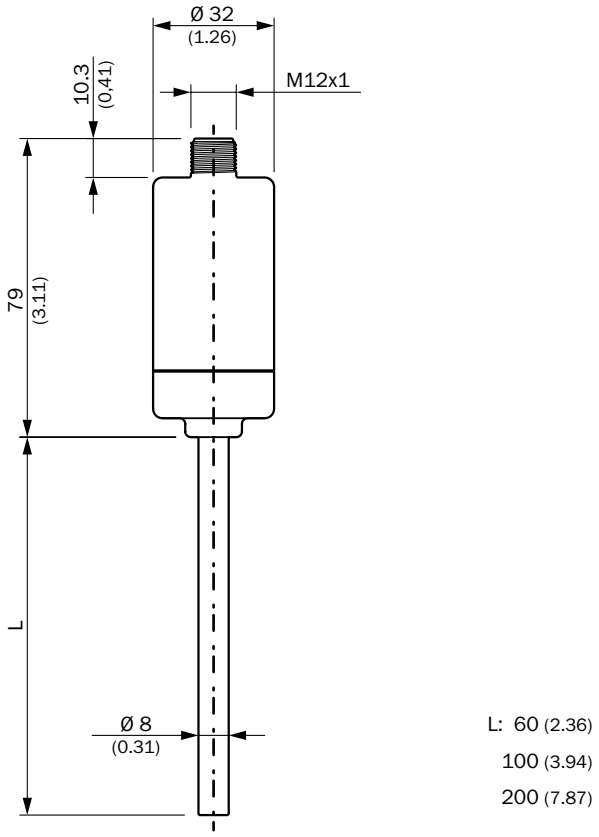


Fig. 28: Dimensional drawing Hygienic version

12.3 Mounting adapters for T-Easic® FTS

12.3.1 Adapter G1/2 (p/n 5338774)

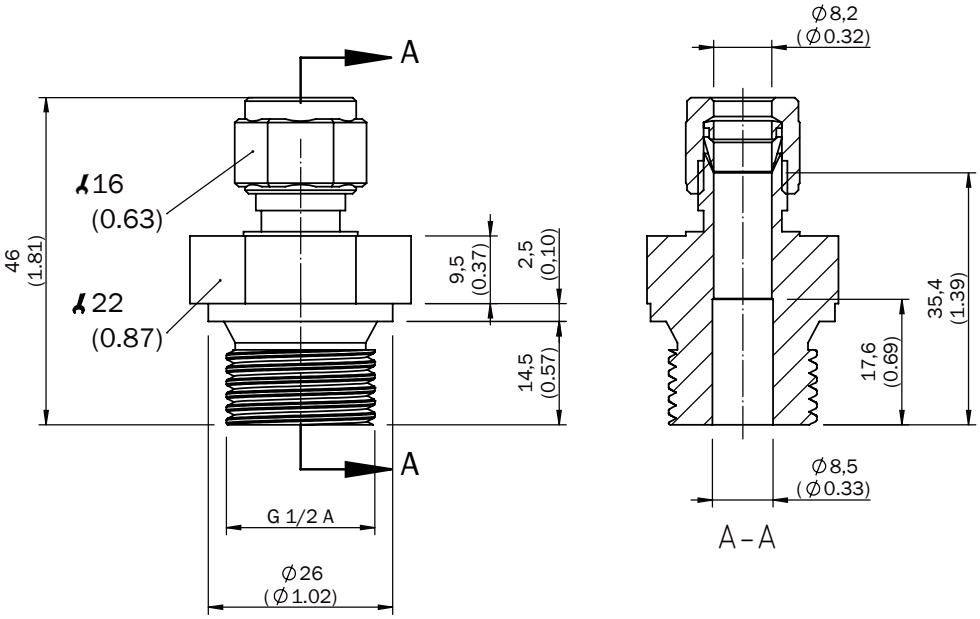


Fig. 29: Dimensional drawing adapter G1/2 (p/n 5338774)

