

T-EASIC® FTS

Flow sensor

SICK
Sensor Intelligence.



Described product

T-Easic FTS

Manufacturer

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Original document

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1 About this document

1.1 Further information

You can find the product page with further information under the pid.sick.com/{P/N}/{S/N}.

{P/N} corresponds to the part number of the product, see type label or packaging.

{S/N} corresponds to the serial number of the product, see type label or packaging (optional, if specified).

The following information is available depending on the product:

- Data sheets
- These publication in all available languages
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Other publications
- Software
- Accessories

1.2 Symbols and document conventions

Warnings and other notes



DANGER

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



WARNING

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



CAUTION

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



NOTICE

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



NOTE

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

Instructions to action

- The arrow denotes instructions to action.
- 1. The sequence of instructions is numbered.
- 2. Follow the order in which the numbered instructions are given.
- ✓ The tick denotes the results of an action.

2 Safety information

2.1 Intended use

The T-Easic® is a flow sensor for liquids (defined in [section 11](#)) that operates on the basis of the calorimetric measuring principle. It converts the flow rate and temperature of the medium into an electrical signal, thereby providing the following measurands:

- Velocity (absolute)
- Velocity (relative)
- Volume flow
 - Volume
 - Temperature

The information about the flow rate and average temperature of the liquid is shown on the OLED display (industrial version only). In addition, flow and temperature data are also available via IO-Link. Two switching output elements or the pulse output can be configured to control the flow and temperature. Some variants also have an additional analog output.

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

2.2 Improper use

The sensor is not a safety component under the meaning of the EU Machinery Directive (2006/42 / EC). The sensor must not be used in potentially explosive atmospheres.

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

Any use outside the specified areas, in particular use outside the technical specifications and in contradiction to the requirements related to the intended use, is considered improper use.

If the device is not used according to the specifications in this document, the protection provided by the device may be impaired.

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

2.3 Requirements on technical and operating personnel



WARNING RISK OF INJURY DUE TO INADEQUATE TRAINING.

Improper handling of the sensor can lead to significant personal injury and damage to property.

All work must be carried out exclusively by the designated persons.

The operating instructions list the qualification requirements for the various fields of work:

- Instructed personnel have been instructed by the operator in the tasks assigned to them, and have been informed about the potential hazards resulting from incorrect procedures.
- Skilled personnel have the specialized training, skills and experience, as well as knowledge of the relevant regulations, to perform the tasks assigned to them and to recognize potential hazards independently.
- Skilled electricians have the specialized training, technical skills and experience, as well as knowledge of the relevant standards and regulations, to be able to perform work on electrical systems and recognize potential hazards independently. In Germany, qualified electricians must meet the requirements of the BGV A3 Ordinance on Industrial Safety and Health (e.g., master electricians). Other applicable regulations in other countries must be observed.

The following qualifications are necessary for the various tasks:

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 guidelines Knowledge of device control and device operation in the relevant application (e.g., conveyor line)
Commissioning, configuration	• Basic knowledge of the control system used • Basic knowledge of data transmission Basic knowledge of the design and setup of the described connections and interfaces
Operating the device in the relevant application	• Knowledge of device control and device operation in the relevant application (e.g., CIP/SIP system) • Knowledge of the software and hardware environment in the relevant application (e.g., CIP/SIP system)

2.4 Use at high operating temperatures

At a process temperature above 50 °C, the sensor housing may become hot.



DANGER DANGER OF BURNS ON THE SENSOR HOUSING

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

2.5 General safety notes

- Read these operating instructions before commissioning the device.
- These operating instructions are valid for devices with a firmware version of 2.0.0 or higher.
- Observe the national accident prevention regulations/safety rules.
- Wiring work and the opening and closing of electrical connections must only be carried out in a de-energized state.
- The sensor must not be connected to the voltage supply until it has been installed in the pipeline system as described in [section 5.1](#).
- The radiated power is significantly lower than that of telecommunications equipment. According to current scientific knowledge, the operation of this device can be classified as safe and non-hazardous.

3 Product description

3.1 Product identification

3.1.1 Information about the housing

Information identifying the sensor (serial number, part number, and type code) and the electrical connection are provided on the housing (see label) of the sensor.

3.1.2 Type code

T-Easic®FTS	-	I	10	0	F	1	4	A
1		2	3	4	5	6	7	8

Position	Description
1	Product group T-Easic®FTS (flow sensors)
2	Type I: Industrial version H: Hygienic version
3	Probe length 06: 60 mm 10: 100 mm 20: 200 mm
4	Process connection 0: without process connection 1: Clamping ring
5	Media F: Liquids
6	Display 0: No 1: Yes (OLED +3 status LEDs)
7	Electrical connection 4: M12, 4-pin
8	Electrical power A: 1 digital output + 1 digital input/output B: 1 digital output + 1 digital input/output/analog output



NOTE

Not all versions with the type code can be combined

3.2 Product characteristics

3.2.1 Device view

The T-Easic® is offered in two versions:

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

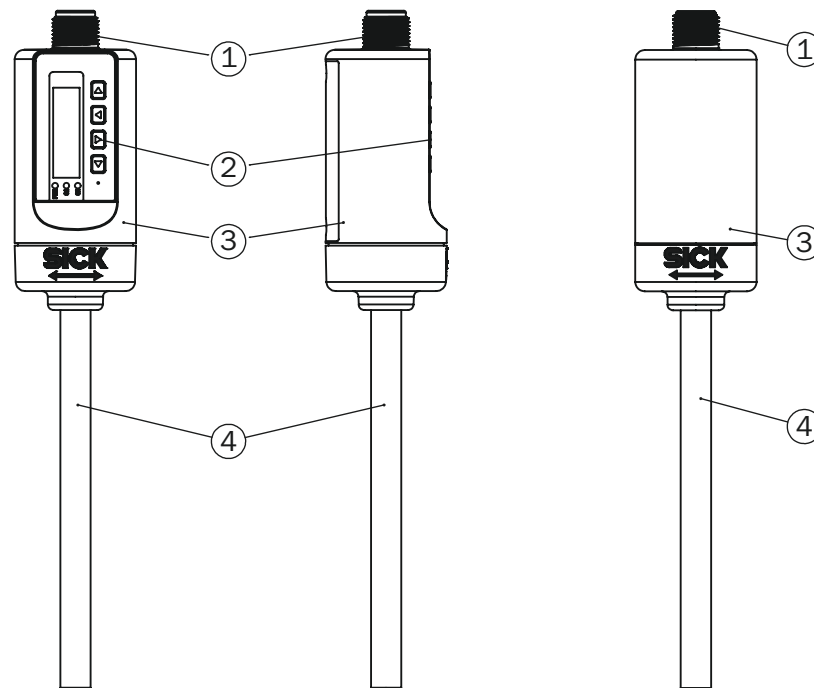


Figure 1: View of the industrial version T-Easic®, hygienic version

- ① M12 electrical connection
- ② Display with operating buttons and LEDs
- ③ Housing
- ④ Measurement probe

3.2.2 Control elements (industrial version only)

The sensor is controlled using the display and the operating buttons (industrial version only).

A detailed description of the buttons and their functions can be found in [see "Delay Mode Q1", page 43](#).



NOTE

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

Information on IO-Link can be found in [see "Operation", page 25](#).

3.3 Product features and functions

Principle of operation

The T-Easic FTS (Flow Thermal Switch) monitors the flow rate of liquids (e.g. water, aqueous media, oil, etc.).

This measurement method is based on the calorimetric principle. The sensor measures the cooling effect of the liquid flowing past the heated measurement probe. The higher the flow rate of the liquid, the greater the cooling effect on the heated probe.

The sensor has two configurable digital outputs (Q1 and Q2) for flow and temperature. Q1 can also be used for empty pipe detection. The sensor can detect whether there is medium at the sensor tip and thereby detect an empty pipe.

The Q1 digital output also has an IO-Link interface (see [see "Operation", page 25](#)).

Q2 can also be used as a pulse output or digital input.

Depending on the electrical version (see ["Type code", page 9](#)), Q2 can also be used as an analog output.

Fields of application

The T-Easic® is particularly suitable for measurement tasks relating to coolant circuits, pumps, heat exchangers, leak monitoring for process lines, dry-running protection for pumps, as well as monitoring the oil in hydraulic systems, the lubrication of wind turbines, and hydraulic circuits. Due to its high temperature resistance, the T-Easic® is also suitable for use in SIP (**Sterilization in place**) processes.

4 Transport and storage

4.1 Transport

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



NOTICE DAMAGE TO THE SENSOR DUE TO IMPROPER TRANSPORT.

- When being transported, the device must be packed in a shockproof manner and protected against moisture.
- Recommendation: Use the original packaging as it offers optimal protection.
- Transport should only be carried out by qualified personnel.
- Always exercise the utmost care and caution when unloading and transporting the sensor within your company.
- Pay attention to the symbols on the packaging.
- Do not remove the packaging until immediately before starting the installation.

4.2 Transport inspection

Immediately after receipt of the goods, check the delivery for completeness and any damage that may have occurred during transport. Proceed as follows in the event of externally visible transport damage:

- Do not accept the delivery, or only with reservations.
- Note the extent of damage on the transport documents or on the carrier's delivery bill.
- Submit a complaint.



NOTE

Defect complaints should be submitted immediately after they are noticed. Claims for damages can only be made prior to expiry of the relevant complaint period.

4.3 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Do not store outdoors.
- Store in a dry and dust-protected place.
- Do not store in an airtight container: This does not allow any residual moisture to escape.
- Do not expose to aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature range: see [see "Technical data", page 55](#).
- For storage periods longer than 3 months, regularly check the general condition of all components and the packaging.

5 Mounting

5.1 Installation conditions

When installing the sensor, the system must be de-pressurized and the pipe in which the sensor is to be installed must be empty.

For flow and temperature measurement, the inserted probe must always be completely enclosed by the medium. If the sensor is used for empty pipe detection, the sensor detects whether there is medium at the sensor tip and can thereby detect an empty pipe.

The minimum insertion depth 3 of ≥ 12 mm must be adhered to.

The cutting ring of the process connection adapter 1 must be ≥ 25 mm away from the probe tip 2 to avoid damage to the sensor element.

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

A minimum distance of ≥ 10 mm from the tip of the probe to the pipe wall must be maintained 4.

At medium temperatures above $100\text{ }^{\circ}\text{C}$, the distance between the bottom of the housing and the top of the process connection adapter must be at least 25 mm 5.



NOTE

If a Sick process connection adapter is used (see ["Accessories", page 68](#), the 60 mm probe cannot be used at process temperatures above $100\text{ }^{\circ}\text{C}$. This is because the separation distances cannot be maintained.

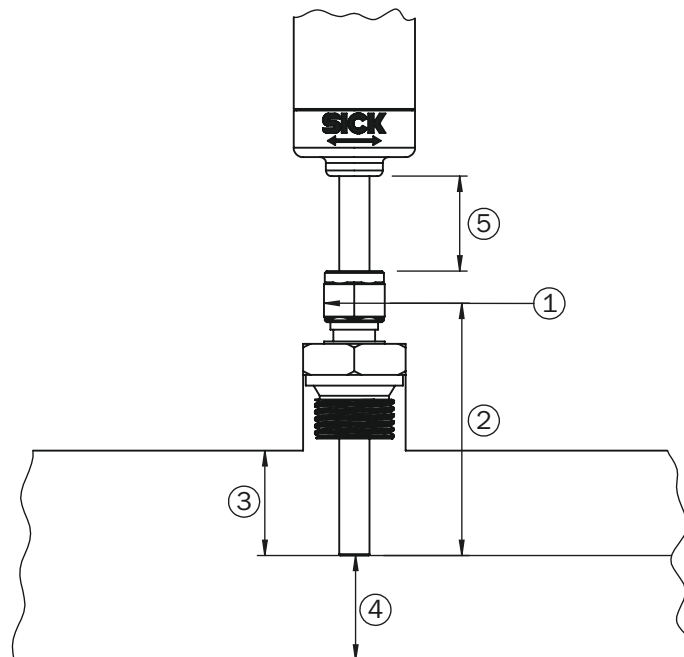


Figure 2: Minimum lengths during installation

- ① Clamping area of the cutting ring
- ② Distance between cutting ring threaded connection and probe tip ≥ 25 mm
- ③ Insertion depth ≥ 12 mm
- ④ Distance from the probe tip to pipe wall ≥ 10 mm
- ⑤ Distance between the bottom of the housing and the top of the process connection adapter at temperatures above $100\text{ }^{\circ}\text{C}$: ≥ 25 mm

The inlet zone before the sensor should be at least 5 to 10 times the pipe diameter. The outlet zone after the sensor should be at least 3 to 5 times the pipe diameter.

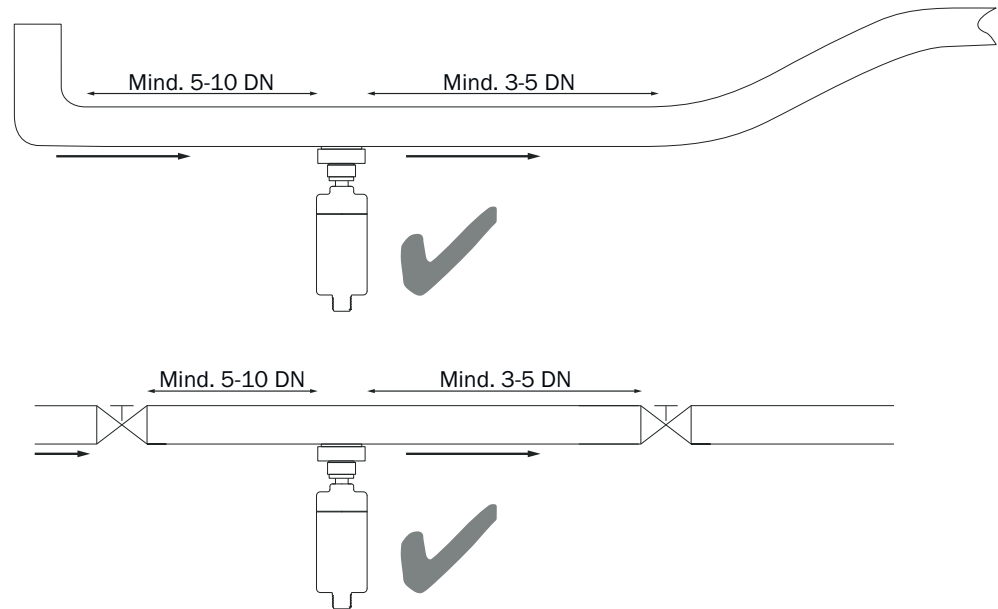


Figure 3: Recommended inlet and outlet zones

For vertically installed pipes, installation in the riser is recommended. The sensor must not be installed in front of or in a downpipe, or in an open downpipe.

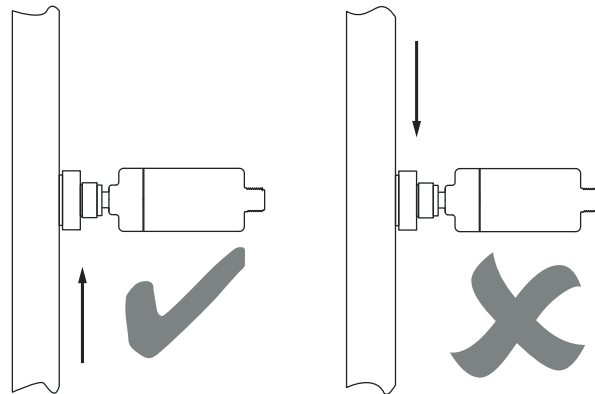


Figure 4: Vertical installation position

For horizontal pipes, side mounting or mounting from below is possible (only applies if the pipe is free of deposits).

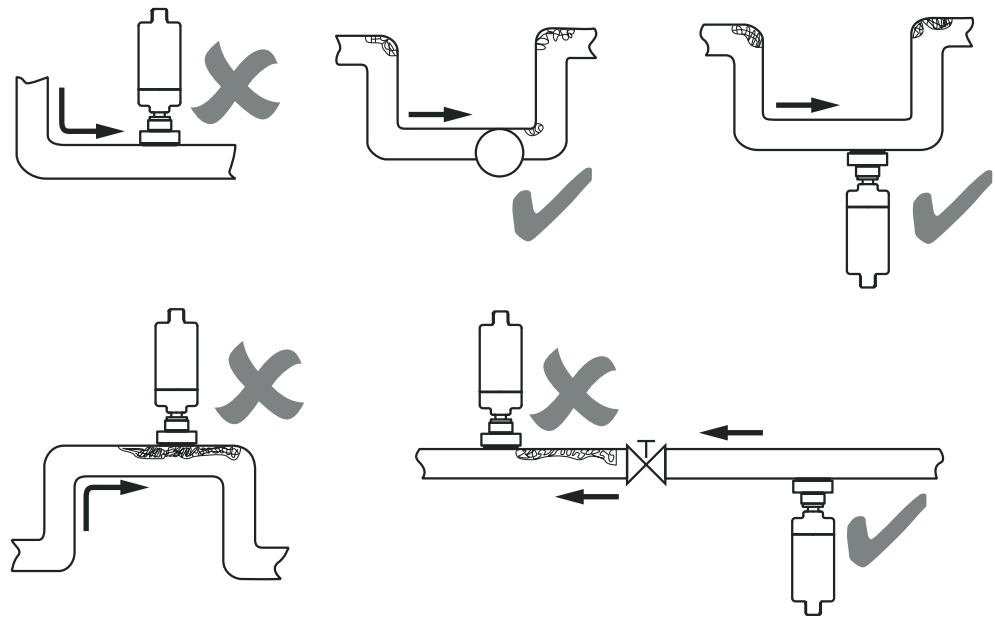


Figure 5: Horizontal installation position

Mounting from above is only possible if the pipeline is completely filled with medium.



NOTICE

Restrictions and additional conditions apply in the case of installations for hygienic applications (see ["Mounting the hygienic process adapter"](#), page 18 and ["Removing the hygienic process adapter"](#), page 21)

5.2 Probe alignment to the flow direction

For optimum measurement accuracy, make sure that the arrow on the bottom shell of the sensor is aligned in the direction of flow.

