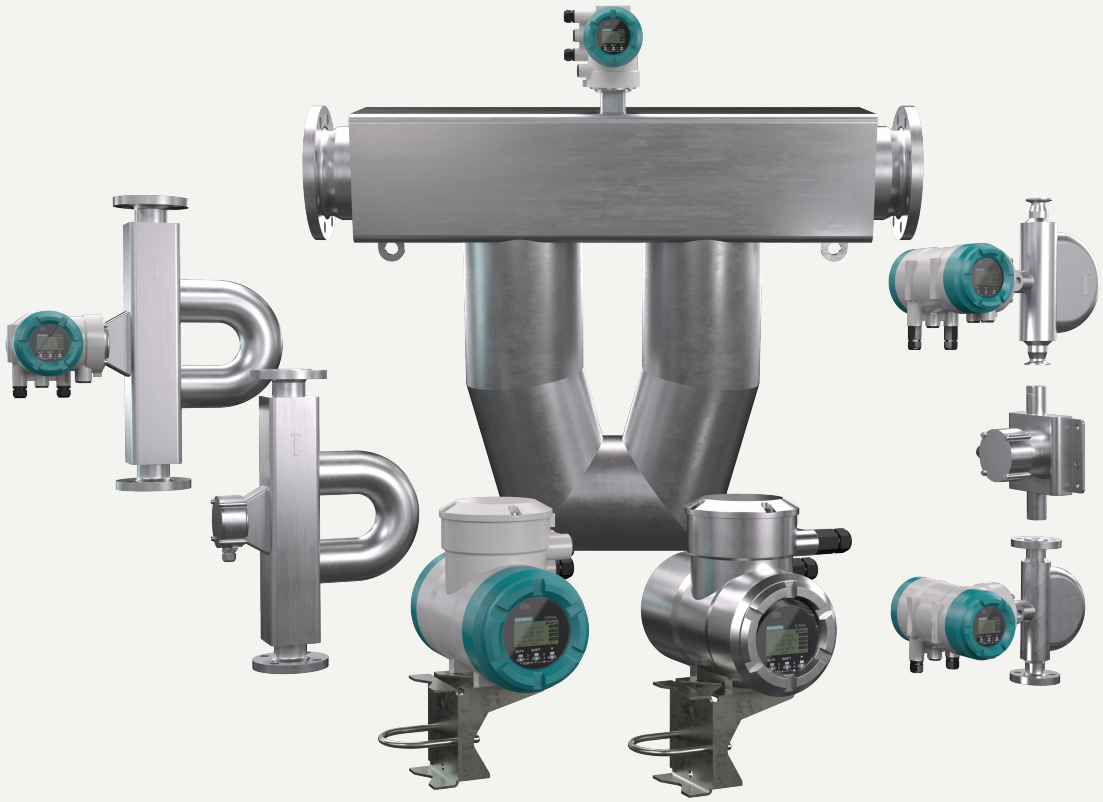
SIEMENS



Edition 09/2023

OPERATING INSTRUCTIONS

SITRANS F

Coriolis flowmeters

SITRANS FC620/FC640

www.siemens.com/flow

Table of contents

1 Introduction

1.1 Scope of application

These instructions apply to the following Siemens SITRANS FC products:

- SITRANS FC1x0
- SITRANS FC6x0
- SITRANS FC7x0
- SITRANS FC5x0
- SITRANS FC Spare transmitter and Spare sensor.

1.2 Target group

The following persons are the target group of this manual:

- Technicians
- Engineers

This manual along with its applicable documents enables the target group to complete the following steps:

- Installation
- Commissioning
- Configuration (parametrization)
- Integration of the flow meter into a process control system
- Troubleshooting
- Maintenance and repair
- Replacement (sensor and transmitter)
- Dismantling and disposal

1.3 Document history

The following table shows major changes in the documentation compared to the previous edition.

Edition	Remark
09/2023	First edition

1.4 Product compatibility

The following table describes compatibility between manual edition, device revision, software and firmware revision.

Manual edition	Remarks	Hardware revision	Main software revision	Sensor software revision	Indicator software revision
09/2023	Initial release	S1.01 or later	R4.01.01 or later	R1.01.04 or later	R4.01.01 or later R4.01.02 or later

1.5 Applicable documents

The following documents supplement this manual:

- Explosion Proof Type Reference Manual
  - ATEX A5E52487402
  - IECEx A5E52595170
  - FM/CSA A5E52487431
  - NEPSI A5E52595174
  - Korea Ex A5E52778071
- Function Manual
  - HART A5E52748515
  - Profibus PA A5E52748624
  - Modbus A5E52748619

All relevant manuals can be downloaded from: http://www.siemens.com/flowdocumentation.

1.6 Explanation of safety instructions and symbols

Signal words

Warning notices are intended to alert users to potential hazards when working with the flow meter. There are four hazard levels that can be identified by the signal word:

Signal word	Meaning
DANGER	Identifies a high-risk hazard resulting in death or severe injury unless avoided.
WARNING	Identifies a fluid-risk hazard that may lead to death or severe injury unless avoided.
CAUTION	Identifies a low-risk hazard that may lead to minor or moderate injury unless avoided.
NOTICE	Identifies a hazard resulting in property damage.

Explanation of symbols

Symbols in this document	Meaning
	Indicates a hazard, documentations must be consulted.
	Indicates important information.

Symbols on the nameplates	Meaning
	Warning that requires reading the documentation
	RCM marking
	CE marking
	ATEX explosion protection marking
	EAC and EAC Ex marking
	Korean (KC and KCs) marking

Symbols on the nameplates	Meaning
	FM/CSA marking
	NEPSI marking
	INMETRO marking
	DNV GL type approval marking
	3-A Sanitary approval marking
	China RoHS marking
	Taiwan Safety (TS) marking
	Russia Pattern approval marking
	Belarus Pattern approval marking

2 Safety

2.1 Intended use

The flow meter described in this Operating Instructions is intended to measure mass flow of fluids and gases while simultaneously also capturing their density and temperature. These values form the basis for calculating additional measured quantities, such as volume flow and concentration of fluids.

The flow meter uses the Coriolis principle and can be used in process automation for a wide range of flow rate measurements. It allows for measuring various fluids, e.g.:

- Oils, grease
- Gases, liquid gases
- Acids, solutions, solvents
- Emulsions and suspensions

Use of the flow meter is limited primarily by the necessary homogeneity of the fluid and chemical resistance of the wetted parts. Details can be obtained from the responsible Siemens sales organization. Operational safety cannot be ensured in the event of any improper or not intended use. Siemens is not liable for damage arising from such use.