12.3.2 Adapter 1/2" NPT (p/n 5338775)

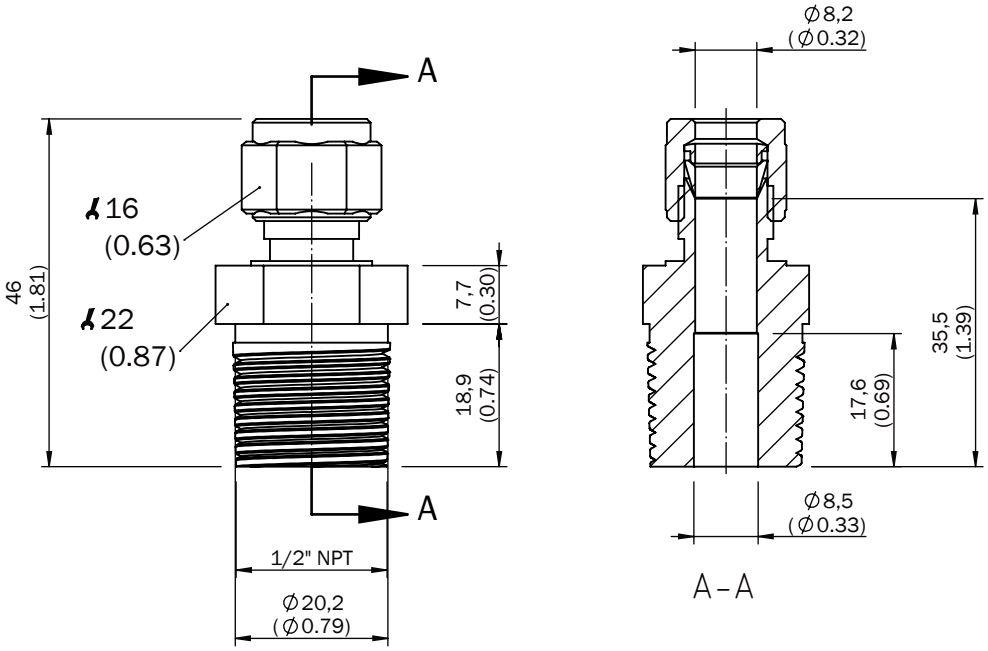


Fig. 30: Dimensional drawing adapter 1/2" NPT (p/n 5338775)

12.3.3 Adapter M18 x 1.5 (p/n 2104208)

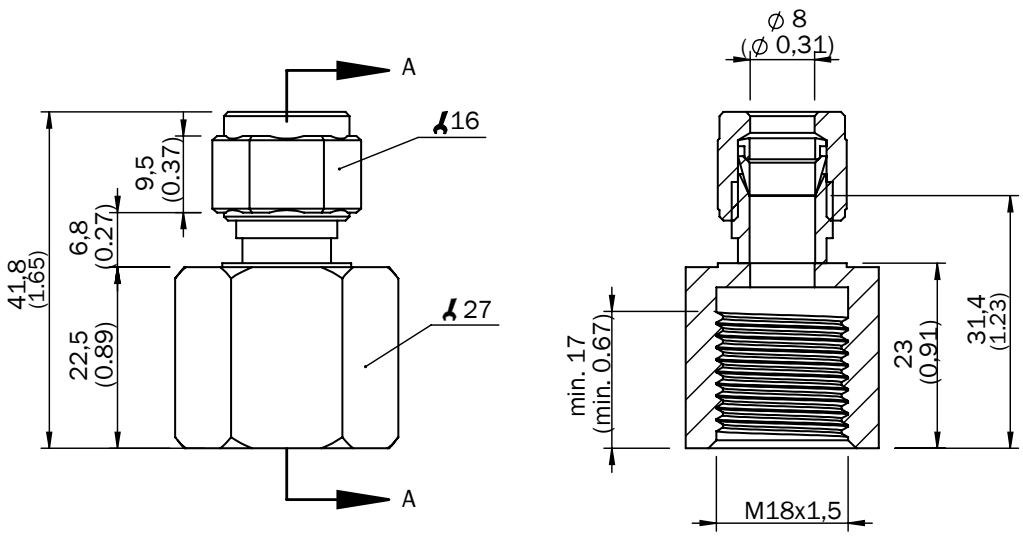


Fig. 31: Dimensional drawing adapter M18 x 1.5 (p/n 2104208)