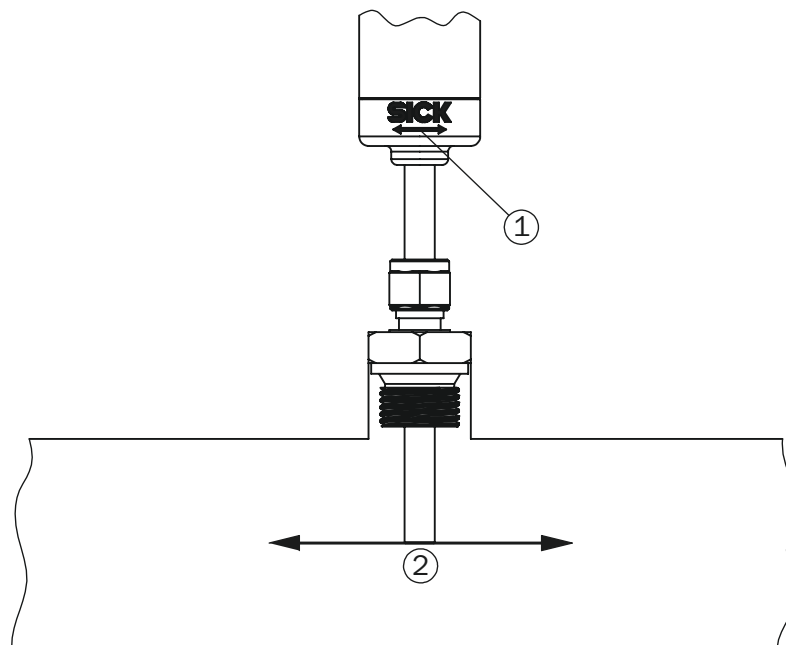


Figure 6: Probe alignment to the flow direction

- ① Arrow on the bottom shell of the housing

② Flow direction



NOTE

For different installation conditions or a different probe alignment, the measurement accuracy cannot be maintained.

5.3 Probe alignment for empty pipe detection

For optimum empty pipe detection, make sure that the sensor is installed laterally in the pipeline and that the medium can flow off the sensor tip well. The pipe will only be detected as empty if the probe is uncovered and free of debris.

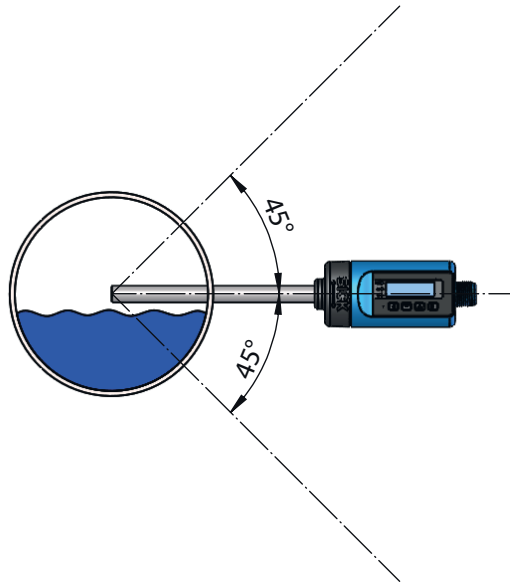


Figure 7: Alignment of the T-Easic® for empty pipe detection

5.4 Mounting the sensor

1. Stop the flow.
2. Depressurize the system.
3. Empty the pipe in which the sensor is to be installed.
4. Install the process connection adapter or T-piece at the desired installation location. Make sure that the interfaces are sealed off.
5. Install the sensor in the process connection adapter or in the T-piece (see ["Mounting the process connection adapter"](#), page 16 see ["Mounting the hygienic process adapter"](#), page 18 and see ["Mounting in a T-piece"](#), page 18).



NOTICE LEAK

When sealing the process connection and pipe, take into account the operating pressure so as to select the correct sealing method.

5.5 Mounting the process connection adapter

Only use original adapters from SICK. These are available as accessories (see ["Accessories"](#), page 68).

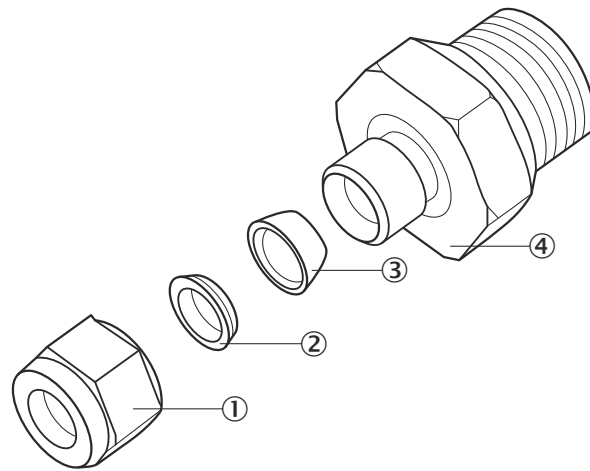


Figure 8: Parts of the process connection adapter

- ① Coupling nut
- ② Rear clamping ring
- ③ Front clamping ring
- ④ Process connection

1. Insert the probe of the sensor into the process connection adapter. Adjust the adapter to the correct height (see ["Installation conditions", page 13](#)).
2. Hand tighten the coupling nut until the probe can no longer be turned by hand or moved axially in the connection.
3. Mark the coupling nut in the 6 o'clock position.
4. Hold the process connection with an open-end wrench (width across flats 27) and tighten the coupling nut 1 1/4 turns to the 9 o'clock position. For this purpose, use an open-end wrench with a width across flats of 16.

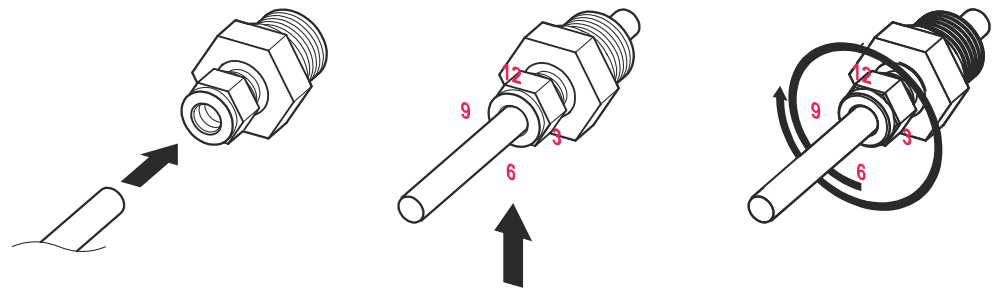


Figure 9: Mounting a process connection adapter on the sensor probe

5.6 Removing and remounting the process connection adapter



CAUTION PRESSURE

Always depressurize the system. Stop the flow and drain the pipe before removing the sensor.

The process connection adapter can be removed from the sensor and remounted multiple times. The compression fitting remains firmly attached to the sensor probe (cannot be detached from the sensor probe once it has been mounted (see ["Mounting the process connection adapter", page 16](#))).

Removing the process connection adapter

Hold the process connection with an open-end wrench (width across flats 27). Loosen the coupling nut using an open-end wrench (width across flats 16).

Remounting the process connection adapter

1. Insert the probe with the mounted compression fitting into the process connection. When doing so, make sure that the sealing surfaces are clean and there is no damage on the surface.
2. Tighten the coupling nuts finger tight. Then tighten them using an open-end wrench (width across flats 16) until you feel a sharp increase in the force to be applied (approx. 1/4 turn). While doing so, hold the body of the fitting with a second open-end wrench (width across flats 27).

5.7 Mounting in a T-piece

Use only original T-pieces from SICK. These are available as accessories (see ["Accessories"](#), page 68).

When mounting in these T-pieces, use the sensor variants with a permanently pre-mounted clamping ring (see ["Type code"](#), page 9 position 4).

During installation, insert the sensor with pre-assembled clamping ring into the T-piece until the clamping ring is seated in the nozzle. Align the sensor so that the arrow on the bottom shell of the sensor points in the direction of flow. Hold the T-piece in place while tightening the coupling nut until there is noticeable resistance. Slightly tighten the coupling nut at this point using an open-end wrench with a width across flats of 16.

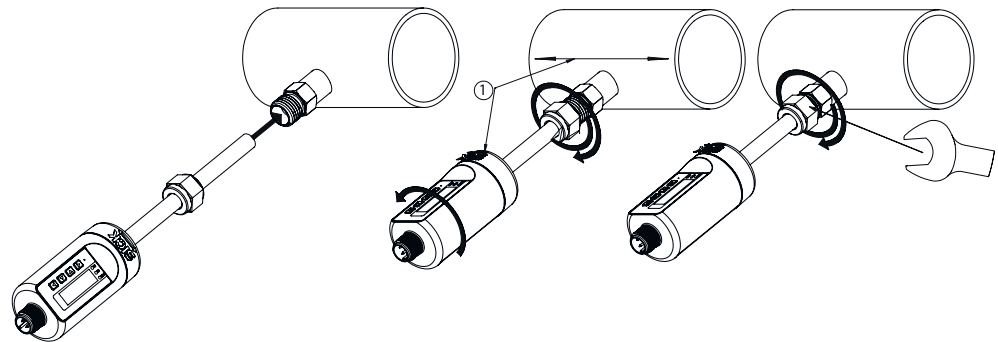


Figure 10: Mounting of the T-Easic® with permanently pre-mounted clamping ring in a T-piece



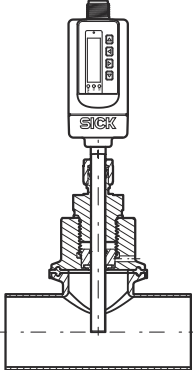
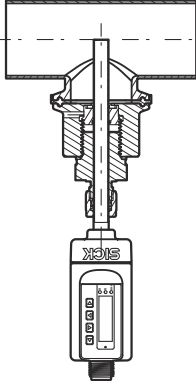
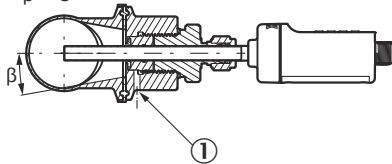
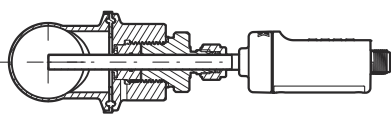
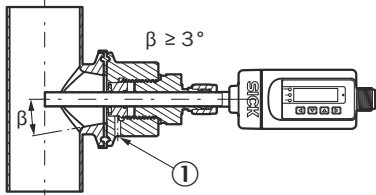
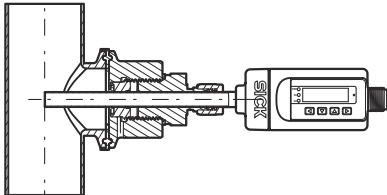
NOTE

Removal of the sensor with pre-assembled clamping ring from the T-piece is carried out in the same way as described in ["Removing and remounting the process connection adapter"](#), page 17.

5.8 Mounting the hygienic process adapter

For hygienic applications, the sensor must always be combined with the hygienic process adapter. Installation must always be carried out in such a way that the installation space around the installation is self-draining. That is, the process medium must be able to flow off completely under the influence of gravity only.

Table 1: Installation

Permissible installation ☺	Impermissible installation ☹
Media flow downwards 	Media can collect in the installation space 
Orient the leakage hole ① downwards $\beta \geq 3^\circ$ 	Media in the installation space cannot drain off 
Orient the leakage hole ① downwards $\beta \geq 3^\circ$ 	Media in the installation space cannot drain off 

**NOTE**

EHEDG-certified installations are only possible using the process connections listed in the **EHEDG Position Paper**. For this purpose, special seals or connection systems must be used, which also comply with the relevant **EHEDG Position Paper**. These seals are not included with delivery.

**NOTE**

Furthermore, for EHEDG compliant installations, the conditions described in the **EHEDG Position Paper** must be adhered to. Particular care must be taken to ensure that the prescribed conditions in the dead zone are met, [see figure 11](#).

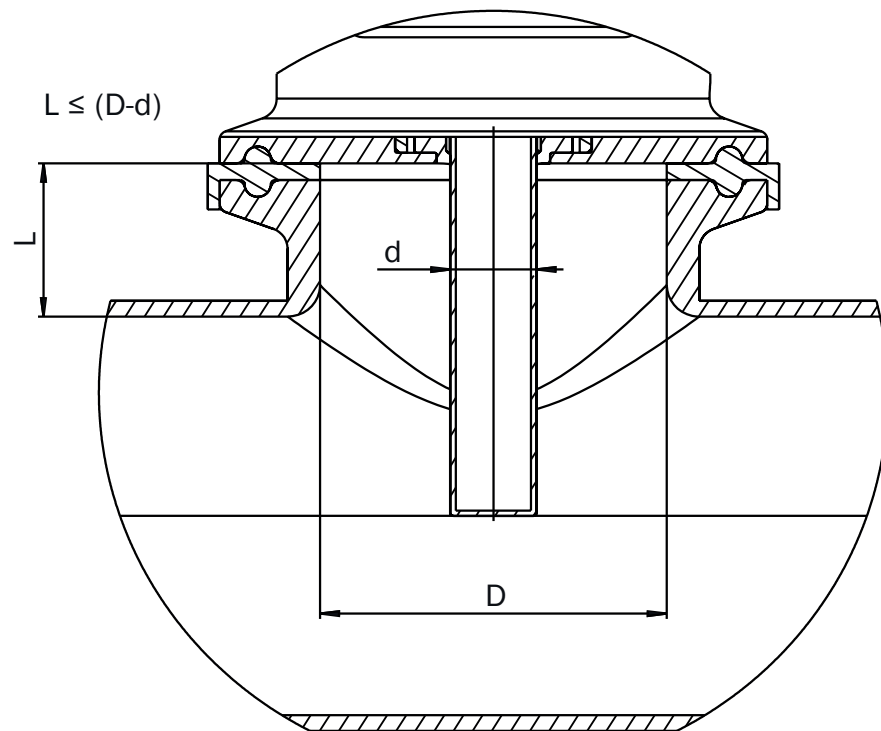


Figure 11: Conditions in the dead zone according to the *EHEDG Position Paper, Version 5*

The hygienic process adapter is supplied assembled and must not be unscrewed.

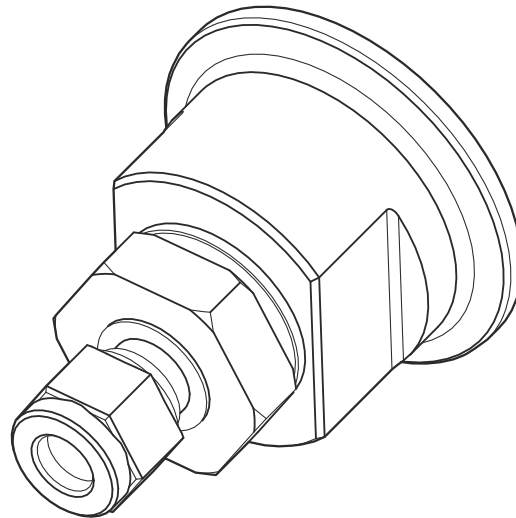


Figure 12: Structure of the hygienic process adapter in the assembled state

1. Insert the probe of the sensor into the hygienic process adapter (P/N 2093548). If you perform a rotary movement in addition to the axial movement when inserting the measuring probe, the sensor can be inserted more easily. Adjust the adapter to the correct height (see ["Installation conditions", page 13](#)). For optimum measurement accuracy, make sure that the arrow on the bottom shell of the sensor is aligned in the direction of flow (see ["Probe alignment to the flow direction", page 15](#))
2. Hand tighten the coupling nut until the probe can no longer be turned by hand or moved axially in the connection.

3. Mark the coupling nut in the 6 o'clock position.
4. Hold the body of the fitting securely with a spanner and open-end wrench (width across flats 27). Tighten the coupling nut 1 1/4 turns to the 9 o'clock position. For this purpose, use an open-end wrench with a width across flats of 16.

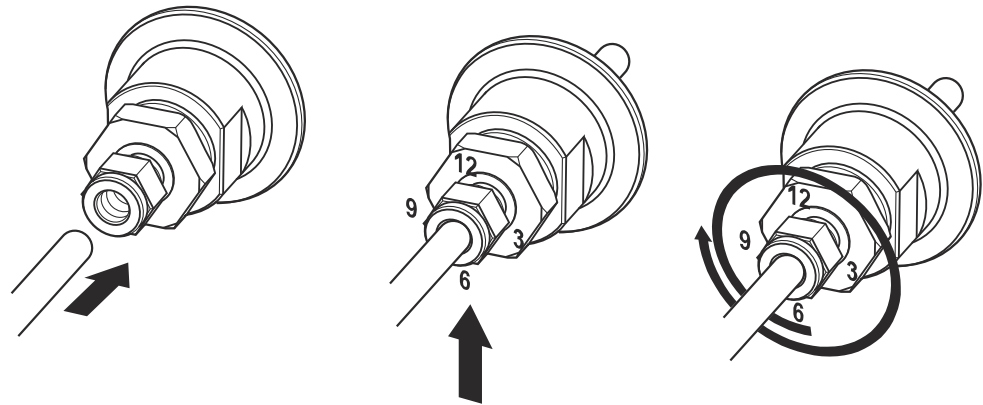


Figure 13: Mounting the hygienic process adapter on the sensor probe



NOTE

All wetted materials of the hygienic process adapter and the sensor probe are FDA compliant.



NOTE

The hygienic process adapter must not be exposed to temperatures below 5 °C with the sensor installed. At temperatures below 5 °C with the sensor installed, the molded seal will be irreversibly damaged.



NOTE

When installing the sensor, make sure that the leakage hole is facing downwards so the medium can drain off (see [section 5.8](#)).



NOTICE

The assembly sequence is functionally relevant. A pre-assembled measuring probe with process connection adapter that was mounted without using a hygienic process adapter as per [section 5.8](#), or a measuring probe with pre-mounted clamping ring must not be retrofitted with the hygienic process adapter.



NOTICE

Only use the hygienic process adapter for process media where the chemical resistance of the integrated FKM seal is ensured.