The flow meter described in this Operating Instructions is a class A device according to EN 61326-1 and may only be used in an industrial environment.

2.2 Technical conditions

At normal conditions, the flow meter does not release any poisonous gases or substances.

If the flow meter is operated in faulty conditions, its safety and function may be impaired.

For this reason, the following must be observed:

- ▸ Operate the flow meter only when in good working order.
- ▸ If its operational performance changes unexpectedly, check flow meter for faults.
- ▸ Do not undertake unauthorized conversions or modifications on the flow meter.
- ▸ Eliminate faults immediately.
- ▸ Use only original spare parts.

2.3 General safety instructions

⚠ **DANGER**

Use of fluids that are a health hazard may result in caustic burns or poisoning

- ▸ When removing the flow meter, avoid touching the fluid and breathing gas residues left in the sensor.
- ▸ Wear protective clothing and a breathing mask.

⚠ DANGER

Use of unproper materials through the customer may result in heavy corrosion and/or erosion

- The medium temperature / pressure ranges are calculated and approved without corrosion or erosion.
- The customer is fully responsible to select proper materials to withstand his corrosive or erosive conditions.
- In case of heavy corrosion and/or erosion the instrument may not withstand the pressure and an incident may happen with human and / or environmental harm.
- Siemens will not take any liability regarding damage caused by corrosion / erosion.
- If corrosion / erosion may happen, the user has to check periodically if the necessary wall thickness is still in place.

⚠ DANGER

Improper installation in hazardous area

The following basic safety instructions must be observed when handling the flow meter:

- When using the flow meter in areas at risk of explosion, compliance with the Explosion Proof Type Manual is mandatory.

⚠ WARNING

High fluid temperatures may result in hot surfaces and therefore a risk of burns

- Apply thermal insulation to sensor.
- Attach warning labels to the sensor.
- Wear protective gloves.

⚠ WARNING

Risk of injury from electrical shock due to inadequate clothing

- Wear protective clothing as required by regulations.

⚠ WARNING

Risk of injury from electrical shock at the transmitter

- Avoid handling the transmitter with wet hands.
- Wear protective gloves.

The following basic safety instructions must be observed when handling the flow meter:

- Carefully read the Reference Manual prior to operating the flow meter.
- Only qualified specialist personnel must be charged with the tasks described in this Operating Instructions.
- Ensure that personnel complies with locally applicable regulations and rules for working safely.
- Do not remove or cover safety markings and nameplates from flow meter.
- Replace soiled or damaged safety markings on the flow meter. For replacing please contact the Siemens Service Center.
- If SITRANS FC is used to measure safety-related quantities, ensure that the transmitter does not display any error messages and, if applicable, the Total Health Check function is performed at regular intervals.
- Avoid erosion and corrosion as they reduce accuracy and resistance to temperature and pressure. Over time, calibration constants change as a result of erosion and corrosion, therefore requiring recalibration. Siemens does not assume any guaranty or liability with respect to corrosion resistance of wetted parts in any specific process. The user is responsible for selecting the appropriate materials. Siemens provides support in clearing up the question of corrosion resistance of the materials used (special fluids but also cleaning agents). Minor changes in temperature, concentration or pollution degree in the process may result in differences in terms of corrosion

resistance. In case of corrosion or erosion, the pipes must be checked periodically to ensure necessary wall thickness. This can be accomplished by using, for example, the Tube Health Check function.

- When performing welding tasks on the pipe, it is important not to ground the welding equipment by way of the flow meter. Soldering and welding work on parts of the flow meter is prohibited.
- Continuous temperature fluctuations in excess of 100 °C may result in tube failure due to material fatigue and therefore must be avoided.
- The operator is responsible for ensuring that design limits (pressure, temperature) are not exceeded in the event unstable fluids decay.
- External influences may result in failure of threaded connections. The operator is responsible for providing suitable protective measures.
- Compression and shock waves in pipes can cause damage to the sensor. For this reason it is important to avoid exceeding the design limits (pressure, temperature).
- Fires may result in increased process pressure (caused by temperature-related volume changes) and failure of gaskets. The operator is responsible for taking suitable measures to prevent fire-related damage.
- Manufacturing methods and technologies have been successfully field-tested for decades. Erosion and/or corrosion are not taken into account.
- Removal of material from the flow meter with power tools such as drills or saws is not permitted.
- Any repair, modification, replacement or installation of replacement parts is permitted only if it's complying with this Operating Instructions. Other work must be first authorized by Siemens. Siemens does not assume liability for damage caused by unauthorized work on the flow meter or by improper use.

3 Warranty

Please contact the Siemens sales organization if the device needs to be repaired.

The warranty terms for this device are described in the quotation.

If a defect for which Siemens is responsible occurs in the device during the warranty period, Siemens will repair that defect at its own cost.

If you believe that the device is defective, please contact us and provide a detailed description of the problem. Please also tell us how long the defect has already occurred and list the order code and serial number. Additional information, such as drawings, simplifies the identification of the cause and repair of the defect.

Based on our test results, we determine whether the device can be repaired at Siemens' expense or at the expense of the customer. If, for example, the Siemens calibration device for the water flow rate confirms a deviation of the output signal from the stated flow rate accuracy of the device, the device is deemed defective.

The warranty does not apply in the following cases:

- If the adhesion, blockage, deposit, abrasion or corrosion is the result of the device's actual use.
- If the device is mechanically damaged through solids in the fluid, hydraulic shock, or similar influences.
- If the instructions in the corresponding Operating Instructions or Reference Manual that must be met have not been followed.
- In case of problems, errors or damage that result from unprofessional installation by the customer, for example due to insufficient tightness of the pipe fittings.
- In case of problems, errors or damage that result from operation, handling or storage in rough ambient conditions that are beyond the specifications of the device.
- In case of problems, errors or damage that result from unprofessional or insufficient maintenance by the customer, for example, if water or foreign particles enter the device due to opening the device cover.
- In case of problems, errors or damage that result from use or from performing maintenance work on the device in a location other than the installation location specified by Siemens.
- In case of problems, errors or damage that result from modification or repair work that was not performed by Siemens or by a person authorized by Siemens.
- In case of problems, errors or damage that result from unprofessional installation, if the location of the device has been changed.
- In case of problems, errors or damage that result from external factors, such as other devices that are connected to this device.
- In case of problems, errors or damage that result from catastrophic external influences, such as fire, earthquake, storm, flooding or lightning.