12.3.4 Adapter clamp DIN32676 DN25-40 (p/n 2093548)

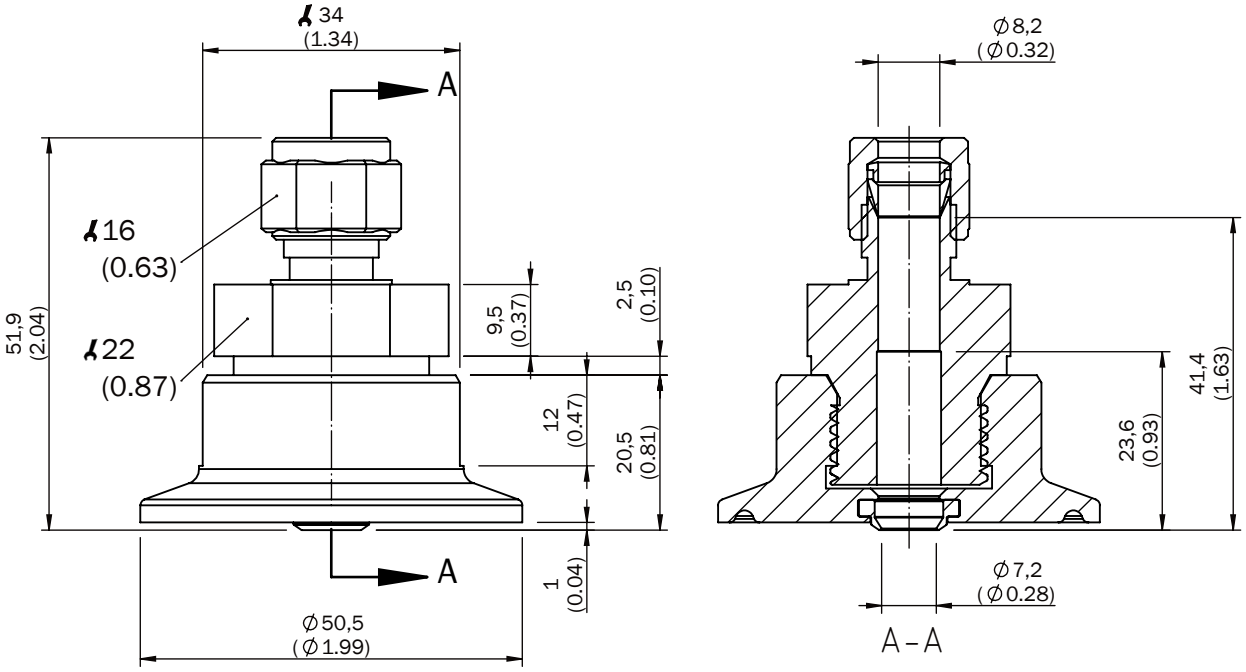


Fig. 32: Dimensional drawing adapter clamp DIN32676 DN25-40 (p/n 2093548)

13 Factory settings

Factory settings can be restored via RstFac.