5.9 Removing the hygienic process adapter

When removing the hygienic process adapter, the process connection adapter must remain attached to the sensor as the sensor is unscrewed. To do so, loosen the fitting using an open-end wrench with a width across flats of 27. The process connection adapter must not, however, be detached from the measuring probe under any circumstances, i.e. the coupling nut must not be loosened, as otherwise the tightness of the hygienic seal is no longer ensured when it is remounted.

When remounting the sensor assembly incl. process connection adapter with the hygienic process adapter, make sure that the sealing ring is also installed.

The tightening torque of the process connection adapter on the hygienic process adapter must be 30-40 Nm.

The width across flats on the process connection adapter is 27 mm, the width across flats on the hygienic process adapter is 30 mm.

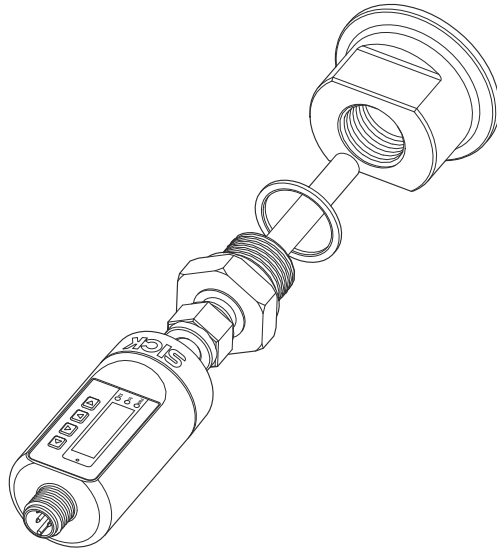


Figure 14: Removing the hygienic process adapter

5.9.1 Cleaning the sensor with hygienic process adapter

When combined with the hygienic process adapter, the sensor is designed for CIP cleaning and does not have to be removed for cleaning. The cleaning parameters must be determined by the operating entity in line with the hygienic requirements. The wetted materials are made from 1.4404 stainless steel and FKM. Corrosive and chemically aggressive substances such as chlorine-based cleaning media may cause damage to the surfaces and materials depending on the concentration, temperature and exposure time. It is the responsibility of the user to select the cleaning agent.

6 Electrical installation

6.1 Safety

Instructions on electrical installation



NOTICE DEVICE DAMAGE DUE TO INCORRECT SUPPLY VOLTAGE!

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

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



NOTICE EQUIPMENT DAMAGE OR UNPREDICTABLE OPERATION DUE TO WORKING WITH LIVE PARTS.

Working with live parts may result in unpredictable operation.

- Only carry out the wiring when the power is off.
 - The voltage supply must be disconnected when attaching and detaching electrical connections.
-
- Only qualified electricians are allowed to perform the electrical installation work.
 - Always comply with standard safety requirements when working on electrical systems.
 - Only switch on the supply voltage for the device when all connections have been established and the wiring has been thoroughly checked.
 - When using extension cables with flying leads, make sure the bare wire ends do not touch (risk of short-circuit when the supply voltage is switched on). All cables must be properly insulated from each other.
 - The conductor cross section of the supply cable from the user's voltage supply system must be designed in accordance with the applicable standards. In Germany, the following standards must be observed:
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 circuits with safety extra-low voltage (SELV) and protective extra-low voltage (PELV).
 - Protect the device with a separate fuse at the input of the supply circuit.



NOTE REGARDING THE LAYOUT OF DATA LINES:

- Use only shielded data cables with twisted wires.
- Make sure that the shielding is correct and complete.
- 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 in parallel with voltage supply cables or motor cables over longer distances within cable ducts.

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

- The cable connected to the M12 connection is screwed tight.

If this is not the case, the device will not meet the specified IP enclosure rating.

6.2 Electrical connection

Overview of the electrical connections

The sensor is connected using a pre-assembled female cable connector with an M12 x 1 (4-pin) plug connector. For more information on the available cables, please refer to [see "Accessories", page 68](#).

In the de-energized state, plug the female cable connector into the sensor. Screw them tight.

Connect the cables according to their function. After the supply voltage has been switched on, the display (industrial version only) shows the current measured values.



NOTICE

All connections are reverse polarity protected, however, in the event of incorrect connection of the supply voltage, the sensor might appear to be operating correctly but this may not be the case.

The T-Easic FTS is available in two different electrical versions A and B (see [see "Type code", page 9](#) position 8).

The electrical version B differs from version A only by having an additional analog output on Q2.

Pin assignment, M12 plug connection, 4-pin, version A

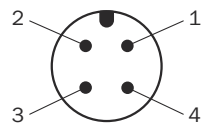


Figure 15: M12 x 1 plug connection, 4-pin

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

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

Pin assignment, M12 plug connection, 4-pin, version B

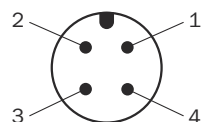


Figure 16: M12 x 1 plug connection, 4-pin

Contact	Identification	Wire color	Description
1	L+	Brown	Supply voltage
2	Q2 / Qa	White	Switching output/push-pull/pulse output/digital input/analog output (4...20 mA scalable)
3	M	Blue	Weight
4	C/Q1	Black	Switching output/push-pull/IO-Link communication

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

7 Commissioning

7.1 Quick commissioning (using factory settings)

Quick commissioning is used when operating under reference conditions (see [see "Installation conditions", page 13](#)).

Commissioning

1. Install the sensor according to the installation conditions as described in [see "Mounting", page 13](#). While installing the T-Easic®, the pipe system must be empty and pressure-free.
2. Switch on the supply voltage.
The sensor performs a self-test and is then ready for operation (with default settings: see [see "Factory settings", page 57](#)).
The display (industrial version only) shows the current measured values.

Should any problems arise during commissioning, you will find information under [see "Troubleshooting", page 49](#).

7.2 Operation

The industrial version of the T-Easic® is controlled via the display using the operating buttons.

A detailed description of the operating buttons and their functions can be found under [see "Operation", page 25](#).

The T-Easic® (hygienic and industrial variant) can be configured via the IO-Link 1.1 communication interface (see [see "Operation", page 25](#)).

Display, LEDs and operating buttons (industrial version only)

The OLED display shows settings, values, information, and error messages. The OLED display turns off automatically after 10 minutes of non-use. It can be turned on again by pressing any key.

The display is aligned horizontally to the axis of the measurement probe. It can be rotated (figures shown) by 180° (see [see "Display Rotation \(industrial version only\)", page 46](#)).



Figure 17: Display (industrial version only)

Use the arrow keys and the display to navigate through the menu structure.

Use the right and left arrow keys to navigate between the individual menu items.

Use the up and down arrow keys to select between the different options within a menu and to change values. Your selection will be applied immediately.

You can also use the down arrow key to open a submenu.

Information shown on the display (industrial version only)

The display shows the current values for flow and temperature. Which value is shown in the upper or lower part of the display is configurable (see ["Display Mode", page 46](#)). If there is an additional information or warning, the display alternates between this message and the current values every 3.5 seconds.

If there is more than one information (or warning/error message; up to three are possible), the display alternates between the messages and the current values every 2 seconds. For more information on the messages shown on the display, see ["Error message shown on the display \(industrial version only\)", page 49](#).

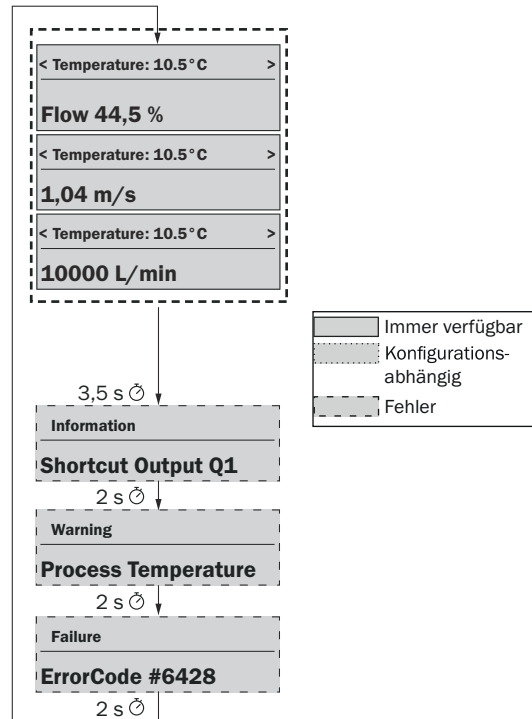


Figure 18: Home screen and error messages

LEDs (industrial version only)

To the left of the display there are three LEDs that indicate the following:

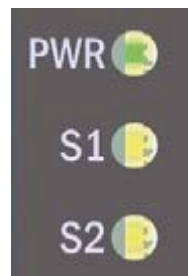


Figure 19: LEDs for industrial version

LED	Status on	Status off	Status flashing
PWR	Supply voltage is on	Supply voltage is not on	Flashes during IO-Link communication
S1	Digital output Q1 active	Digital output Q1 inactive	Device in error state (see displayed message)

LED	Status on	Status off	Status flashing
S2	Digital output Q2 active or High signal applied at digital input Q2	Digital output Q2 inactive or Low signal applied at digital input Q2 or pulse output active or analog output active	Device in error state (see displayed message)

**NOTICE**

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

IO-Link

To operate the device via IO-Link, an IODD file, function blocks for 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 by means of various measurement parameters.

First of all, you need to specify whether the sensor is to be operated in Velocity (relative or absolute) or Volume (volume flow or counter) mode, or whether it is to be taught-in (Teach).

Secondly, you can select from three different medium options (water, oil A, oil B).

There are several ways to configure Measurement Mode:

- **Velocity relative [%]:** The velocity is displayed as a percentage of the full scale value.
- **Velocity absolute:** The velocity is displayed as an absolute measured value in the unit selected for Unit Velocity (see ["Unit Velocity", page 40](#)).
- **Volume flow:** The volume flow is displayed as an absolute measured value in the unit selected for Unit Volume Flow (see ["Unit Volume Flow", page 40](#)).
- **Volume counter:** The volume counter is displayed as an absolute measurement in the unit selected for Unit Volume (see ["Unit Volume", page 40](#)). If this measurement mode is set, there is an option in the display to reset the volume counter (**Reset Volume**). The volume counter is automatically reset each time the device is restarted. To output the volume counter, pulse output must be selected in Q2.
- **Teach relative [%]:** If the medium to be measured differs from the available preset media (water, oil A or oil B), a teach-in operation can be performed to optimize the performance of the sensor. The flow rate is then displayed as a percentage of the flow range between the taught-in maximum and minimum flow. The sensor gives you the option to teach in three different media and to store them in the sensor (see ["Configuring the measuring mode based on the "Teach relative" mode \(example\)", page 28](#)).

If the sensor is operated in Velocity (relative or absolute) or Volume (volume flow or counter) mode, the medium can be selected from three different options (water, oil A, oil B). The closer the actual medium is to the selected 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 continuously displays 0% or 100% even though the correct medium has been selected, then the selected medium does not fit. Please teach in the medium via the Teach relative menu item (see ["Configuring the measuring mode based on the Teach relative" mode \(example\)", page 28](#)).

**NOTE**

The T-Easic FTS is calibrated with water at the reference conditions (inner pipe diameter 25 mm, vertical installation in the pipe, tip in the middle of the pipe, probe oriented in the pipe as described in section ["Probe alignment to the flow direction", page 15](#), completely filled pipe without air bubbles, velocity between 10 cm/s and 100 cm/s, inlet zone > 30 cm, outlet zone > 30 cm, 26 °C ± 1 °C, 2 bar ± 1 bar). The media OIL A and OIL B are taught-in. If you are using different medium, this can result in deviations in the measurement accuracy.

7.3.1 Configuring the measurement mode based on the volume (volume flow and counter) (example)

1. Use the arrow keys (left/right) to select the **Measurement Mode** menu.
2. Use the arrow keys (up/down) to select the **Volume (flow and counter)** parameter.
3. Use the right arrow key to select the **Medium** parameter.
4. Use the arrow keys (up/down) to select **Water**, **Oil A** or **Oil B**.
5. Use the right arrow key to select **Pipe Diameter**. (The pipe inner diameter only needs to be entered in Volume measurement mode and is only visible in this mode. The unit for the diameter can be selected in the advanced menu settings, see ["Unit Pipe Diameter", page 39](#).)
6. Increase or decrease the value using the arrow keys (up/down).
7. To output the volume counter, pulse output must be selected in Q2. The pulse width and pulse valency can be entered here in the **Pulse Width** and **Pulse Valency** fields.
The volume flow can be output via the switching outputs Q1 and/or Q2 or, depending on the electrical version, via the analog output.

7.3.2 Configuring the measuring mode based on the "Teach relative" mode (example)

1. Use the arrow keys (left/right) to select the **Measurement Mode** menu.
2. Use the arrow keys (up/down) to select the **Teach relative [%]** parameter.
3. Use the right arrow key to open the **Teach select** menu.
4. Use the down arrow key to select Teach 1, Teach 2, or Teach 3, depending on whether you already have taught-in media that you do not want to overwrite.
5. Start the system and make sure that the maximum flow rate is reached.
6. Use the right/down arrow keys to select the **Teach max?** parameter. (Teach max.?) off.
The message **run ...** is displayed during the teach-in cycle.
If the teach-in completed successfully, the message **Teach OK** is displayed. If an error occurred during teach-in, the message **Teach not OK** is displayed and the steps described above must be repeated.
7. Reduce the flow rate to the minimum flow rate.
8. Use the arrow keys (up/down) to select the **Teach min?** parameter. (Teach min.?) off. (Parameter is displayed only after the **Teach max?** step has been successfully completed.)
The message **run ...** is displayed during the teach-in cycle.
When the teach-in is successfully completed, the message **Teach OK** is displayed. If an error occurred during teach-in, the message **Teach not OK** is displayed and the steps described above must be repeated.

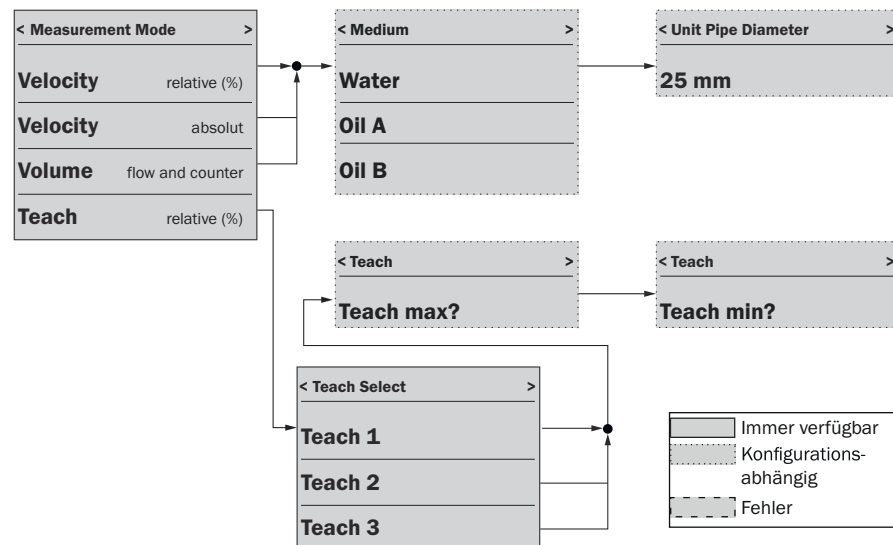


Figure 20: Menu structure for configuring the measurement mode

**NOTE**

For optimum measurement accuracy, make sure that the medium teach-in is only performed when the medium temperature of the system has reached the steady state.

7.3.3 Configuration options for Q1 and Q2

Q1 and Q2 can be configured as a 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). Q1 can be configured as an empty pipe detection output (normally open or normally closed). Q2 can be configured as a pulse output or disabled (by selecting **Off Pin Q2 inactive**).

Q2 can be linked to Q1 as an input using Boolean logic (AND or OR). In the electrical version B with analog output, Q2 can additionally be configured as an analog output.

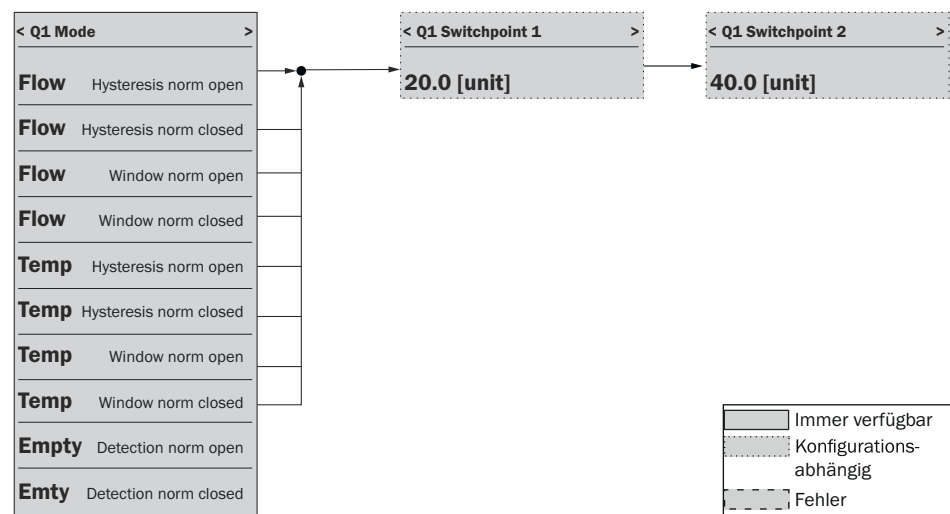


Figure 21: Menu structure for Q1 mode

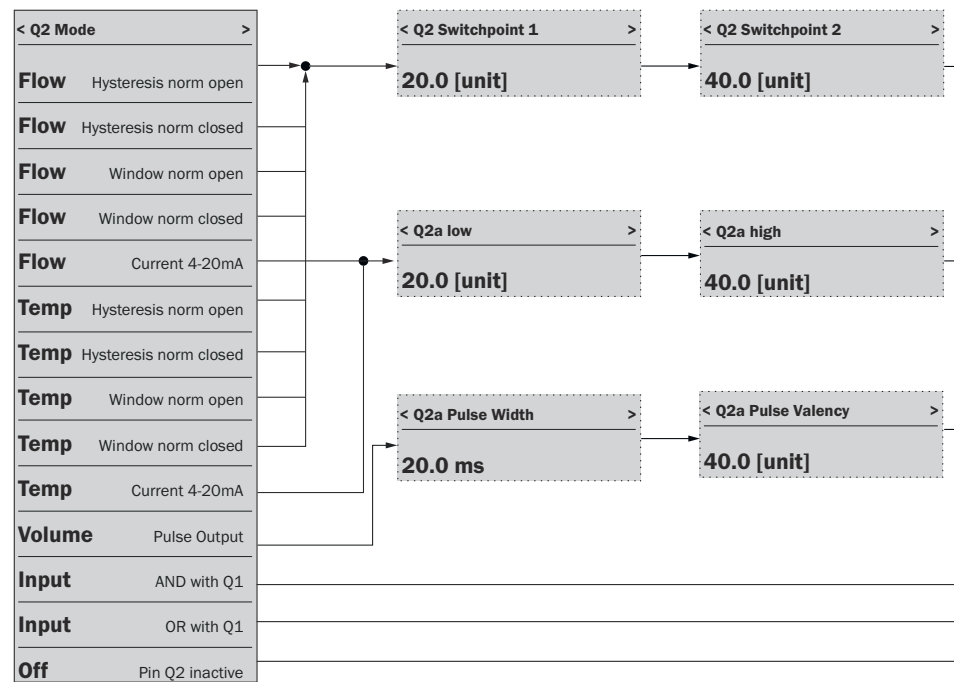


Figure 22: Menu structure for Q2 mode

**NOTE**

Pulse output can only be selected if **Volume (flow and counter)** measurement mode has been selected.