4 Product specification

4.1 Scope of delivery

The scope of delivery of the flow meter must be checked for completeness using the following list:

Tab. 1: Overview: Scope of delivery of the flow meter

	Compact type	Remote type	Spare sensor	Spare trans-mitter
Sensor	1 unit	1 unit	1 unit	–
Transmitter		1 unit	–	1 unit
Connecting cable	–	Length acc. to order code	–	–
Operating tool for terminals	2 units	2 units	2 units	2 units
2-inch pipe mounting bracket set ▪ Sheet metal console (bracket) ▪ Mounting bracket (U-bracket) ▪ Fixing materials (2 nuts, 2 washers, 4 Allen screws)	-	1 set	–	1 set
Pipe installation set for sensor (with device option S30) ▪ Sheet metal console (bracket) ▪ Mounting bracket (U-bracket) ▪ Fixing plate ▪ Fixing materials (14 nuts, 6 washers, 4 bolts, 8 notched washers, 4 rubber buffers)	–	1 set	1 set	–
Cable glands are included for a device with metric cable entries and without Ex approval. Please note: ▪ No cable glands are included for a device with cable entries other than metric. ▪ For a device with Ex approval the inclusion of cable glands may vary. Please refer to the applicable Explosion Proof Type Manual.	2 units	2 units	–	2 units
Cable glands for connecting cable between sensor and transmitter, metal (pre-installed)	–	2 units	–	–
Termination kit for shortening the connecting cable (not with option L50 or L70), including instruction booklet.)	–	1 set	–	–
Document folder with this content: ▪ microSD card (includes the complete product documentation) ▪ Safety Instructions Manual ▪ Further documents like certificates (depending on order code)	1 folder	1 folder	1 folder	1 folder

4.2 Identification

The order code can be used to identify the flow meter along with its specification. The order code is located on each main nameplate.

4.2.1 Nameplates

The sensor as well as the transmitter each contain a main nameplate and an additional nameplate that feature different information.

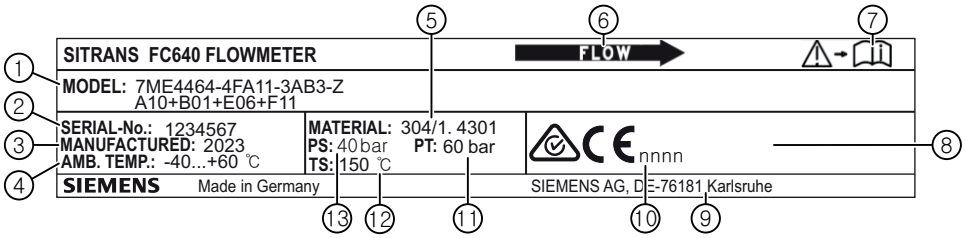
NOTICE

For individual applications (e.g. marine applications with option S2x) additional limitations to those on the nameplate may apply according to the respective applicable regulations. The language of the nameplates may vary depending on the selected option (e.g. Chinese language with option W21).

The variants of the nameplates are described below.

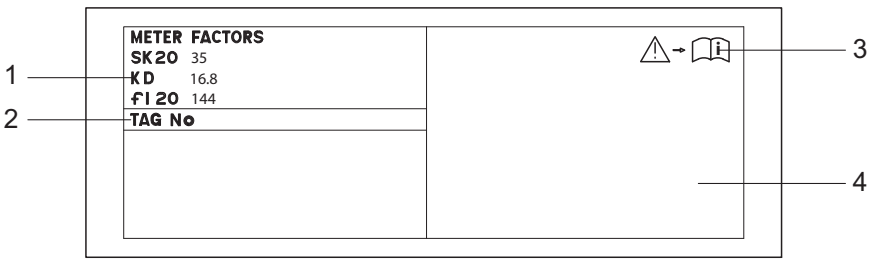
4.2.1.1 Sensor

Main nameplate



1	Order code
2	Serial number
3	Year of manufacture
4	Ambient temperature range
5	Material wetted parts
6	Flow direction
7	Warning with the request to read the documentation
8	Area for conformity marking
9	Manufacturer's address
10	Notified body for ATEX QA supervision
11	Test pressure
12	Maximum allowed process fluid temperature
13	Maximum allowed working pressure at room temperature

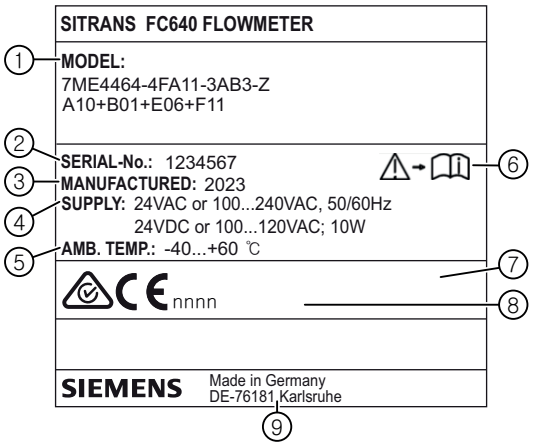
Additional sensor nameplate



1	Calibration constants of sensor	3	Warning that requires reading the documentation
2	Customer-Device location identification (option Y11)	4	Space for Ex marking (see Explosion Proof Type Manual)