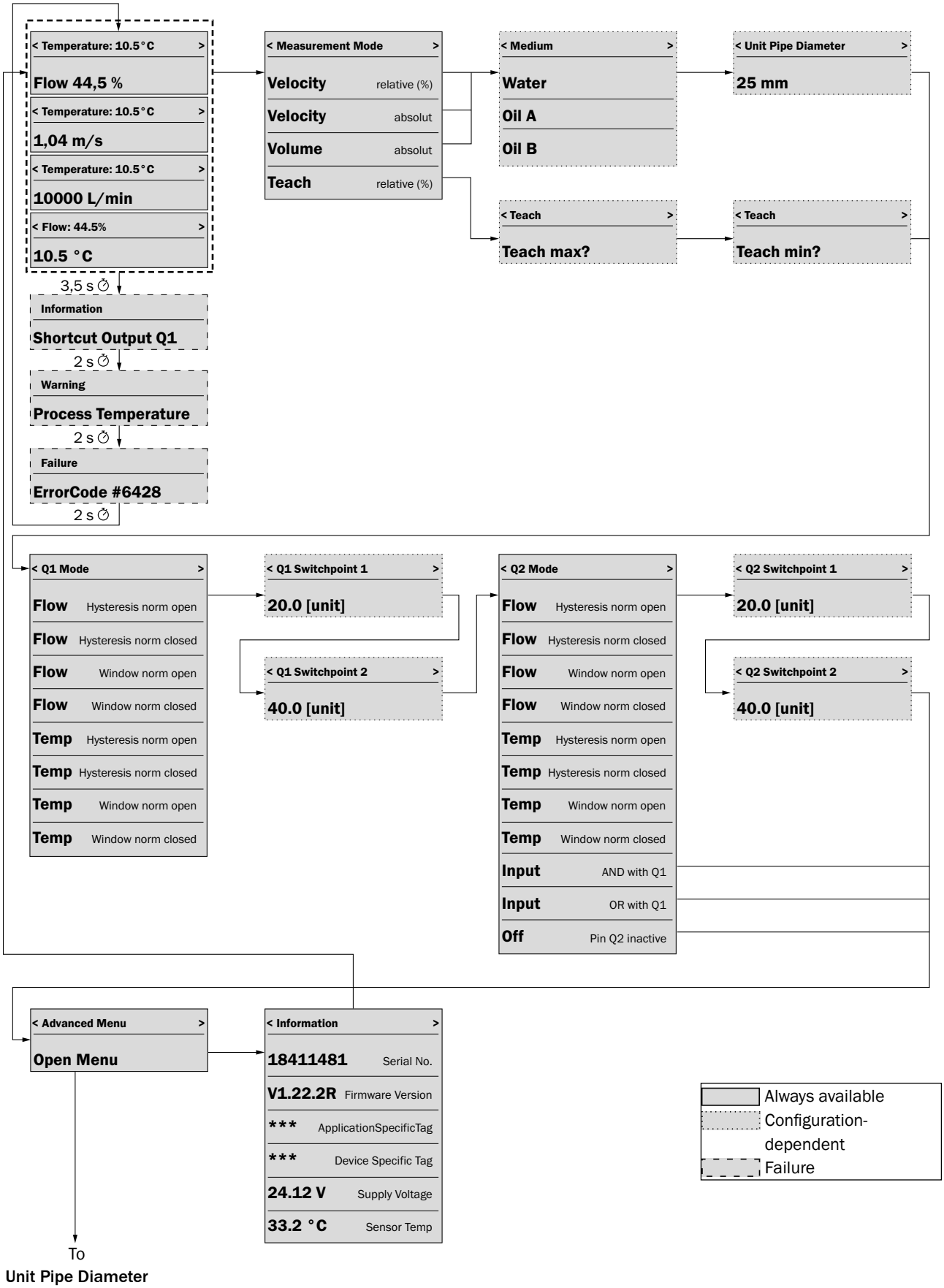
Parameter	Value
Measurement Mode	Relative (%)
Medium	Water
Diameter	26 mm
Q1 Switchpoint 1	50 % (when Flow and Velocity relative are selected)
Q1 Switchpoint 2	30 % (when Flow and Velocity relative are selected)
Q1 Switchpoint 1	0.5 m/s (when Flow and Velocity absolute are selected)
Q1 Switchpoint 2	0.3 m/s (when Flow and Velocity absolute are selected)
Q1 Switchpoint 1	16.0 L/min (when Flow and Volume absolute are selected)
Q1 Switchpoint 2	9.5 L/min (when Flow and Volume absolute are selected)
Q1 Switchpoint 1	30 °C (when Temperature is selected)
Q1 Switchpoint 2	25 °C (when Temperature is selected)
Q1 Mode	Flow Hysteresis norm open
Q2 Switchpoint 1	80 % (when Flow and Velocity relative are selected)
Q2 Switchpoint 2	60 % (when Flow and Velocity relative are selected)
Q2 Switchpoint 1	0.8 m/s (when Flow and Velocity absolute are selected)
Q2 Switchpoint 2	0.6 m/s (when Flow and Velocity absolute are selected)
Q2 Switchpoint 1	25.5 L/min (when Flow and Volume absolute are selected)
Q2 Switchpoint 2	19.0 L/min (when Flow and Volume absolute are selected)
Q2 Switchpoint 1	80 °C (when Temperature is selected)
Q2 Switchpoint 2	75 °C (when Temperature is selected)
Q2 Mode	Flow Hysteresis norm closed
Unit Diameter	mm
Unit Velocity	m/s
Unit Temperature	°C (Celsius)
Unit Volume	L/min
Filter (process data)	1 s
Linear Flow Factor	100 %
Delay Mode Q1	Off
Delay Mode Q2	Off
Simulation	Off
Display Mode	Flow & Temperature
Display Lock	Inactive
ApplicationSpecificTag	***
Device Specific Tag	***