The **Flow Current 4-20 mA** and **Temp Current 4-20 mA** selections are only shown in the electrical version B with an analog output.

7.3.4 Configuring the Q1 and Q2 digital output

When the flow (or temperature) varies by the configured value, the hysteresis keeps the switching state of the outputs stable.

When the flow (or temperature) increases, the output switches when the respective switchpoint (SP1) is reached. When the flow (or temperature) drops again, the output does not switch back until the reset switchpoint (SP2) is reached.

The window function allows you to monitor a specified range. When the flow (or temperature) is between window high (SP1) and window low (SP2), the output is active (normally open) and/or inactive (normally closed).

The cable break monitoring indicates the error status of the measuring device. When in error status, the measuring device switches to the safe state. The safe state of the electronics is in the 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. Use the arrow keys (left/right) to select **Q1 Mode**.
2. Use the arrow keys (up/down) to select **Flow Hysteresis norm open**.
3. Use the right arrow key to select **Q1 Switchpoint 1 (SP1)**.
4. Increase or decrease the value using the arrow keys (up/down).
5. Use the right arrow key to select **Q1 Switchpoint 2 (SP2)**.

6. Increase or decrease the value using the arrow keys (up/down).
7. The sensor uses the larger **Switchpoint** as the upper switching threshold, and the smaller **Switchpoint** as the lower switching threshold.
8. If required, configure the delay mode and delay time (see ["Delay Mode Q1", page 43](#)).

Switching output behavior

Flow/temperature

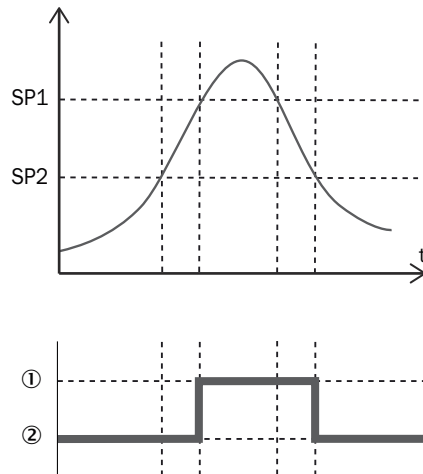


Figure 23: Normally open with configurable hysteresis

- ① Active
- ② Deactivated

7.3.6 Normally closed with configurable hysteresis

Configuration based on Q1 for flow (example)

1. Use the arrow keys (left/right) to select **Q1 Mode**.
2. Use the arrow keys (up/down) to select **Flow Hysteresis norm closed**.
3. Use the right arrow key to select **Q1 Switchpoint 1 (SP1)**.
4. Increase or decrease the value using the arrow keys (up/down).
5. Use the right arrow key to select **Q1 Switchpoint 2 (SP2)**.
6. Increase or decrease the value using the arrow keys (up/down).
7. The sensor uses the larger **Switchpoint** as the upper switching threshold, and the smaller **Switchpoint** as the lower switching threshold.
8. If required, configure the delay mode and delay time (see ["Delay Mode Q1", page 43](#)).

Switching output behavior

Flow/temperature

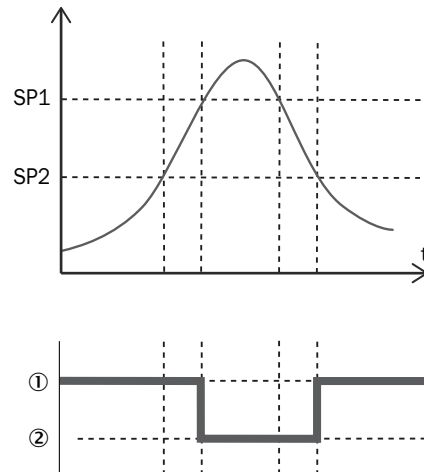


Figure 24: Normally closed with configurable hysteresis

- ① Active
- ② Deactivated

7.3.7 Normally open with window function

Configuration based on Q1 for flow (as an example)

1. Use the arrow keys (left/right) to select **Q1 Mode**.
2. Use the arrow keys (up/down) to select **Flow window norm open**.
3. Use the right arrow key to select **Q1 Switchpoint 1 (SP1)**.
4. Increase or decrease the value using the arrow keys (up/down).
5. Use the right arrow key to select **Q1 Switchpoint 2 (SP2)**.
6. Increase or decrease the value using the arrow keys (up/down).
7. The sensor uses the larger **Switchpoint** as the upper switching threshold, and the smaller **Switchpoint** as the lower switching threshold.
8. If required, configure the delay mode and delay time (see [see "Delay Mode Q1", page 43](#)).

Switching output behavior

Flow/temperature

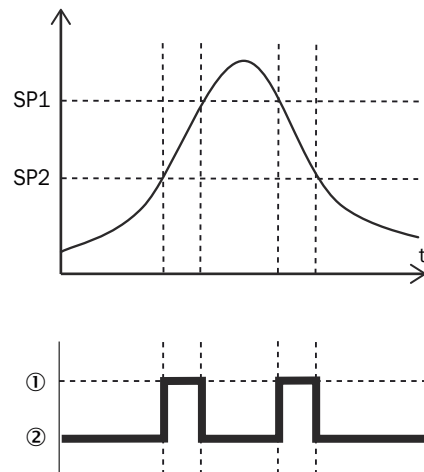


Figure 25: Normally open with window function

- ① Active
- ② Deactivated

7.3.8 Normally closed with window function

Configuration based on Q1 for flow (as an example)

1. Use the arrow keys (left/right) to select **Q1 Mode**.
2. Use the arrow keys (up/down) to select **Flow window norm closed**.
3. Use the right arrow key to select **Q1 Switchpoint 1 (SP1)**.
4. Increase or decrease the value using the arrow keys (up/down).
5. Use the right arrow key to select **Q1 Switchpoint 2 (SP2)**.
6. Increase or decrease the value using the arrow keys (up/down).
7. The sensor uses the larger **Switchpoint** as the upper switching threshold, and the smaller **Switchpoint** as the lower switching threshold.
8. If required, configure the delay mode and delay time (see ["Delay Mode Q1", page 43](#)).

Switching output behavior

Flow/temperature

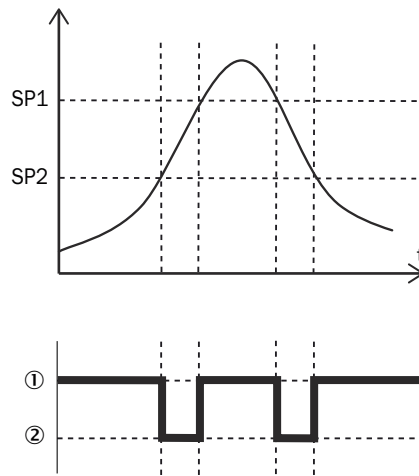


Figure 26: Normally closed with window function

- ① Active
② Deactivated

7.3.9 Configuring the digital output Q1 for empty pipe detection

Q1 can be used for empty pipe detection. The sensor can detect whether there is medium at the sensor tip and thereby detect an empty pipe. The pipe is detected as full as soon as the probe tip touches the medium.

Configuration – normally open with empty pipe detection

1. Use the arrow keys (left/right) to select **Q1 Mode**.
2. Use the arrow keys (up/down) to select **Empty norm open**.
3. If required, configure the empty detect factor (see ["Empty Detect Factor", page 41](#)).

The status LED S1 is off when the pipe is full and switches on as soon as the probe tip is no longer covered with medium.

Switching output behavior of Q1 NO contact

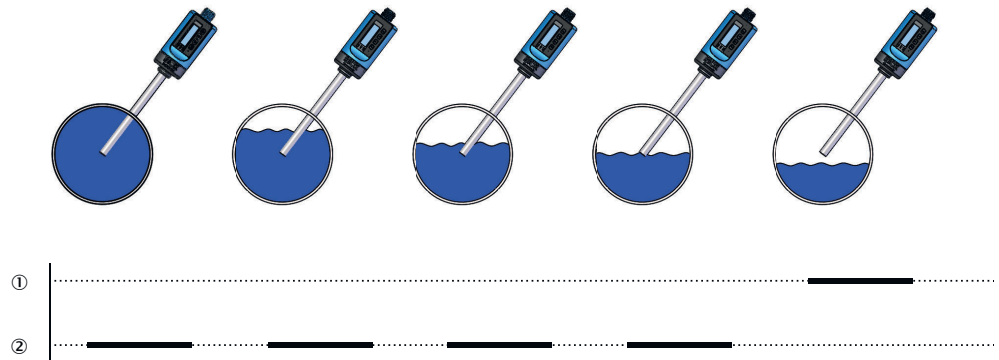


Figure 27: Normally open with empty pipe detection

- ① Active
- ② Deactivated

Configuration – normally closed with empty pipe detection

1. Use the arrow keys (left/right) to select **Q1 Mode**.
2. Use the arrow keys (up/down) to select **Empty norm closed**.
3. If required, configure the empty detect factor (see "Empty Detect Factor", page 41).

The status LED S1 lights up when the pipe is full and switches off as soon as the probe tip is no longer covered with medium.

Switching output behavior of Q1 NC contact

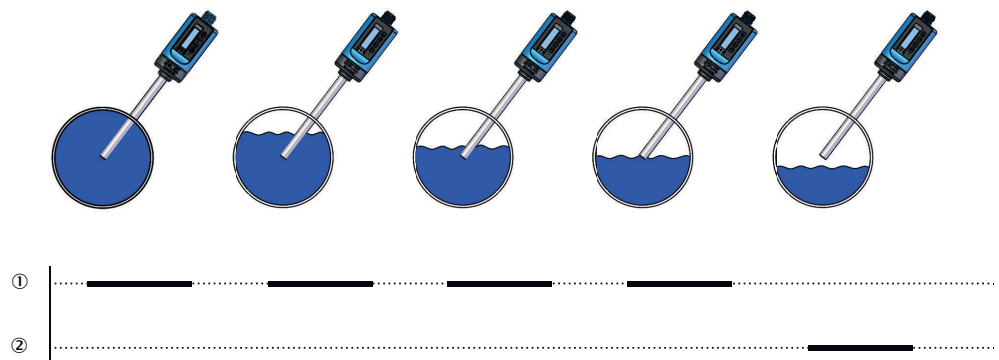


Figure 28: Normally closed with empty tube detection

- ① Active
- ② Deactivated

7.3.10 Configuration of pulse output Q2

The pulse output is used to specify the flow rate for which an output pulse is issued.

The pulse width can be specified in the **Pulse Width** field (duration of a pulse in ms). The pulse valency can be specified in the **Pulse Valency** field (defines the volume, in 0.1 L, that generates a pulse).

Example:

Pulse Width = 50 ms

Pulse Valency = 1 L

When the volume reaches 1 L, we have generated a pulse with a duration of 50 ms.

The pulse width should be set as short as possible and as long as necessary so that the device/controller connected to the digital output still recognizes the pulse. When the configured pulse valency is reached, a pulse is output at the digital output.

If the pulse valency specified by the user is too low, the pulse repetition rate may increase too much, thereby causing the sensor to output too few pulses. In this case, the sensor shows the warning **Q2 PulseConfig** on the display.

Example:

Parameterization: **Pulse Valency** = 0.1 L

Pulse Width = 1,000 ms

Measured flow rate = 60 L/min

Result: 600 pulses/min, but since one pulse needs 2,000 ms (1,000 ms pulse + 1,000 ms pause), max. 30 pulses per minute are possible. A warning message appears.

Configuration

1. Use the arrow keys (left/right) to select **Q2 Mode**.
2. Use the arrow keys (up/down) to select **Volume Pulse output**.
3. Use the right arrow key to select **Q2 Pulse Width**.
4. Increase or decrease the value using the arrow keys (up/down).
5. Use the right arrow key to select **Q2 Pulse Valency**.
6. Increase or decrease the value using the arrow keys (up/down).

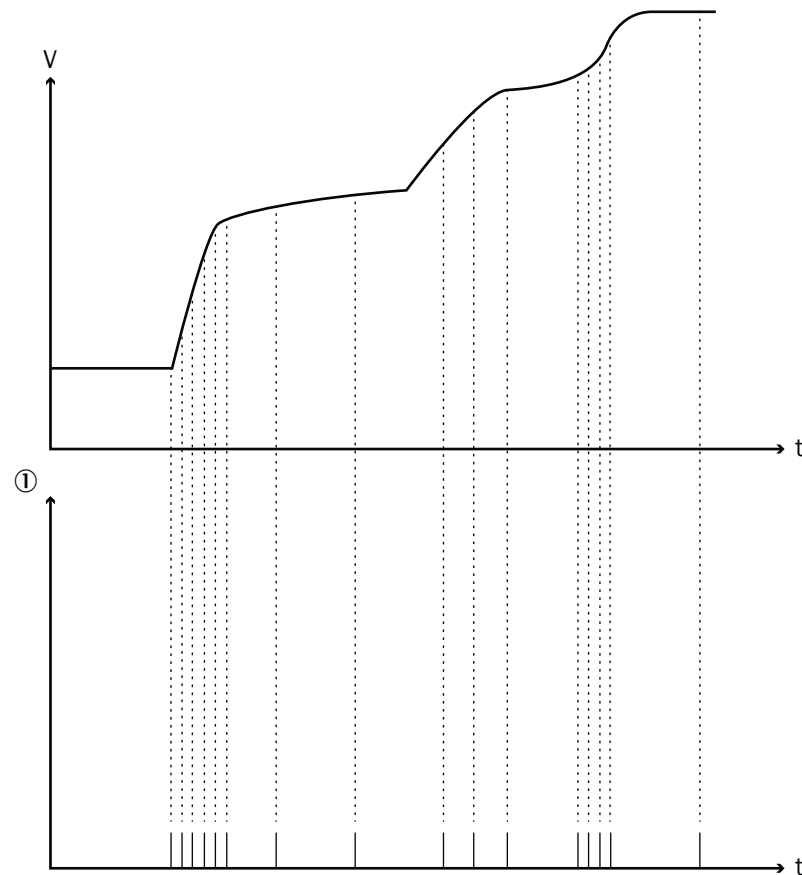


Figure 29: Example behavior of the pulse output (the larger the slope of the volume, the more pulses are output)

① Pulse output

7.3.11 Configuring the Q2 digital input

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

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

This function can be used, for example, to create a functional logic using the signals from two T-Easic® devices and using only one digital PLC input. In this case, the Q1 output of the T-Easic® B serves as the Q2 digital input of the T-Easic® A, and the Q1 output of the T-Easic® A is connected to the PLC.

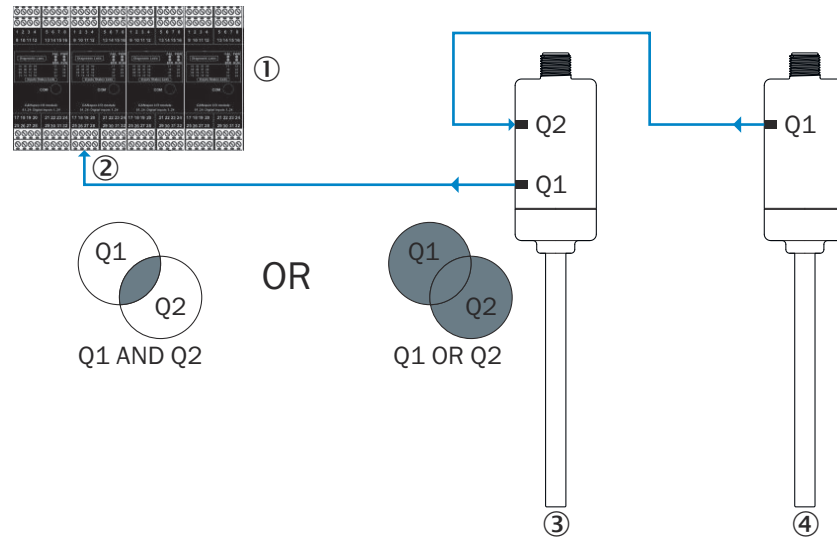


Figure 30: Example application where the digital input is used with the digital output using Boolean logic

- ① PLC
- ② PLC digital input
- ③ T-Easic® A
- ④ T-Easic® B

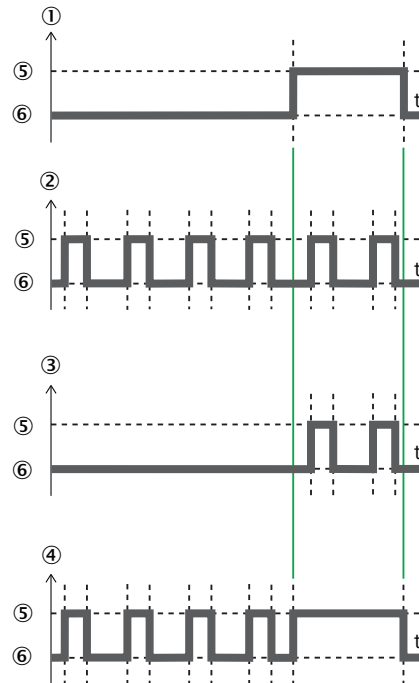


Figure 31: Explanation of the Q2 digital input and Boolean logic

- ① Input Q2
- ② Internal Q1
- ③ External Q1 = Internal Q1 AND Q2
- ④ External Q1 = Internal Q1 OR Q2
- ⑤ Active
- ⑥ Deactivated

7.3.12 Configuring the Q2 analog output

In the electrical version B, the T-Easic FTS has an analog output on Q2. The analog output is available as an active current output with 4...20 mA. The analog output can be parameterized with regard to **Flow** (flow rate, volume flow) and **Temp** (temperature).