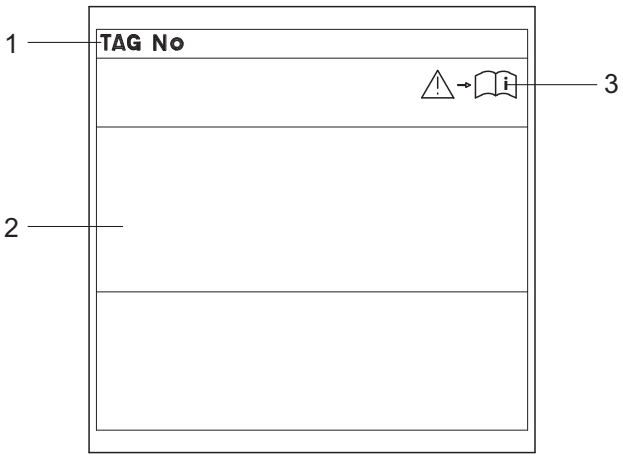
4.2.1.2 Transmitter

Main nameplate



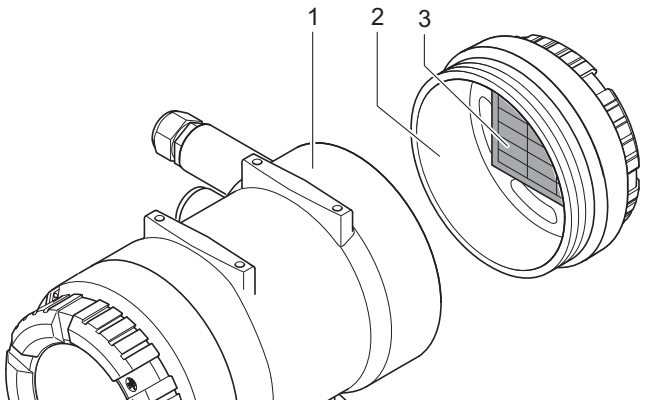
1 Order code
2 Serial number
3 Year of manufacture
4 Power supply range
5 Ambient temperature range
6 Warning with the request to read the documentation
7 Area for conformity marking
8 Notified body for ATEX QA supervision
9 Manufacturer's address

Additional transmitter nameplate

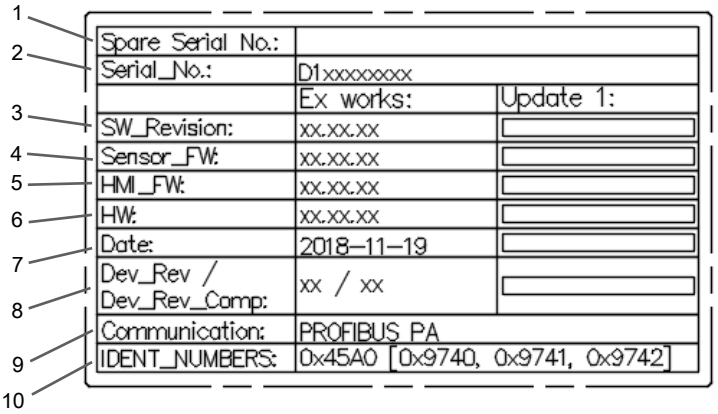


1 Customer-Device location identification (option Y11)
2 Space for Ex marking (see Explosion Proof Type Manual)
3 Warning that requires reading the documentation

Transmitter label



1 Transmitter
2 Transmitter back cover
3 Label



1	Spare serial number	6	Hardware revision
2	Serial number	7	Date of Ex works/ Update
3	Main software revision	8	Device Revision / Device Revision Compatibility
4	Sensor software revision	9	Type of Communication
5	Indicator software revision	10	Supported "IDENT NUMBERS" (only for PROFIBUS PA)

NOTICE

Software revisions are also shown on the Indicator after power on, with the following designations:

- "SW_Revision" indicated as "Main"
- "Sensor_FW" indicated as "Sensor"
- "HMI_FW" indicated as "Indicator"

4.2.2 Order code description

General specifications

All available properties of the SITRANS FC Coriolis flowmeters are specified by means of an order code.

The position of the order code relevant to the respective property is depicted and highlighted in blue.

A complete description of the order code is included in the Operating Instructions of the corresponding products.

The order code of the SITRANS FC is explained below.

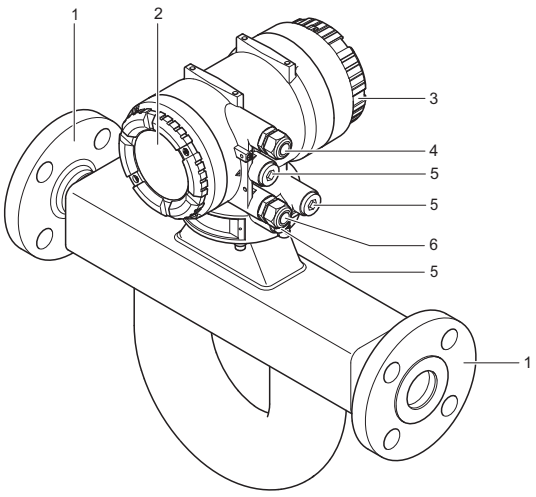
Items 1 through 16 are mandatory entries and must be specified at the time of ordering.

Device options (item -Z) can be selected and specified individually.

1	7
2	M
3	E
4	Product group: MASS
5	Sensor
6	Sensor
7	Transmitter variant
8	Sensor type and size
9	Connector size
10	Process connection / Pressure
11	Process connection / Pressure
12	Tube material (wetted), process connection material and maximum operational temperature
13	Calibration
14	Mounting style, transmitter housing & material
15	Ex approval
16	Local user interface
Z	Axx Cable glands Bxx Sensor housing material Exx I/O configuration Ch1 Fxx I/O configuration Ch2, Ch3 & Ch4

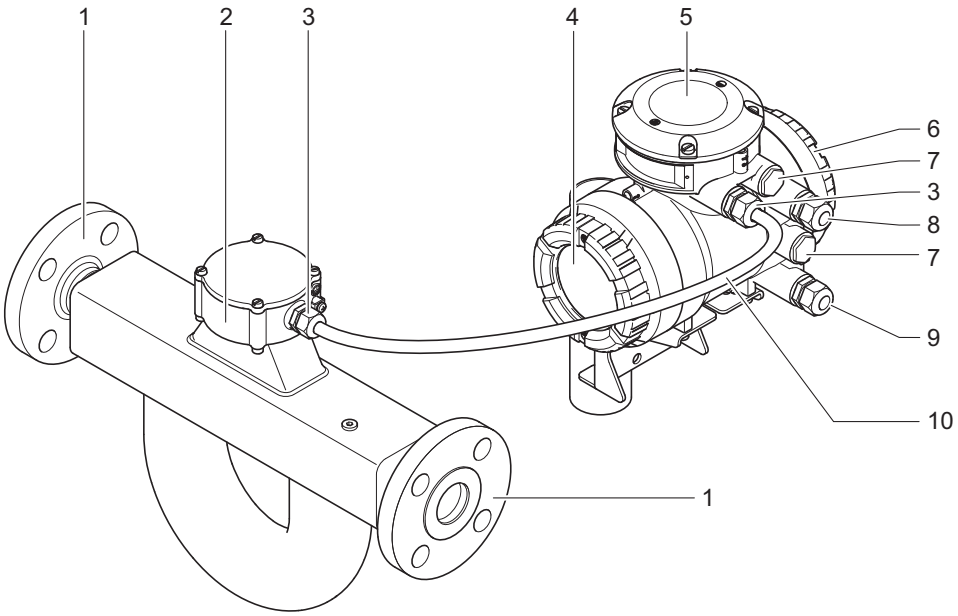
4.3 Flow meter components

Compact type



1	Process connections
2	Back cover for inputs and outputs, and power supply
3	Display cover
4	Power supply cable entry
5	Blind plug
6	Inputs/outputs cable entry