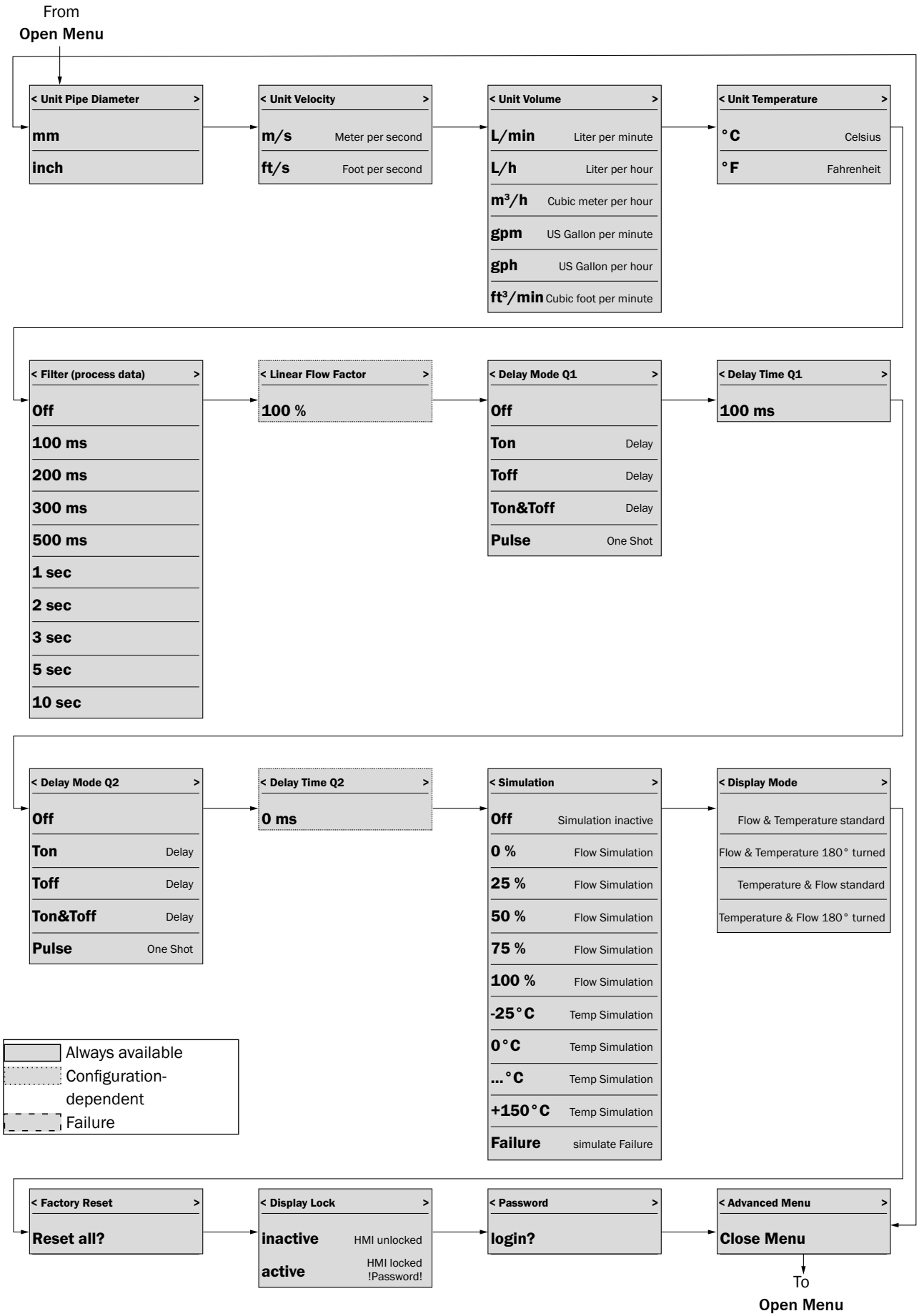
14 Accessories

Part number	Type code	Description
5338774	BEF-CFSG12-FTS1-COMPR. FITTING G1/2	Compression fitting for T-Easic® FTS G1/2
5338775	BEF-CFSN12-FTS1-COMPR. FITTING 1/2"NPT	Compression fitting for T-Easic® FTS 1/2" NPT
2104208	BEF-CFSM18-FTS1-COMPR. FITTING M18X1,5	Compression fitting for T-Easic® FTS M18 x 1.5
2093548	BEF-HA-TCLI10-FTS1-TRI-CLAMP	Compression fitting for T-Easic® FTS clamp DIN32676 DN25-40 (50.5 mm)
6052613	DOL-1204-G02MNI	Cable IP69K - M12x1 4 pins - 2 meter straight
6052615	DOL-1204-G05MNI	Cable IP69K - M12x1 4 pins - 5 meter straight
6052617	DOL-1204-G10MNI	Cable IP69K - M12x1 4 pins - 10 meter straight

▶ More accessories can be found online at: www.sick.com

15 Menu overview




From
Open Menu
< Unit Pipe Diameter >
mm
inch
< Unit Velocity >
m/s Meter per second
ft/s Foot per second
< Unit Volume >
L/min Liter per minute
L/h Liter per hour
m³/h Cubic meter per hour
gpm US Gallon per minute
gph US Gallon per hour
ft³/min Cubic foot per minute
< Unit Temperature >
°C Celsius
°F Fahrenheit
< Filter (process data) >