Configuration based on Q2 for flow (example)

1. Use the arrow keys (left/right) to select **Q2 Mode**.
2. Use the arrow keys (up/down) to select **Flow Current 4-20 mA**.
3. Use the right arrow key to select **Q2a low**.
4. Increase or decrease the value using the arrow keys (up/down).
5. Use the right arrow key to select **Q2a high**.
6. Increase or decrease the value using the arrow keys (up/down).
7. If required, configure the Q2a error mode (see ["Error Current Q2a"](#), page 46).

Inversion of the analog output can be achieved by setting the lower threshold as **Q2a high** and the higher threshold as **Q2a low**.

The **Error Current Q2a** submenu defines how the analog output behaves in the event of a critical device error. You can select whether to output 3.5 mA or 21.5mA as a signal in the event of an error.

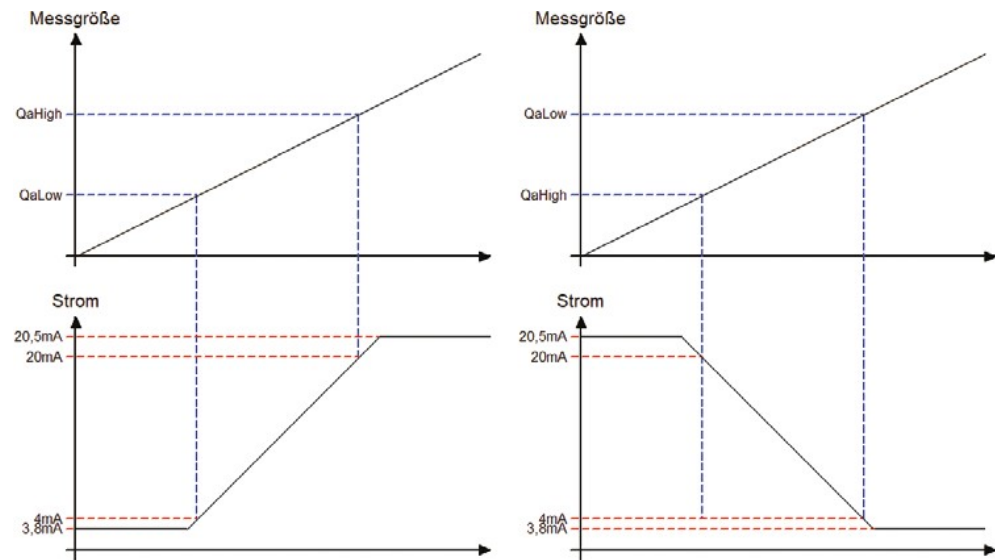


Figure 32: Behavior of the analog output

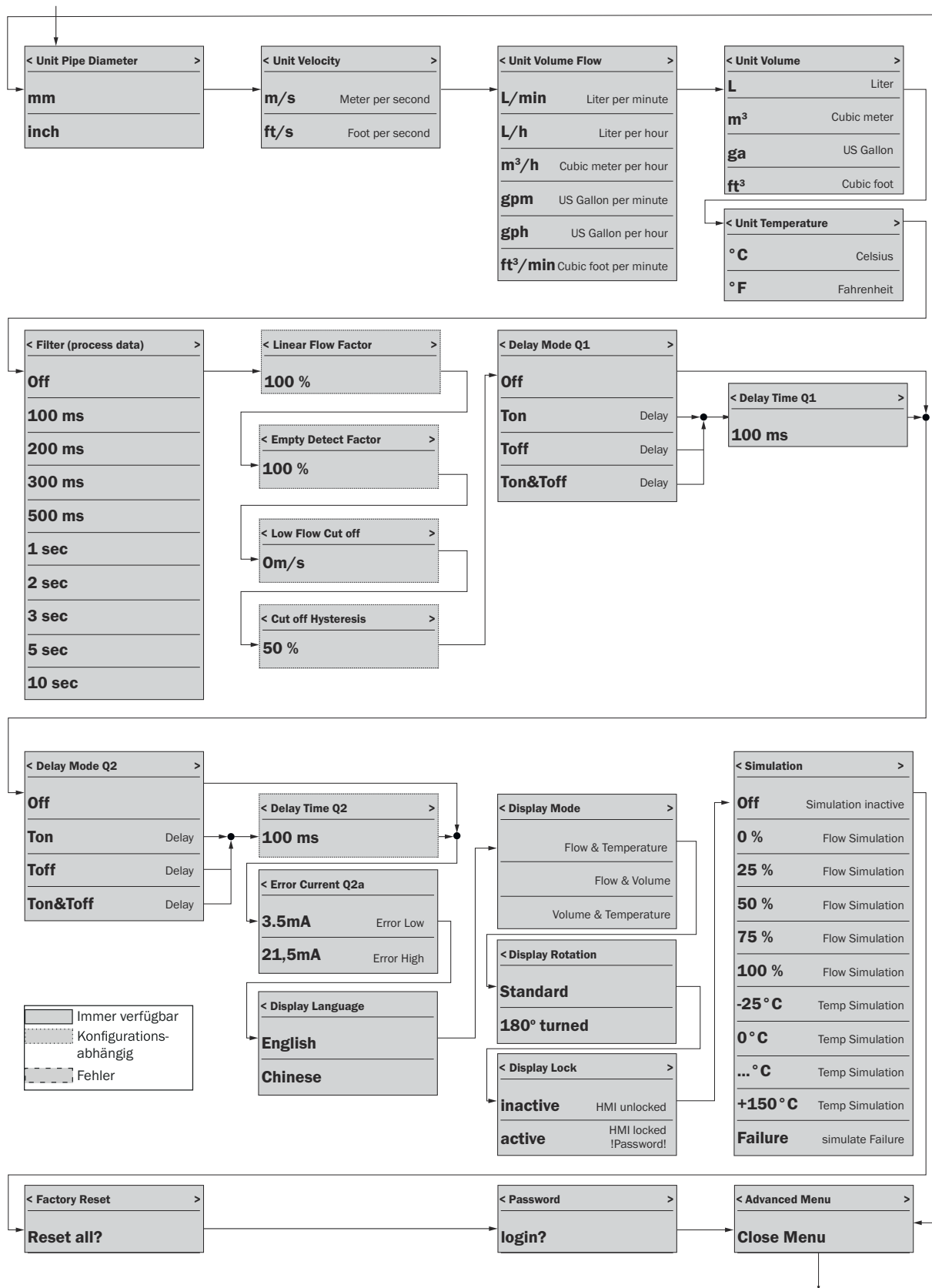
7.4 Advanced menu (advanced settings)

The **Advanced Menu** allows you to access the advanced settings.

1. Use the arrow keys (left/right) to select **Advanced Menu**.
2. Use the arrow keys (up/down) to select **Open menu**.
3. Use the arrow keys (left/right) to select the desired parameter.

You can access the following parameters:

- Unit Pipe Diameter
- Unit Velocity
- Unit Volume Flow
- Unit Volume
- Unit Temperature
- Filter (process data)
- Linear Flow Factor
- Empty Detect Factor
- Low Flow Cutoff & Cutoff Hysteresis
- Delay Mode Q1
- Delay Time Q1
- Delay Mode Q2
- Delay Time Q2
- Error Current Q2a
- Display Language
- Display Mode
- Display Rotation
- Display Lock
- Simulation
- Factory Reset
- Password
- Close Menu



7.4.1 Unit Pipe Diameter

In this submenu, you can configure the unit of the pipe inner diameter. This value is required to calculate the correct volume flow and count.

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

- mm
- Customs fees

7.4.2 Unit Velocity

In this submenu, you can set the unit of measurement for the velocity. The following units are available for selection:

- m/s
- ft/s

7.4.3 Unit Volume Flow

In this submenu, you can set the unit of measurement for the volume flow. The following units are available for selection:

- L/min
- L/h
- m³/h
- gpm
- gph
- ft³/min

7.4.4 Unit Volume

In this submenu, you can set the unit of measurement for the volume. The following units are available for selection:

- L
- m³
- ga
- ft³

7.4.5 Unit Temperature

In this submenu, you can set the unit of measurement for the temperature. The following units are available for selection:

- °C
- °F

7.4.6 Filter (process data)

Smoothing of the measured value, for example when the flow is irregular (e.g., when pumps start and stop). If the values are changing rapidly, the average of the measured values over a specified number of seconds is output.

The following values are available for selection:

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

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

7.4.7 Linear Flow Factor

The **Linear Flow Factor** enables the sensor to be matched to a reference flow in the application.

This menu is only available when **Velocity relative [%]**, **Velocity absolute** or **Volume flow and counter** is selected in the **Measurement Mode** menu.

You can use the special adjustment to change the curve slope of measured values. The slope is specified as a percent. You can select a value between 50% and 150% for this factor. The factory setting is 100%.

The **Linear Flow Factor** affects the process data. This option is not available after a teach-in has been performed for flow.

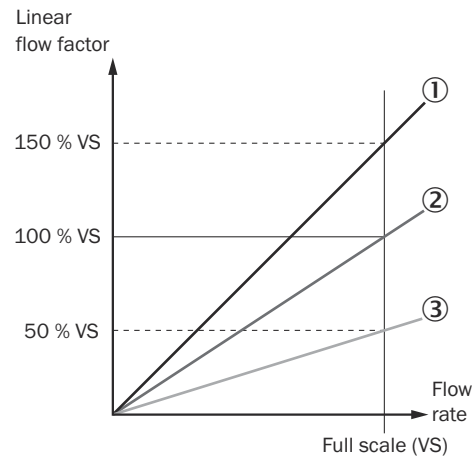


Figure 33: Examples of the linear flow factor

- ① Curve with adjustment 1
- ② Curve at factory setting
- ③ Curve with adjustment 2

7.4.8 Empty Detect Factor

The **Empty Detect Factor** can be used to adjust the response time of the empty pipe detection. You can select a value between 70% and 140% for this factor. The factory setting is 100%. The higher the empty detect factor, the faster the response time. This means that the empty pipe detection will react more sensitively to any level fluctuations in the pipe and Q1 will also switch if the sensor tip is only uncovered for a short time. To avoid this, the response time can be increased by reducing the empty detection factor.

For applications with water, an **Empty Detect Factor** in the range of 90-140% is useful. For oils and oil-like media, the **Empty Detect Factor** should be between 70-90% to ensure reliable detection.

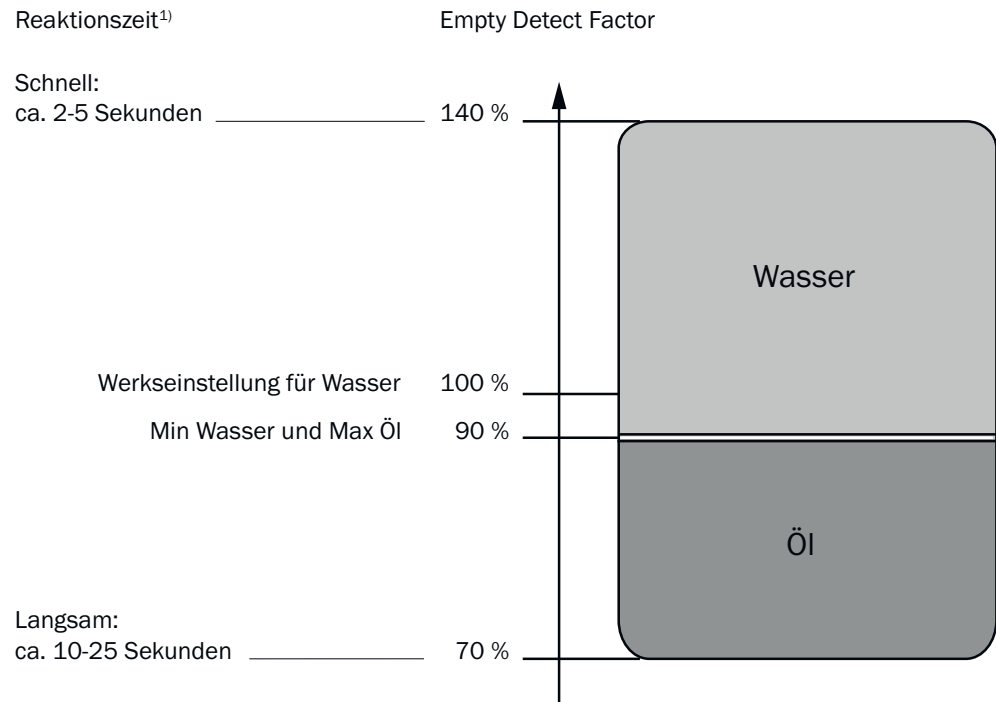


Figure 34: Configuring the empty detect factor

- ① For reference conditions: Pipe inner diameter 25 mm, water, vertical installation in the pipe, tip in the middle of the pipe, probe oriented in the pipe as described in section 5.2, “Probe alignment to the flow direction”, completely filled pipe without air bubbles, velocity between 10 cm/s and 100 cm/s, inlet zone > 30 cm, outlet zone > 30 cm, 26 °C ± 1 °C, 2 bar ± 1 bar

7.4.9 Low Flow Cutoff & Cutoff Hysteresis

Even when the valve is closed, convection or vibration of the pipeline can result in very low flow rates. If the flow rate of a medium is zero, this can result in inaccurate measurements. The leak flow volume suppression feature helps prevent these measurements from triggering unwanted switching behavior or causing incorrect meter readings.

When enabled, flows that are within a narrow range around zero are treated by the sensor as if the flow were at zero.

When the flow falls below a specified **Cutoff** value, the display and output are set to zero (switch-on point). When the flow exceeds the set

Cutoff+Hysteresis value again, the measurements are continued (switch-off point).

If a value greater than 0 is entered as the **Cutoff** value, low flow cutoff becomes active. In the factory setting, the low flow cutoff is deactivated (**Cutoff** value = 0).

The switch-off point is specified as a positive hysteresis value as a percentage of the switch-on point of the selected low flow rate. You can select values between 5% and 300% for the hysteresis. The factory setting is 50%.



NOTE

The analog output outputs the current that was parameterized for Q = 0 L/min. The pulse output does not output any pulses at Q = 0 L/min.

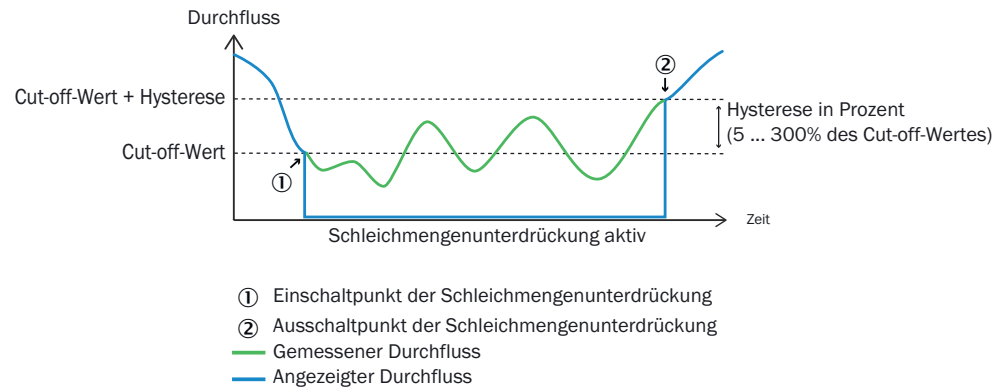


Figure 35: Low flow cutoff function

7.4.10 Delay Mode Q1

This parameter is used to define the delay mode for Q1. The following parameters are available for selection:

Parameter	Function
Off	No delay on Q1 status change.
Ton Delay	When Q1 Switchpoint 1 is reached, the status of Q1 does not change until Delay time Q1 (see "Delay Time Q1", page 45) has elapsed.
Toff Delay	When Q1 Switchpoint 2 is reached, the status of Q1 changes only after Delay time Q1 (see "Delay Time Q1", page 45) has elapsed.
Ton&Toff Delay	When Q1 Switchpoint 1 is reached, the status of Q1 does not change until Delay time Q1 (see "Delay Time Q1", page 45) has elapsed. When Q1 Switchpoint 2 is reached, the status of Q1 changes only after Delay time Q1 (see "Delay Time Q1", page 45) has elapsed.