Remote type



1	Process connections
2	Terminal box
3	Cable entry for connecting cable
4	Display cover
5	Sensor connection cover
6	Back cover for inputs and outputs, and power supply
7	Blind plug
8	Inputs/outputs cable entry
9	Power supply cable entry
10	Connecting cable

5 Transport and storage

5.1 Transport

The following rules apply when transporting the flow meter:

- Observe the transport-related instructions on packaging.
- In order to avoid damage, do not unpack the flow meter until it is at the installation site.
- Do not remove protective materials, such as protective stickers or covers from process connections during transport.
- Starting at a weight of 15 kg, have at least two persons and/or use suitable tools (shoulder straps, lifting device, cart) to lift and transport the flow meter.

⚠ WARNING

Risk of injury from slipping or falling flow meter

- Ensure that suspension points of the ropes are located above the flow meter's center of gravity.
- Use a lifting device meeting local regulations.
- Attach lifting ropes to process connections.
- Do not suspend flow meter from transmitter housing, neck of sensor or flange holes.

The lifting ropes must always be attached to the sensor at the process connections (except for the SITRANS FC1x0). The depictions that are crossed out in the figure below show impermissible attachment types. This applies to the remote type, the remote type with long neck and the compact type, independent of the design. If the process connections are others than flanges, the holding ropes must be secured against slipping, if necessary (for example, for the SITRANS FC5x0).

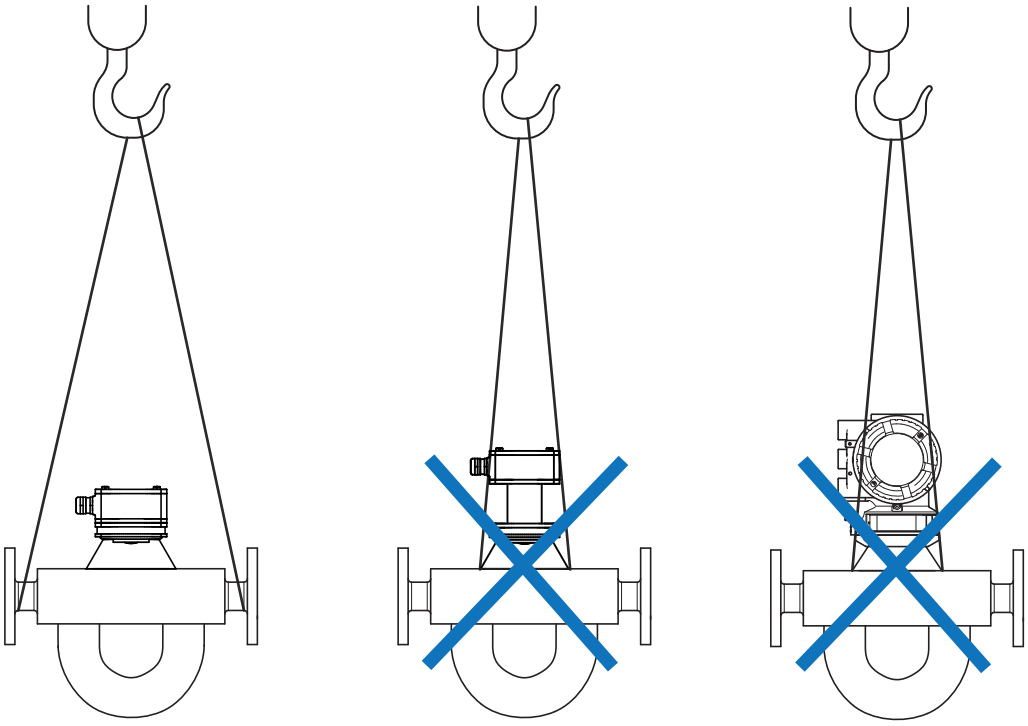


Fig. 1: Attachment of the transport ropes to the sensor independent of the design (impermissible attachment types are crossed out)

5.2 Storage

Please note the following rules apply when storing the flow meter:

NOTICE

Risk of damage to the flow meter due to storage in a damp environment

- Protect flow meter from rain and humidity.
- Ensure that a relative humidity of 95 % is not exceeded.

NOTICE

Risk of damage to the flow meter due to mechanical wear during storage

- Store flow meter in a location that is secured against mechanical influences.

- Ensure compliance with the allowed storage temperature, see *Specifications [▶ 190]*.
- Protect flow meter against direct insolation to prevent exceeding the allowed storage temperature.
- Protect flow meter from rain and inappropriate humidity.
- Keep protective materials such as protective stickers or covers on process connections or re-apply them.
- Prior to storing a used flow meter, completely drain all fluids from the measuring tube, as well as from the process and heat tracing connections (if applicable), and thoroughly clean the flow meter, see Dismantling and disposal.

6 Measuring principle and flow meter design

6.1 Measuring principle

The measuring principle is based on the generation of Coriolis forces. For this purpose, a driver system (E) excites the two measuring tubes (M1, M2) in their first resonance frequency. Both pipes vibrate inversely phased, similar to a resonating tuning fork.