Off
100 ms
200 ms
300 ms
500 ms
1 sec
2 sec
3 sec
5 sec
10 sec
< Linear Flow Factor >
100 %
< Delay Mode Q1 >
Off
Ton Delay
Toff Delay
Ton&Toff Delay
Pulse One Shot
< Delay Time Q1 >
100 ms
< Delay Mode Q2 >
Off
Ton Delay
Toff Delay
Ton&Toff Delay
Pulse One Shot
< Delay Time Q2 >
0 ms
< Simulation >
Off Simulation inactive
0 % Flow Simulation
25 % Flow Simulation
50 % Flow Simulation
75 % Flow Simulation
100 % Flow Simulation
-25°C Temp Simulation
0°C Temp Simulation
...°C Temp Simulation
+150°C Temp Simulation
Failure simulate Failure
< Display Mode >
Flow & Temperature standard
Flow & Temperature 180° turned
Temperature & Flow standard
Temperature & Flow 180° turned
Always available
Configuration-dependent
Failure
< Factory Reset >
Reset all?
< Display Lock >
inactive HMI unlocked
active HMI locked !Password!
< Password >
login?
< Advanced Menu >
Close Menu
To
Open Menu

16 License text

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Universal 8bit Graphics Library (https://github.com/olikraus/u8glib)

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