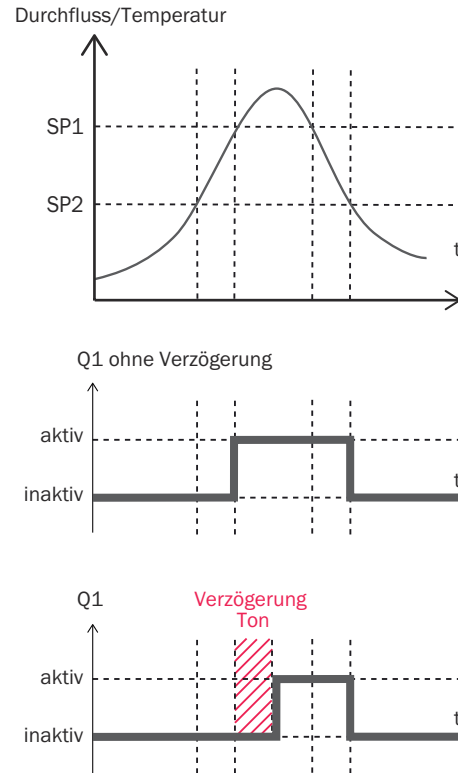


Figure 36: Delay mode Q1 with setting “Ton Delay”/Hysteresis – normally open

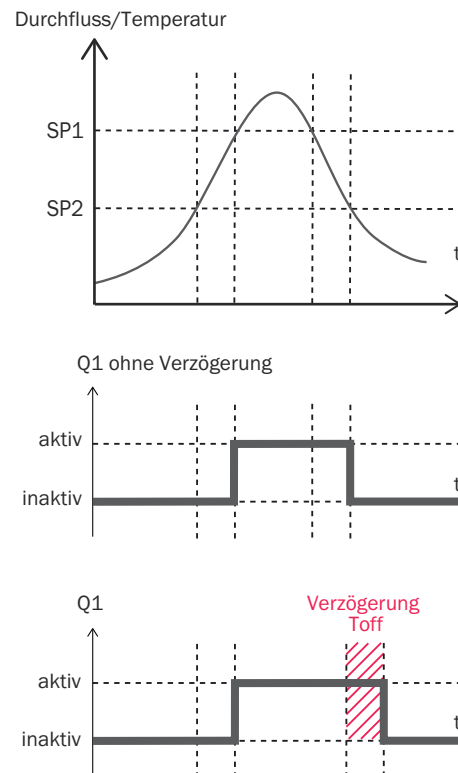


Figure 37: Delay mode Q1 with setting “Toff Delay”/Hysteresis – normally open

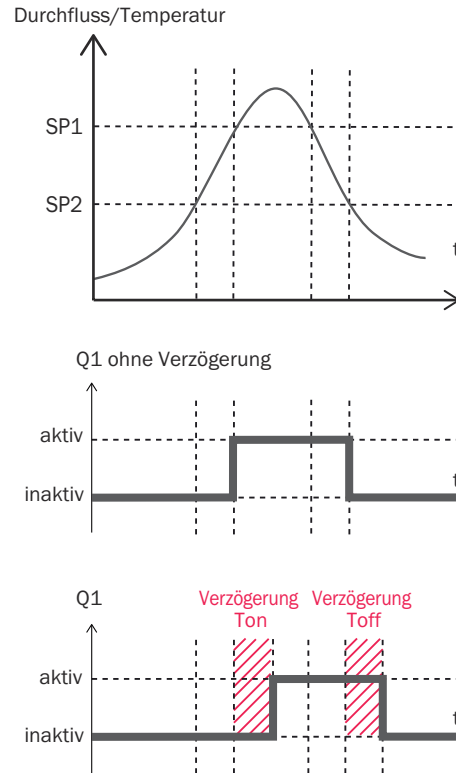


Figure 38: Delay mode Q1 with setting "Ton&Toff Delay"/Hysteresis – normally open

7.4.11 Delay Time Q1

In this submenu, you can set the delay time for Q1 according to the mode selected under **Delay Mode Q1** (see [see "Delay Mode Q1", page 43](#)). This menu is not available if **Delay Mode Q1 Off** is set.

7.4.12 Delay Mode Q2

This parameter is used to define the delay mode for Q2. The following parameters are available for selection:

Parameter	Function
Off	No delay when a Q2 status change occurs.
Ton Delay	When Q2 Switchpoint 1 is reached, the status of Q2 changes only after Delay time Q2 (see see "Delay Time Q2", page 46) has elapsed.
Toff Delay	When Q2 Switchpoint 2 is reached, the status of Q2 changes only after Delay time Q2 (see see "Delay Time Q2", page 46) has elapsed.
Ton&Toff Delay	When Q2 Switchpoint 1 is reached, the status of Q2 does not change until Delay time Q2 (see see "Delay Time Q2", page 46) has elapsed and Q2 Switchpoint 2 has been reached. The status of Q2 changes only after Delay time Q2 (see see "Delay Time Q2", page 46) has elapsed.

7.4.13 Delay Time Q2

In this submenu, you can set the delay time for Q2 according to the mode selected under Delay Mode Q2 (see ["Delay Mode Q2", page 45](#)). This menu is not available if **Delay Mode Q2 Off** is set.

7.4.14 Error Current Q2a

In this submenu, you can configure how the analog output behaves in the event of a critical device error. You can select whether to output 3.5 mA or 21.5mA as a signal in the event of an error. This menu item is only available in the electrical version B of the T-Easic FTS.

7.4.15 Display Language

In this submenu, you can configure the display language - **English** or **Chinese**.

**NOTE**

If you set the Chinese language by mistake, you can return to the English menu by pressing and holding the right arrow key and left arrow key simultaneously for 5 seconds.

7.4.16 Display Mode

In this submenu, you can specify the information shown on the display during operation. The following parameters are available for selection:

Parameter	Function
Flow & Temperature	The flow rate is shown in the lower part of the display and the temperature in the upper part.
Flow & Volume	The flow rate is shown in the lower part of the display and the volume in the upper part.
Volume & Temperature	The volume is shown in the lower part of the display and the temperature in the upper part.

7.4.17 Display Rotation (industrial version only)

In this submenu, you can rotate the display by 180°.

7.4.18 Display Lock (industrial version only)

To prevent setting changes, the display of the industrial version can be locked (**HMI locked**). When the display is locked, an unlock password must be entered before any changes can be made.

The password to unlock the display and keys is **000387**.

7.4.19 Simulation

Even if there is no liquid in the measurement channel yet, you can simulate a flow or temperature in this submenu to test the sensor configuration. You can also simulate an error state (safe state simulation).

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

The following parameters are available for selection:

- Off
- Flow Simulation 0%
- Flow Simulation 25%
- Flow Simulation 50%

- Flow Simulation 75%
- Flow Simulation 100%
- Temp Simulation -25 °C
- Temp Simulation 0 °C
- Temp Simulation +25 °C
- Temp Simulation +50 °C
- Temp Simulation +75 °C
- Temp Simulation +100 °C
- Temp Simulation +125 °C
- Temp Simulation +150 °C
- Simulate Failure

When a simulated state is activated, the display cyclically shows the message **Info Simulation is active**. When a simulated error condition is activated, the display cyclically shows the message **Failure Failure Simulation is active** and the status LEDs S1 and S2 flash simultaneously.

7.4.20 Factory Reset

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

- **Reset All?** (Alle zurücksetzen?)

→ Reset the values to the factory settings using the arrow keys (up/down).

7.4.21 Password

This submenu is reserved for SICK service.

7.4.22 Close Menu

Use this submenu to close the advanced configuration menu. The following value is available for selection:

- **Close Menu**

→ Use the arrow keys (up/down) to return to the main menu.

After exiting the advanced menu, **Advanced menu - Open Menu** is displayed.

7.5 Information

In this menu you can check sensor relevant information.

< Information >	
18411481	Serial No.
V1.22.2R	Firmware Version
***	ApplicationSpecificTag
***	Device Specific Tag
24.12 V	Supply Voltage
33.2 °C	Sensor Temp

Figure 39: Structure of the information menu

The following parameters are available for selection:

Parameter	Function
Serial No	Device serial number
Firmware	Firmware version installed in the sensor
Application Specific Tag	Name of the sensor in a specific application. Can be set by the customer via the IO-Link interface.
Device Specific Tag	Displays the device identifier assigned to the sensor. Can be set by the customer via the IO-Link interface.
Supply Voltage	Supply voltage currently applied to the device
Internal Temp	Displays the temperature measured at the PCB of the sensor

8 Troubleshooting

8.1 Error message shown on the display (industrial version only)

The display shows up to three error messages with the highest priority. The following table lists the messages that can be shown on the display. If a warning message is active, the sensor continues to function in normal mode. If an error message is active, the sensor goes into the error state. As soon as no error is present, the sensor automatically switches back to normal operation.

Message	Level	Cause	Solution
Supply Voltage too low	Warning	The supply voltage is too low.	Check the supply voltage and adjust if necessary according to the specifications (see "Technical data", page 55).
Supply Voltage too high	Failure	The supply voltage is too high.	Check the supply voltage and adjust it if necessary according to the specifications (see "Technical data", page 55).
Low Voltage IO-Link	Info	The supply voltage is < 16 V, IO-Link communication is no longer possible.	Check the supply voltage and adjust it if necessary according to the specifications (see "Technical data", page 55).
Simulation is active	Info	The simulation function is active. The status of the outputs does not correspond to the actual measured flow or temperature in the process.	If necessary, deactivate the simulation function.
Failure Simulation is active	Info	The Safe State simulation of the sensor is active. The status of the outputs corresponds to the safe state of the device.	If necessary, deactivate the simulation function.
MemoryInvalid	Failure	Device memory contains an invalid configuration. The sensor goes into the safe state.	Please contact SICK.
Outputdriver Error No.70	Warning	Output driver for the digital outputs is too warm.	Connect a suitable load (see "Technical data", page 55) or reduce the ambient temperature according to the specification (see "Technical data", page 55).
Outputdriver Error No.86	Failure	Configuration of the analog output is lost, analog output no longer functions correctly.	Please contact SICK.

Message	Level	Cause	Solution
Outputdriver Error No.89	Failure	Output driver for the digital outputs much too warm. Sensor goes into the safe state, the outputs are switched off.	Connect a suitable load (see "Technical data", page 55) or reduce the ambient temperature according to the specification (see "Technical data", page 55).
Outputdriver Error No.91	Failure	Configuration of the digital outputs is lost, digital outputs no longer function correctly.	Please contact SICK.
Q1 Shortcut	Info	Short circuit or overload at Q1.	Reduce the load at the output to the maximum values according to the specification (see "Technical data", page 55).
Q1: SP too high for used medium	Warning	One switchpoint of Q1 is above the permissible measuring range.	Check the settings and correct them if necessary.
Q1: Distance SP1 to SP2 too small	Warning	Switchpoint 1 of Q1 is too close to switchpoint 2 of Q1. The settings can lead to undesired sensor behavior.	Check the settings and correct them if necessary.
Q2 Shortcut	Info	Short circuit or overload at Q2.	Reduce the load at the output to the maximum values according to the specification (see "Technical data", page 55).
Q2: SP too high for used medium	Warning	One switchpoint of Q2 is above the permissible measuring range.	Check the settings and correct them if necessary.
Sensor displays a constant value or 0% or 100%		Medium does not match the taught-in or selected medium in the sensor	Teach in the medium (see "Measurement configuration", page 27).
Q2: Distance SP1 to SP2 too small	Warning	Switchpoint 1 of Q2 is too close to switchpoint 2 of Q2. The settings can lead to undesired sensor behavior.	Check the settings and correct them if necessary.
Q2a Overload	Warning	The load at the analog output is too small (resistance too high) or no load is connected.	Connect a suitable load (see "Technical data", page 55) or change the configuration of Q2 (do not configure as an analog output, instead switch it to "off" or use it as a digital output)
Q2a Config out of range	Warning	A threshold of Q2a is above the permissible measuring range.	Check the settings and correct them if necessary.
Q2a Overtemperature	Warning	The output driver for the analog output is too warm. The ambient temperature may be too warm, or the hardware is defective.	Reduce the ambient temperature according to the specification (see "Technical data", page 55) or contact Sick if necessary.

Message	Level	Cause	Solution
Q2 PulseConfig	Warning	The pulse output is not configured to match the flow rate. The pulse output is configured to output too many pulses per time. This is not possible and therefore pulses are lost.	Decrease the pulse width or increase the pulse valency.
Q2: Pulseout only in Volume- Mode	Warning	Q2 is configured as a pulse output, but Volume Flow and Counter is not selected as the measurement mode. No volume is therefore measured, and no pulses are output at the pulse output.	Set the Volume Flow and Counter measurement mode.
Display Volume only in Volume Mode		Flow&Volume or Volume&Temperature is selected in Display Mode, but VolumeMode is not set as the measurement mode. No volume is therefore measured, so zero is always displayed.	Set the Volume Flow and Counter measurement mode.
Ambient Temperature too high	Warning	Ambient temperature is too high.	Reduce the ambient temperature according to the specification (see "Technical data", page 55).
Ambient Temperature too low	Warning	Ambient temperature is too low.	Increase the ambient temperature according to the specification (see "Technical data", page 55).
Medium Temperature too high	Warning	Process temperature of the medium is too high.	Reduce the process temperature according to the specification (see "Technical data", page 55).
Medium Temperature too low	Failure	Process temperature of the medium is much too low.	Increase the process temperature according to the specification (see "Technical data", page 55).
Medium Temperature too low	Warning	Process temperature of the medium is too low.	Increase the process temperature according to the specification (see "Technical data", page 55).
Medium Temperature too high	Failure	Process temperature of the medium is much too high.	Reduce the process temperature according to the specification (see "Technical data", page 55).
Internal Error	Failure	Internal device error. The sensor goes into the safe state.	Please contact SICK.

Message	Level	Cause	Solution
Sensor is not taught	Warning	The sensor is in teach-in mode, but there are no valid teach-in values. The flow rate is 0%. The outputs are switched accordingly.	Correct the minimum and maximum value for teach-in.
Teach is not finished	Warning	Teach was started but did not complete.	Perform the teach-in again.

8.2 Outputs

Error	Cause	Solution
The digital output does not behave as expected.	Configuration is incorrect.	Configure the digital output (see "Measurement configuration", page 27).
	An error has occurred; the sensor outputs are in the safe state.	Eliminate the cause of the error.
	Cable break.	Check the cable.

9 Repair

Repair work on the sensor may only be performed by qualified and authorized personnel from SICK AG. Tampering with or modifying the sensor will void any warranty claims against SICK AG.

9.1 Maintenance

The T-Easic® operates maintenance-free. We recommend that the following measures be performed on a regular basis:

- Check the measurement probe for deposits and wear.
- Check the threaded and plug connections.

Repair work on the sensor may only be performed by qualified and authorized personnel from SICK AG. Tampering with or modifying the sensor will void any warranty claims against SICK AG.

9.2 Return

Rinse and/or clean the removed device before returning it to protect our employees and the environment from dangers posed by residues of the material being measured. Defective devices can only be examined if a completed return form is included. 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 on our website (www.sick.com).

10 Disposal

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



11 Technical data

Measurement principle	Calorimetric measurement method for determining the flow
Media	Aqueous and oily media
Pipe inner diameter	≥ 25 mm ¹⁾
Measuring range	Water: 3 cm/s ... 250 cm/s Oil A/oil B: 3 cm/s ... 300 cm/s Taught-in media: 3 cm/s to 600 cm/s ²⁾
Maximum process pressure	100 bar 16 bar (with hygienic process adapter P/N 2093548) 40 bar (with SICK DN15, DN25 T-piece) (see "Accessories", page 68³⁾) 25 bar (with SICK DN40 T-piece) (see "Accessories", page 68³⁾) 20 bar (with SICK DN50 T-piece) (see "Accessories", page 68³⁾)
Process temperature	−40 °C ... +150 °C ⁴⁾
IO-Link 1.1	✓ COM3 (230.4 kbit/s)
Temperature measurement	Via IO-Link
EHEDG certificate	✓ ⁵⁾

- 1) For highest measurement accuracy, the probe tip must be in the middle of the pipe.
- 2) The measuring range limit value depends on the medium used.
- 3) According to the Pressure Equipment Directive 2014/68 / EU: Good engineering practice according to Article 13 for media of media group 2 (other substances).
- 4) At medium temperatures above 100 °C, the distance between the bottom of the housing and the top of the process connection adapter (see ["Accessories", page 68](#)) must be at least 25 mm.
If a SICK process connection adapter (see ["Accessories", page 68](#)) is used, the 60 mm probe cannot be used at process temperatures above 100 °C because the distances cannot be maintained.
If the sensor is installed with the hygienic process adapter, the process temperature is +5 °C ... 150 °C.
- 5) EHEDG-certified installations are only possible using the process connections listed in the **EHEDG Position Paper**. For this purpose, special seals or connection systems must be used, which also comply with the relevant EHEDG Position Paper.

When used in combination with the hygienic process adapter, the following characteristics apply for the temperature and pressure ranges:

Table 2: Temperature and pressure ranges with the hygienic process adapter

	Process temperature		
Process pressure	t ≥ 5 °C and t < 10 °C	t ≥ 10 °C and t ≤ 110 °C	t > 110 °C and t ≤ 150 °C
p ≥ 0 bar and p < 1 bar	Steam-tight, not suitable for hygienic applications	Bacteria-proof, suitable for hygienic applications	
p ≥ 1 bar and p ≤ 16 bar	Steam-tight, not suitable for hygienic applications	Bacteria-proof, suitable for hygienic applications	Steam-tight, not suitable for hygienic applications

11.1 Performance

Inlet zone	5 x DN
Outlet zone	3 x DN
Measurement accuracy for flow	± (7% of measured value + 3% of full scale) ¹⁾
Reproducibility of flow	< 1 cm/s ¹⁾
Resolution for flow (via IO-Link)	Velocity: 0.01 m/s; Volume: 0.1 L/min; Relative: 0.1%

Temperature drift for flow	< 0.5 cm/ (s*K) ¹
Response time for flow	< 2.5 s (filter off)
Measurement accuracy - temperature	± 1 °C
Resolution for temperature	< 0.1 °C
Response time for temperature (T90 time)	< 5 s ²
Operating mode	Relative velocity (%) Absolute velocity Volume flow and counter Teach-in relative (%)

- Reference conditions: Pipe inner diameter 25 mm, water, vertical installation in the pipe, tip in the middle of the pipe, probe oriented in the pipe as described in section ["Probe alignment to the flow direction"](#), page 15, completely filled pipe without air bubbles, velocity between 10 cm/s and 100 cm/s, inlet zone > 30 cm, outlet zone > 30 cm, 26 °C ± 1 °C, 2 bar ± 1 bar
- Under reference conditions as in 1) but flow rate always = 100 cm/s

11.2 Mechanics/materials

Process connection	Without process connection (adapter required for installation) or with permanently installed clamping ring (in conjunction with SICK T-pieces only)
Wetted parts	Stainless steel 1.4404/316L
Housing material	Industrial version: VISTAL (PA66+PA6I GF50) Hygienic version: Stainless steel 1.4404/316L
Seal material (hygienic process adapter P/N 2093548 only)	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) ²³	Industrial version: IP67 hygienic version: IP67 / IP69
Minimum inner pipe diameter	25 mm for centered installation
Minimum insertion distance	12 mm
Minimum distance from probe tip to pipe wall	10 mm
Weight	Industrial version: approx. 80 g hygienic version: approx. 205 g

- Excluding welds
- Only with M12 male connector fitted
- Not UL tested

11.3 Ambient conditions

Ambient temperature, operation ¹	-40 °C ... +70 °C
Ambient temperature, storage ²	-40 °C ... +80 °C

- According to the UL approval: degree of contamination 3 (UL61010-1: 2012-05); air humidity: 80% at temperatures up to 31 °C; installation altitude: max. 3,000 m above sea level.
When the sensor is installed with a hygienic process adapter, the temperature range is +5 °C ... 70 °C.
- When the sensor is installed with a hygienic process adapter, the temperature range is +5 °C ... 80 °C.