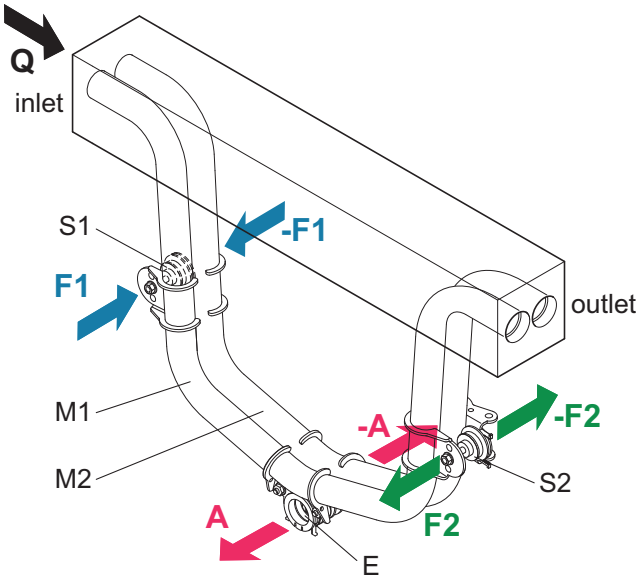


Fig. 2: Coriolis principle

M1,M2	Measuring tubes	E	Driver system
S1, S2	Pick-offs	A	Direction of measuring tube vibration
F1, F2	Coriolis forces	Q	Direction of fluid flow

Mass flow

The fluid flow through the vibrating measuring tubes generates Coriolis forces (F1, -F1 and F2, -F2) that produce positive or negative values for the tubes on the inflow or outflow side. These forces are directly proportional to the mass flow and result in deformation (torsion) of the measuring tubes.

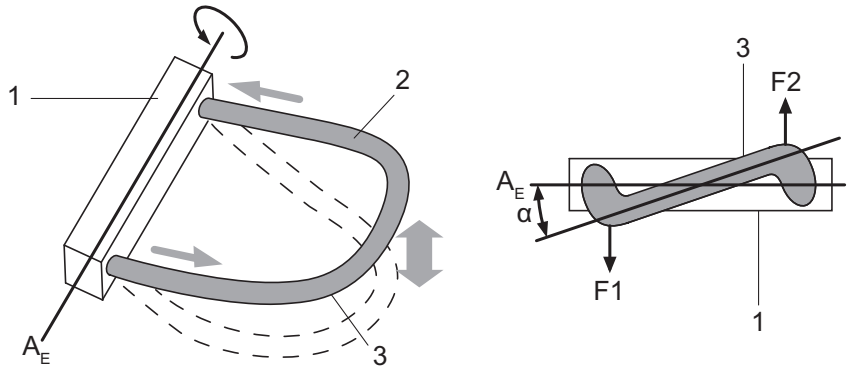


Fig. 3: Coriolis forces and measuring tube deformation

1	Measuring tube mount	A_E	Rotational axis
2	Fluid	F1, F2	Coriolis forces
3	Measuring tube	α	Torsion angle

The small deformation overlying the fundamental vibration is recorded by means of pick-offs (S1, S2) attached at suitable measuring tube locations. The resulting phase shift Δφ between the output signals of pick-offs S1 and S2 is proportional to the mass flow. The output signals generated are further processed in a transmitter.

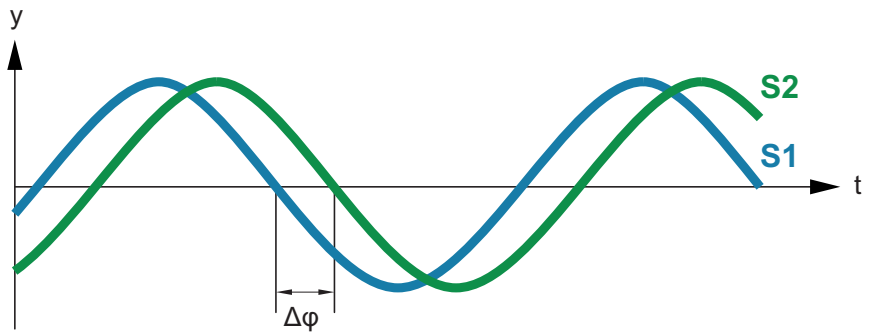


Fig. 4: Phase shift between output signals of S1 and S2 pick-offs

$$\Delta\varphi \sim F_c \sim \frac{dm}{dt}$$

$\Delta\varphi$	Phase shift
m	Dynamic mass
t	Time
dm/dt	Mass flow
F_c	Coriolis force

Density measurement

Using a driver and an electronic regulator, the measuring tubes are operated in their resonance frequency f. This resonance frequency is a function of measuring tube geometry, material properties and the mass of the fluid covibrating in the measuring tubes. Altering the density and the attendant mass will alter the resonance frequency. The transmitter measures the resonance frequency and calculates density from it according to the formula below. Device-dependent constants are determined individually during calibration.

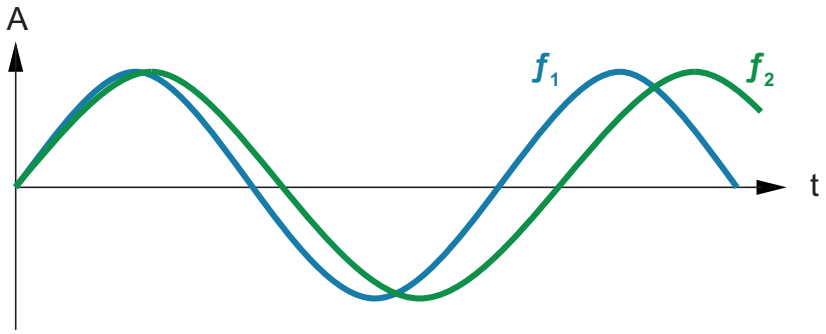


Fig. 5: Resonance frequency of measuring tubes

A	Measuring tube displacement
f_1	Resonance frequency with fluid 1
f_2	Resonance frequency with fluid 2

$$\rho = \frac{\alpha}{f^2} + \beta$$

ρ	Fluid density
f	Resonance frequency of measuring tubes
α, β	Device-dependent constants

Temperature measurement

The measuring tube temperature is measured in order to compensate the effects of temperature on the flow meter. This temperature approximately equals the fluid temperature and is made available as a measured quantity at the transmitter as well.

6.2 Flow meter

The SITRANS FC Coriolis flow meter consists of:

- Sensor
- Transmitter

When the compact type is used, sensor and transmitter are firmly connected.