11.4 Electrical connections

Supply voltage V _S ¹	9 V DC ... 30 V DC
--	--------------------

Power consumption	< 2 W at 24 V DC (without load on the outputs) < 8 W at maximum load
Power-up time	≤ 5 s (IO-Link < 10 s)
Protection class	III
Connection type	M12 round connector x 1, 4-pin
Output signal	2 push-pull digital outputs (Q2 configurable as pulse output or digital input) for flow and temperature; In the electrical version B: Q2 configurable as analog output (4...20 mA scalable)
Output current	≤ 100 mA (per output)
Output load²	4 mA ... 20 mA, max. 350 Ohm, when $U_V < 12$ V, 500 Ohm when $U_V > 12$ V
Lower signal level²	3.5 mA ... 3.8 mA
Upper signal level²	20.5 mA ... 21.5 mA
Inaccuracy of analog output²	QA Pin2: < 0.5% full range (20 mA)
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 for digital input	Voltage HIGH state: depends on U_V Voltage LOW state < 4.0 V
EMC	EN 61326-1, EN 61326-2-3
MTTF	> 200 years

¹ All connections are protected against reverse polarity and overcurrent. Q1 and Q2 are short-circuit protected.

Use an energy-limited circuit for the voltage supply as per UL61010-1 3. Outp.

² Analog output available in electrical version B.

11.5 Factory settings

The factory settings can be restored using the **Factory Reset**.

Parameter	Value
Measuring mode	Relative (%)
Medium	Water
Diameter	26 mm
Q1 switching point 1 - relative velocity	50%
Q1 switching point 2 - relative velocity	30%
Q1 switching point 1 - absolute velocity	0.5 m/s
Q1 switching point 2 - absolute velocity	0.3 m/s
Q1 switchpoint 1 - volume flow	16 L/min
Q1 switching point 2 - volume flow	9.5 L/min
Q1 switchpoint 1 - temperature	30 °C
Q1 switching point 2 - temperature	25 °C
Q1 mode	Flow hysteresis for normally open
Q2 switchpoint 1 - relative velocity	80%
Q2 switching point 2 - relative velocity	60%
Q2 switching point 1 - absolute velocity	0.8 m/s

Parameter	Value
Q2 switching point 2 - absolute velocity	0.6 m/s
Q2 switchpoint 1 - volume flow	25.5 L/min
Q2 switching point 2 - volume flow	19.0 L/min
Q2 switchpoint 1 - temperature	80 °C
Q2 switching point 2 - temperature	75 °C
Q2 mode - electrical version A	Flow hysteresis for normally closed
Q2 mode - electrical version B	Flow analog
Q2a analog lower limit - relative velocity	2%
Q2a analog upper limit - relative velocity	100%
Q2a analog lower limit - absolute velocity	0.03 m/s
Q2a analog upper limit - absolute velocity	1.5 m/s
Q2a analog lower limit - volume flow	1 L/min
Q2a analog upper limit - volume flow	40 L/min
Q2a analog lower limit - temperature	0 °C
Q2a analog upper limit - temperature	100 °C
Q2a analog error mode	3.5 mA
Q2 Pulse valency	0.1 L
Q2 pulse width	10 ms
Diameter unit	mm
Unit Velocity	m/s
Unit Temperature	°C (Celsius)
Unit Volume	L
Unit Volume Flow	L/min
Filter (process data)	1 s
Linear Flow Factor	100%
Empty Detect Factor	100%
Low Flow Cutoff (relative velocity)	0% (inactive)
Low Flow Cutoff (absolute velocity)	0 m/s (inactive)
Low Flow Cutoff (volume flow)	0 l/min (inactive)
Cutoff Hysteresis	50%
Display Language	English
Display Rotation	Standard
Delay Mode Q1	Off
Delay Time Q1	0
Delay Mode Q2	Off
Delay Time Q2	0
Simulation	Off
Display Mode	Flow and temperature
Display Lock	Deactivated
Application-specific indicator	***
Device-specific indicator	***

12 Dimensional drawings

All dimensions are in mm (inches).

12.1 Industrial version

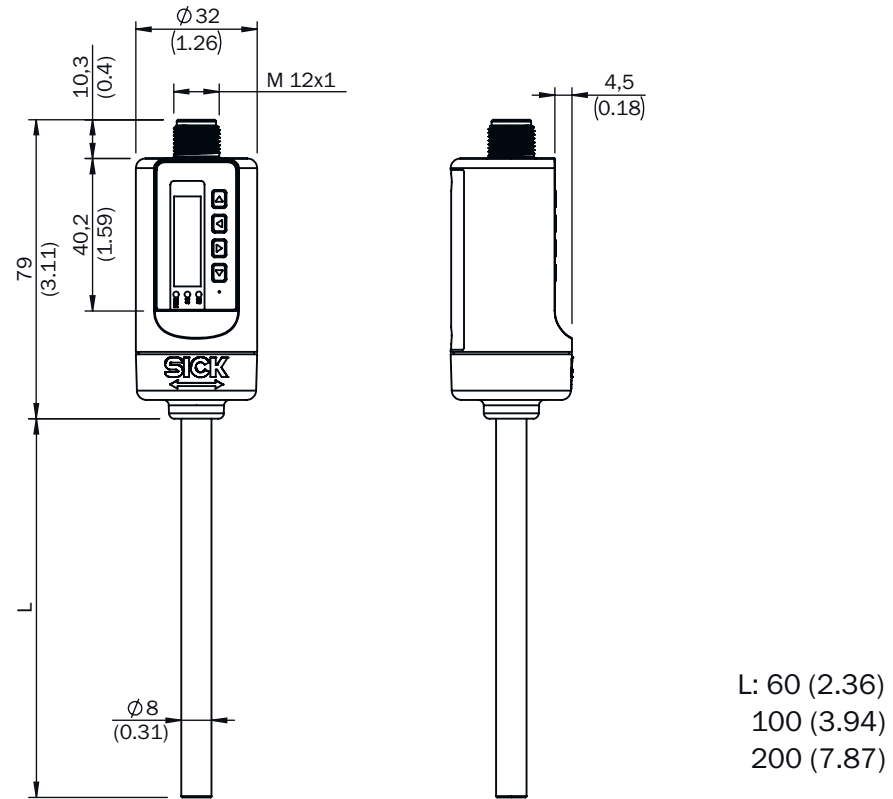


Figure 40: Dimensional drawing for industrial version

12.2 Hygienic version

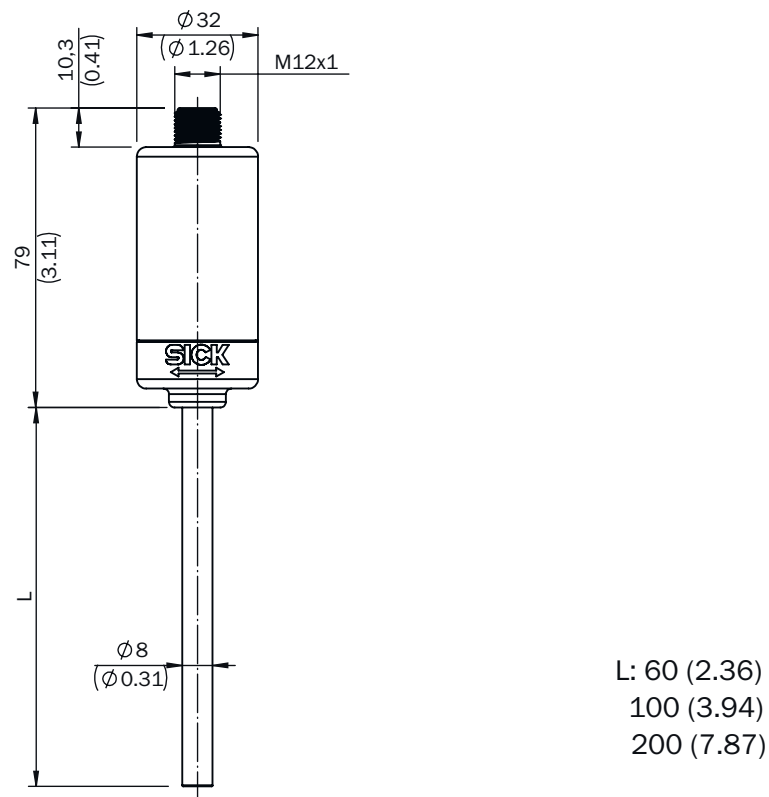


Figure 41: Dimensional drawing for hygienic version

12.3 Industrial version with clamping ring

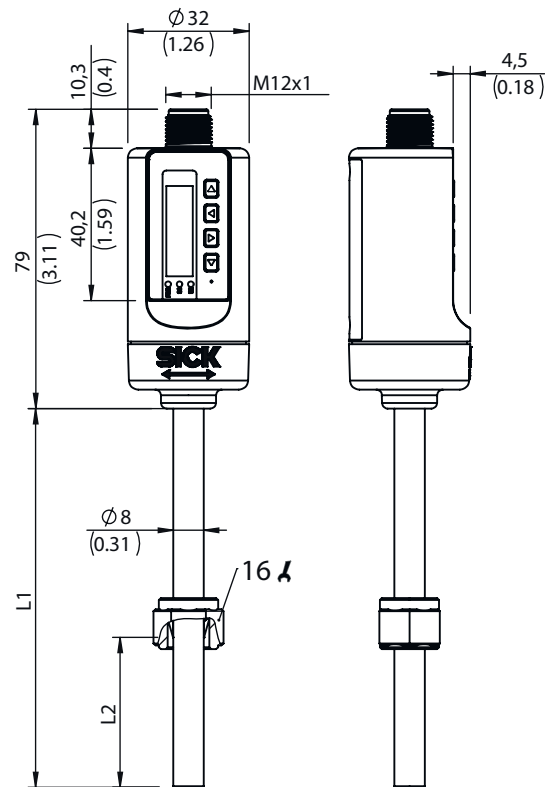


Figure 42: Dimensional drawing for industrial version with clamping ring

Part number	L1	L2
1114951	60 (2.36)	35.9 (1.41)
1114952		
1114953	100 (3.94)	51.9 (2.04)
1114954		

12.4 Hygienic version with clamping ring

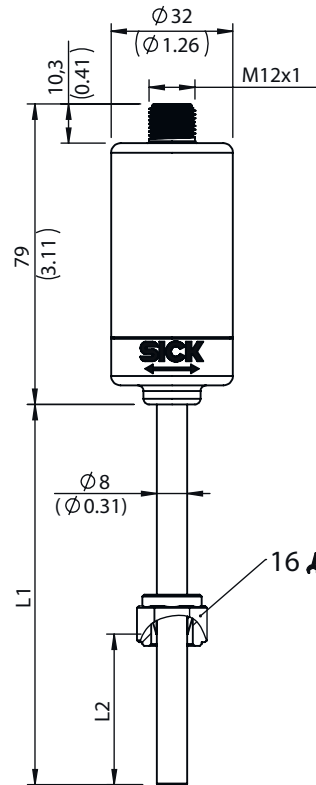


Figure 43: Dimensional drawing for hygienic version with clamping ring

Part number	L1	L2
1114955	60 (2.36)	35.9 (1.41)
1114956		
1114957	100 (3.94)	51.9 (2.04)
1114958		

12.5 Mounting adapter for T-Easic FTS

12.5.1 G1/2 adapter (P/N 5338774)

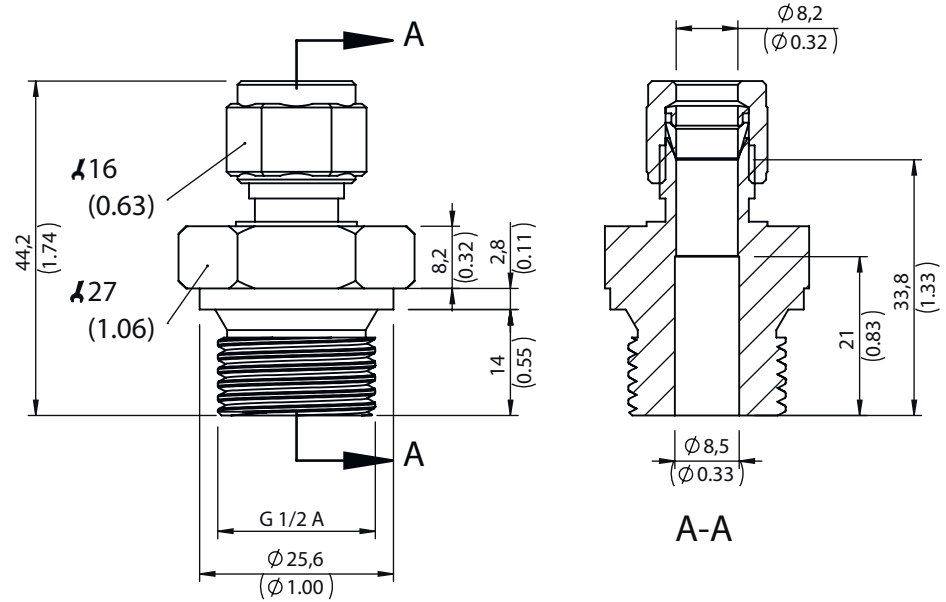


Figure 44: Dimensional drawing of G1/2 adapter (P/N 5338774)

12.5.2 1/2" NPT adapter (P/N 5338775)

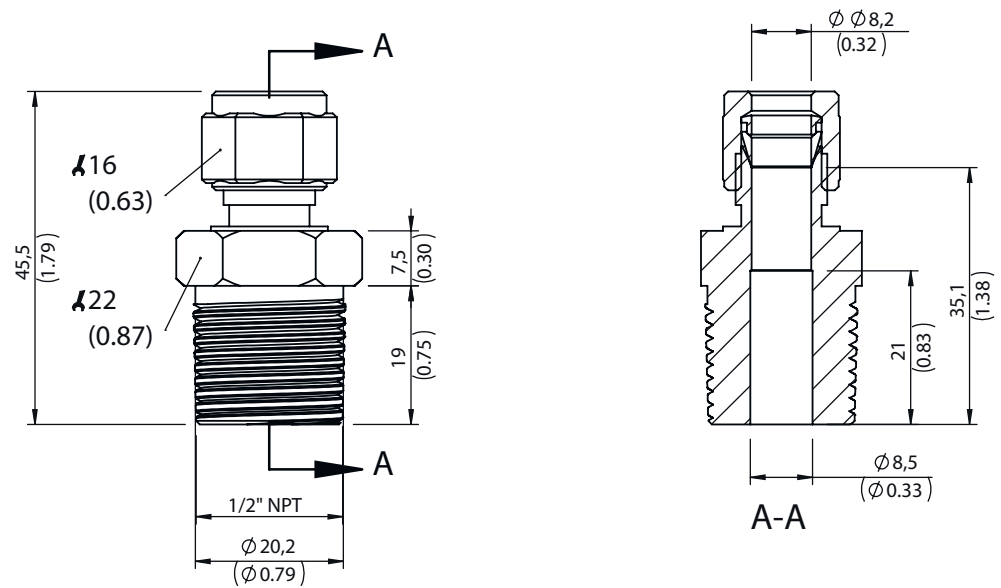


Figure 45: Dimensional drawing of 1/2" NPT adapter (P/N 5338775)

12.5.3 M18 x 1.5 adapter (P/N 2104208)

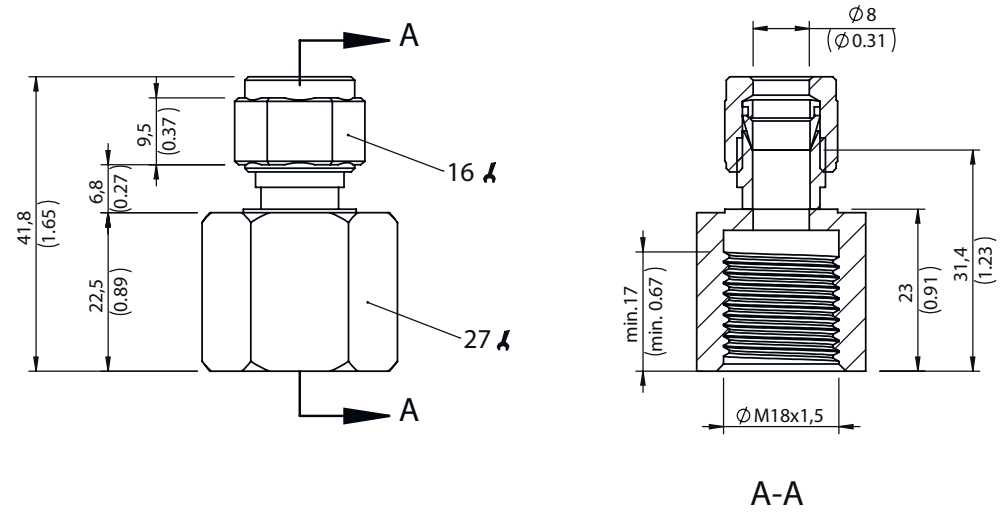


Figure 46: Dimensional drawing for M18 x 1.5 adapter (P/N 2104208)

12.5.4 Hygienic process adapter DIN32676 DN25-40 (P/N 2093548)

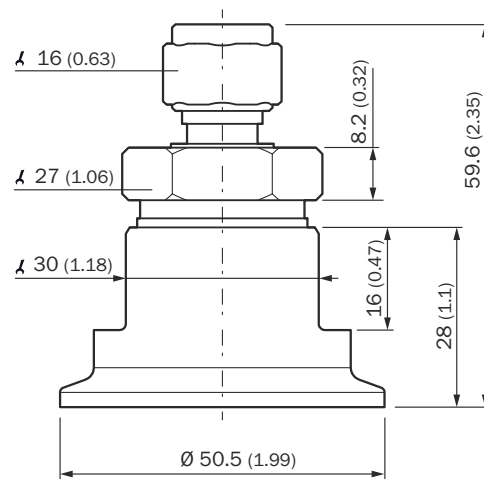


Figure 47: Dimensional drawing for hygienic process adapter DIN32676 DN25-40 (P/N 2093548)

12.5.5 Compression fitting with weld end (P/N 2121340)

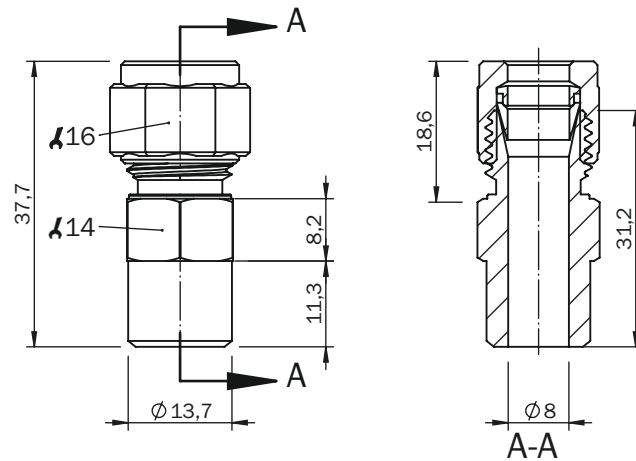


Figure 48: Dimensional drawing for clamp connection with weld end (P/N 2121340)

12.6 T-pieces for T-Easic FTS

12.6.1 T-piece DN25 (P/N 2118844) / DN40 (P/N 2118845) / DN50 (2118846) with weld end

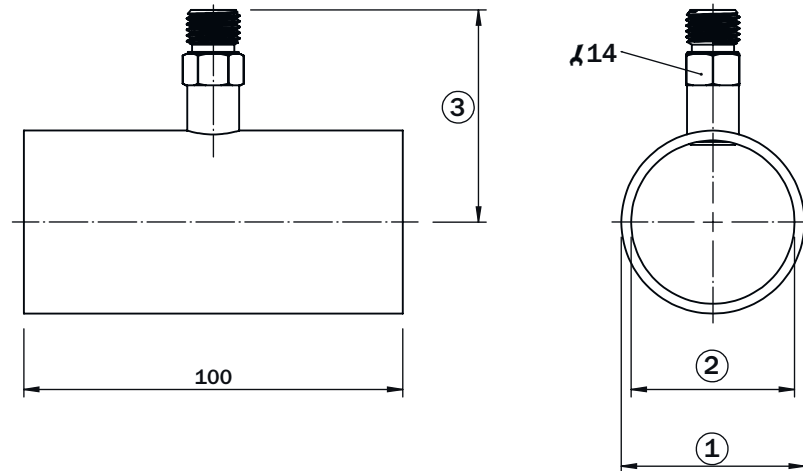


Figure 49: Dimensional drawing for T-piece DN25 (P/N 2118844) / DN40 (P/N 2118845) / DN50 (2118846) with weld end

	2118844	2118845	2118846
①	Ø 33.7	Ø 48.3	Ø 60.3
②	Ø 28.5	Ø 43.1	Ø 54.5
③	40	56	56

12.6.2 T-piece DN25 (P/N 2122453) / DN40 (P/N 2122454) / DN50 (2122455) with Rp thread

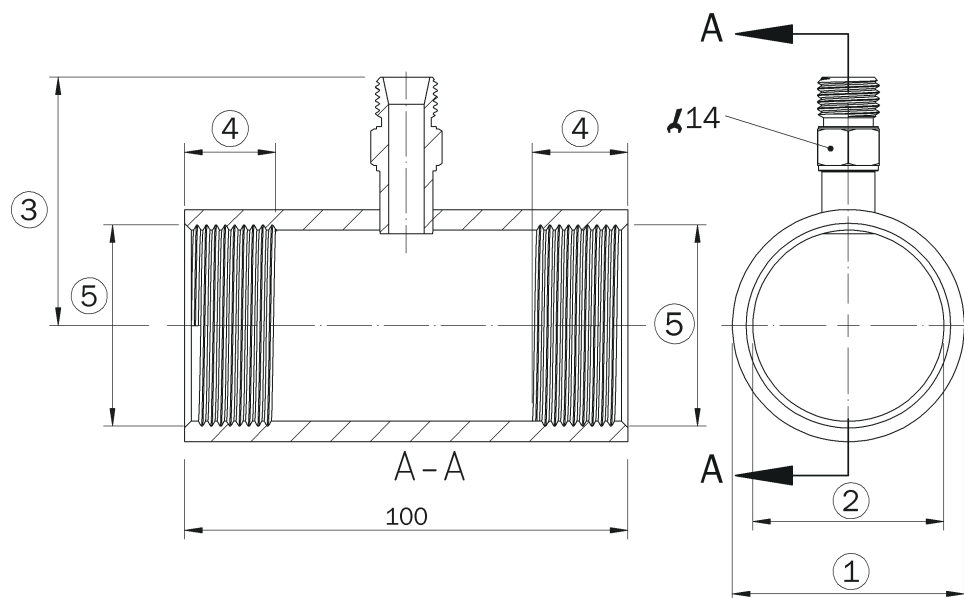


Figure 50: T-piece DN25 (P/N 2122453) / DN40 (P/N 2122454) / DN50 (2122455) with Rp thread

	2122453	2122454	2122455
①	Ø 37.7	Ø 52.3	Ø 63.7
②	Ø 28.5	Ø 43.1	Ø 54.5
③	40	56	56
④	21	22	27
⑤	RP 1	RP 1 1/2	RP 2

12.6.3 T-piece DN15 (P/N 2123468) with weld end

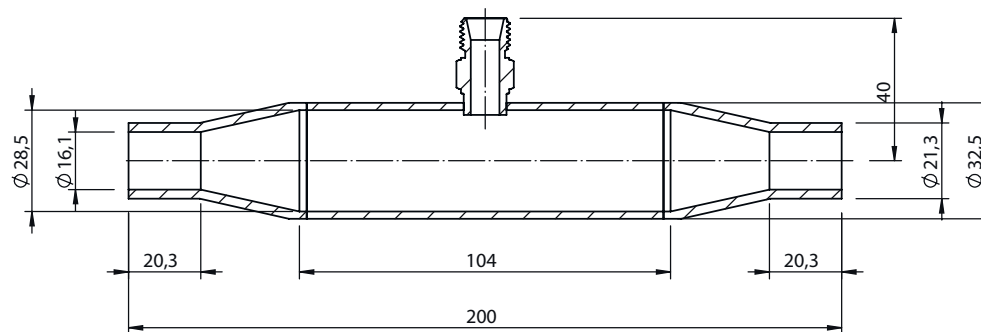


Figure 51: Dimensional drawing for T-piece DN15 (P/N 2123468) with weld end

12.6.4 T-piece DN15 (P/N 2123463) with Rp thread

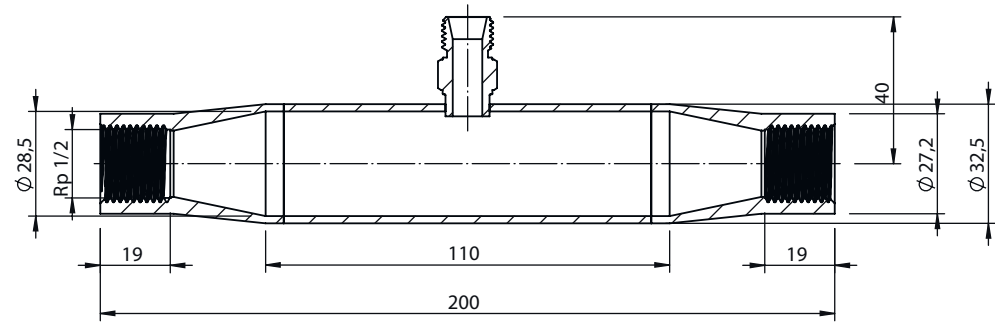


Figure 52: Dimensional drawing for T-piece DN15 (P/N 2123463) with Rp thread

13 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 Hygienic process adapter DIN32676 DN25-40 (50.5 mm)
2118844	BEF-TCFW25-FTS1	T-piece DN25 weld end for T-Easic FTS
2118845	BEF-TCFW40-FTS1	T-piece DN40 weld end for T-Easic FTS
2118846	BEF-TCFW50-FTS1	T-piece DN50 weld end for T-Easic FTS
2123468	BEF-TCFW15-FTS1	T-piece DN15 weld end for T-Easic FTS
2121340	BEF-CFWAXX-FTS1	Compression fitting with weld end for T-Easic® FTS
2122453	BEF-TCFR10-FTS1	T-piece DN25 Rp1 thread for T-Easic FTS
2122454	BEF-TCFR11-FTS1	T-piece DN40 Rp1 1/2 thread for T-Easic FTS
2122455	BEF-TCFR20-FTS1	T-piece DN50 Rp2 thread for T-Easic FTS
2123463	BEF-TCFR12-FTS1	T-piece DN15 Rp1/2 thread for T-Easic FTS
6052613	DOL-1204-G02MNI	Cable IP69K - M12x1, 4-pin, -2 m straight
6052615	DOL-1204-G05MNI	Cable IP69K - M12x1 4-pin - 5 m straight
6052617	DOL-1204-G10MNI	Cable IP69K - M12x1 4-pin - 10 m straight



NOTE

You can find more accessories online at: www.sick.com.

14 Menu overview

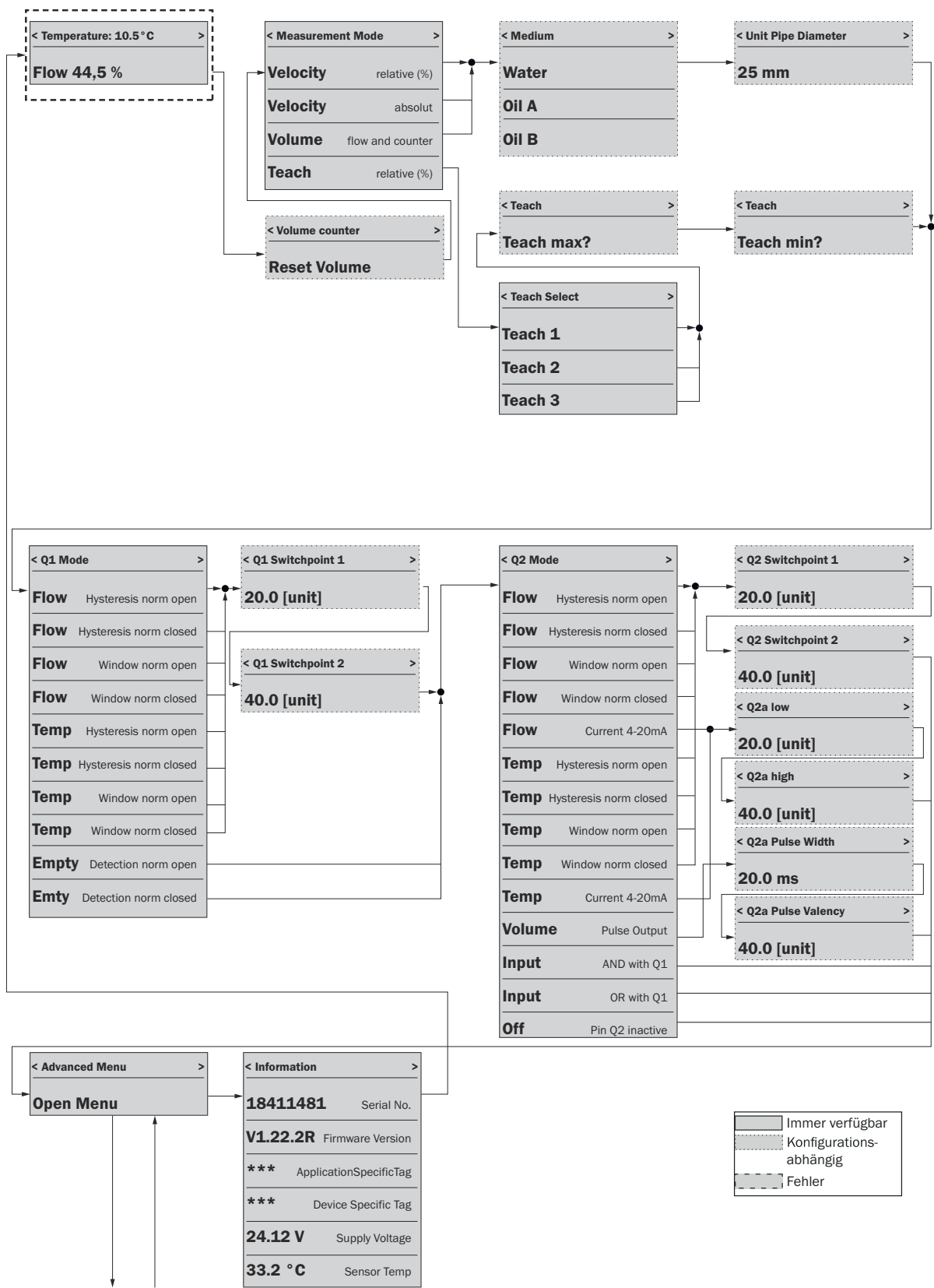
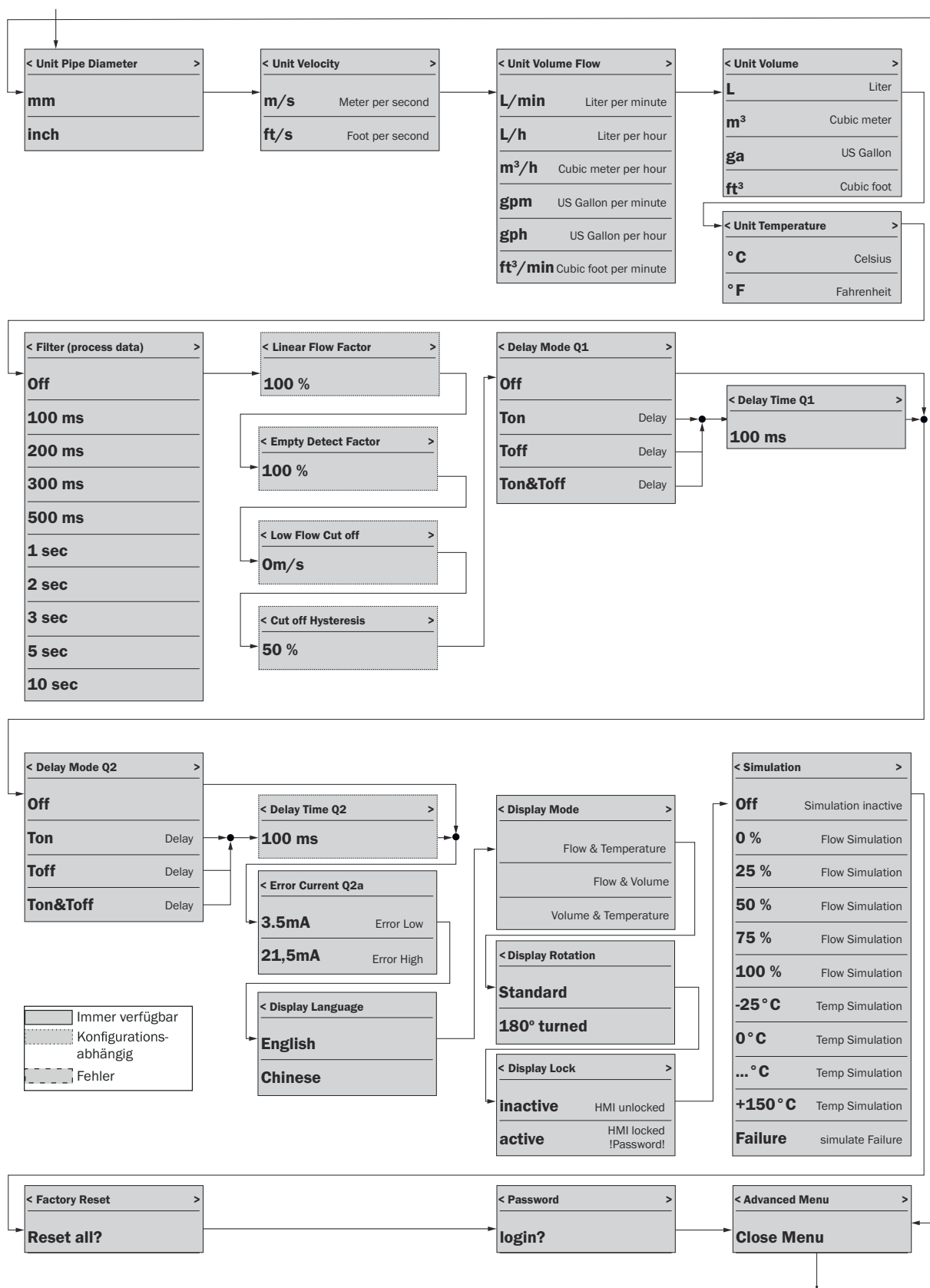


Figure 53: Menu overview



15 Annex

15.1 Conformities and certificates

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

15.2 License text

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