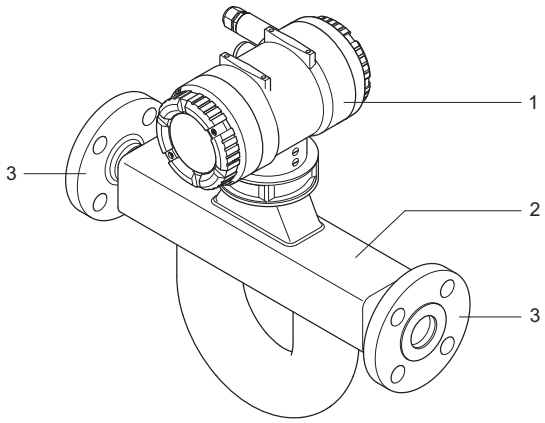


Fig. 6: Configuration of the SITRANS FC compact type

1	Transmitter
2	Sensor
3	Process connections

When the remote type is used, sensor and transmitter are linked via connecting cable. As a result, sensor and transmitter can be installed in different locations.

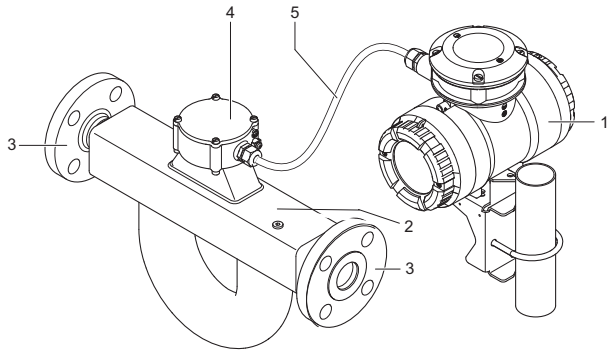


Fig. 7: Configuration of the SITRANS FC remote type

1	Transmitter	4	Sensor terminal box
2	Sensor	5	Connecting cable
3	Process connections		

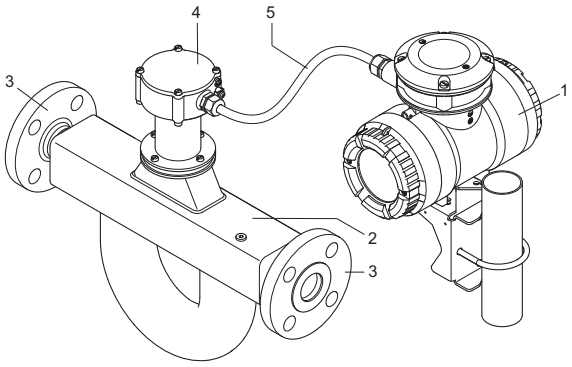


Fig. 8: Configuration of the SITRANS FC remote type - long neck

1	Transmitter	4	Sensor terminal box
2	Sensor	5	Connecting cable
3	Process connections		

General specifications

All available properties of the SITRANS FC Coriolis flow meter are specified by means of an order code.

The positions of the order code relevant for the respective properties are depicted and highlighted in blue. Any values that might occupy these order code positions are subsequently explained.

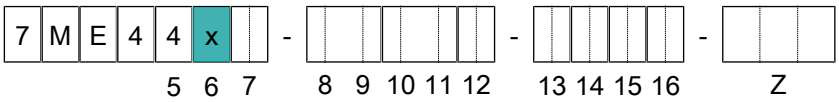


Fig. 9: Highlighted order code positions

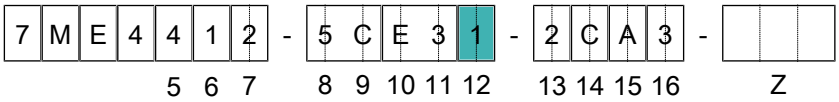


Fig. 10: Example of a completed order code

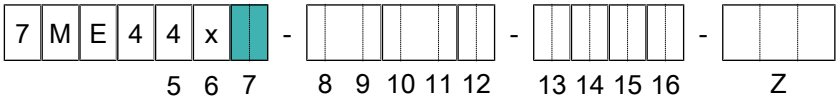
A complete description of the order code is included in the chapter Ordering information.

Transmitter overview

Two different transmitters can be combined with the sensor: SITRANS FCT020 and FCT040.

SITRANS FCT020 transmitter is suitable for general purposes applications and it delivers accurate and precise measurements of flow rate and density.

SITRANS FCT040 transmitter, thanks to the advanced functions, offers dedicated application solutions with a superior accuracy and performances in measuring flow rate, density and concentration.



Transmitter	Properties	Order code position 7
SITRANS FCT020 	▪ Down to 0.15 % mass flow accuracy for liquids ▪ Down to 0.75 % mass flow accuracy for gases ▪ Down to 4 g/l (0.25 lb/ft³) accuracy for density ▪ Total Health Check (diagnostic function) ▪ Advanced functions: - Tube Health Check (diagnostic function) ▪ Communication: - HART - Modbus ▪ Data backup on microSD card	2
SITRANS FCT040 	▪ Down to 0.1 % mass flow accuracy for liquids ▪ Down to 0.5 % mass flow accuracy for gases ▪ Down to 0.5 g/l (0.03 lb/ft³) accuracy for density ▪ Total Health Check (diagnostic function) ▪ Advanced functions: - Standard concentration measurement - Advanced concentration measurement - Net Oil Computing following API standard - Viscosity function - Batching function - Measurement of heat quantity - Tube Health Check (diagnostic function) ▪ Features on Demand ▪ Communication: - HART - Modbus - PROFIBUS PA ▪ Data backup on microSD card	4, 9
No transmitter	▪ Spare sensor without transmitter, combinable with SITRANS FC transmitter	0

7 Application and measuring ranges

In this chapter, all values related to pressure are gauge pressure values.

7.1 Measured quantities

The SITRANS FC Coriolis flow meter can be used to measure the following fluids:

- Liquids
- Gases
- Mixtures, such as emulsions, suspensions, slurries

Possible limitations applying to measurement of mixtures must be checked with the responsible Siemens sales organization.

The following variables can be measured using SITRANS FC:

- Mass flow
- Density
- Temperature

Based on these measured quantities, the transmitter also calculates:

- Volume flow
- Partial component concentration of a two-component mixture
- Partial component flow rate of a mixture consisting of two components (net flow)

The net flow is calculated based on the known partial component concentration and the overallflow.

The mass flow, volume flow, net flow measurements can be bi-directional.

Measured quantities for NTEP custody transfer approval

Measurement variables for NTEP approval options C16 are:

- Mass flow unidirectional
- Volume flow unidirectional

7.2 Measuring range overview

	FCS600 DN15	FCS600 DN25	FCS600 DN40	FCS600 DN65	
Mass flow range					
Typical connection size	DN15, ½"	DN25, 1"	DN40, 1½"	DN80, 3"	Mass flow
Q_{nom}	3 t/h (110 lb/min)	10 t/h (370 lb/min)	32 t/h (1200 lb/min)	100 t/h (3700 lb/min)	
Q_{max}	5 t/h (180 lb/min)	17 t/h (620 lb/min)	50 t/h (1800 lb/min)	170 t/h (6200 lb/min)	
Maximum volume flow					
(Water)	5 m^3/h (42 barrel/h)	17 m^3/h (140 barrel/h)	50 m^3/h (420 barrel/h)	170 m^3/h (1400 barrel/h)	Volume flow
Range of fluid density					
	0 – 5 kg/l (0 – 312 lb/ft^3)			0 – 2,5 kg/l (0 – 156 lb/ft^3)	*[▷ 40]*

	FCS600 DN15	FCS600 DN25	FCS600 DN40	FCS600 DN65	
Process fluid temperature range					
Standard[1)]	-70 – 150 °C (-94 – 302 °F)				[39]
Mid-range	-70 – 230 °C (-94 – 446 °F)				
High	0 – 350 °C (32 – 662 °F)				

Q_{nom} - Nominal mass flow

Q_{max} - Maximum mass flow

Q_{min} - Minimum mass flow

The nominal mass flow Q_{nom} is defined as the mass flow of water (temperature: 20 °C) at 1 bar pressure loss along the flow meter.

8 Accuracy

In this chapter, maximum deviations are indicated as absolute values.

All accuracy data are given in ± values.

8.1 Overview

Achievable accuracies for liquids

The value D_{flat} specified for accuracy of mass flow applies for flow rates exceeding the mass flow limit Q_{flat}. If the flow rate is less than Q_{flat}, other effects have to be considered.

If the flow rate is higher than Q_{nom}, other effects might influence the accuracy (e.g. cavitation).

The following values are achieved at calibration conditions when the device is delivered, see Calibration conditions.

Measured quantity		Accuracy for transmitters	
		SITRANS FCT020	SITRANS FCT040
Mass flow[1]	Accuracy[2] D_{flat}	0.15 % of measured value	0.1 % of measured value
	Repeatability[3]	0.08 % of measured value	0.05 % of measured value
Volume flow (water)[1]	Accuracy[2] D_V	0.43 % of measured value	0.12 % of measured value
	Repeatability[3]	0.22 % of measured value	0.06 % of measured value
Density	Accuracy[2]	4 g/l (0.25 lb/ft³)	0.5 g/l (0.03 lb/ft³)
	Repeatability[3]	2 g/l (0.13 lb/ft³)	0.3 g/l (0.02 lb/ft³)
Temperature	Accuracy[2]	0.5 °C (0.9 °F)	0.5 °C (0.9 °F)

Achievable accuracies for gases

Measured quantity		Accuracy for transmitters	
		SITRANS FCT020	SITRANS FCT040
Mass flow / standard volume flow[1]	Accuracy[2] D_{flat}	0.75 % of measured value	0.35 % of measured value
	Repeatability[3]	0.6 % of measured value	0.28 % of measured value
Temperature	Accuracy[2]	0.5 °C (0.9 °F)	0.5 °C (0.9 °F)

[1] Based on the measured values of the pulse output. This means that the flow accuracy and repeatability considers the combined measurement uncertainties including sensor, electronic and pulse output interface.

[2] Best mass flow accuracy per transmitter type.

[3] The stated repeatability is included in the accuracy.

8.2 Zero point stability of the mass flow

In case of no flow, the maximum measured flow rate is called *Zero point stability*. Zero point values are shown in the table below.

Meter size	Zero point stability *Z* in kg/h (lb/h)
FCS600 DN2	0.005 (0.011)
FCS600 DN4	0.018 (0.040)

Meter size	Zero point stability *Z* in kg/h (lb/h)
FCS600 DN15	0.15 (0.33)
FCS600 DN25	0.5 (1.1)
FCS600 DN40	1.6 (3.5)
FCS600 DN65	5 (11)

8.3 Mass flow accuracy

Above mass flow Q_{flat}, maximum deviation is constant and referred to as D_{flat}. It depends on the product version and can be found in the tables in chapter Accuracy of mass flow and density when combined.

Use the following formulas to calculate the maximum deviation *D*:

$Q_m \geq Q_{flat} \rightarrow D = D_{flat}$

$Q_m < Q_{flat} \rightarrow D = \frac{a \times 100\ \%}{Q_m} + b$

D	Maximum deviation in %	Q_m	Mass flow in kg/h
D_{flat}	Maximum deviation for high flow rates in %	Q_{flat}	Mass flow value above which D_{flat} applies, in kg/h
a, b	Constants		

Meter size (Q_{nom} in kg/h)	Order code position 13	Order code position -Z	D_{flat} in %	Q_{flat} in kg/h	*a* in kg/h	*b* in %
FCS600 DN2 (45)	8	-	0.2	4.0	0.0075	0.0132
	6	-	0.1	5.0	0.0054	-0.0088
FCS600 DN4 (170)	7	-	0.2	8.5	0.021	-0.05
	2, 5	-	0.1	14	0.0097	0.031
FCS600 DN15 (3000)	7	-	0.2	150	0.38	-0.05
	1, 2, 4	-	0.1	250	0.17	0.032
	9	N1A	0.75	150	0.38	0.5
	9	N2A	0.5	200	0.21	0.393
	9	N3A	0.35	200	0.21	0.393
FCS600 DN25 (10000)	7	-	0.2	500	1.3	-0.05
	1, 2, 3	-	0.1	830	0.57	0.032
	9	N1A	0.75	500	1.3	0.5
	9	N2A	0.5	670	0.71	0.394
	9	N3A	0.35	670	0.71	0.394
FCS600 DN40 (32000)	7	-	0.2	1600	4	-0.05
	1, 2, 3	-	0.1	2670	1.8	0.032
	9	N1A	0.75	1600	4	0.5
	9	N2A	0.5	2100	2.3	0.39
	9	N3A	0.35	2100	2.3	0.39

Meter size (Q_{nom} in kg/h)	Order code position 13	Order code position -Z	D_{flat} in %	Q_{flat} in kg/h	*a* in kg/h	*b* in %
FCS600 DN65 (100000)	7	-	0.2	5000	13	-0.05
	1, 2, 3	-	0.1	8330	5.7	0.032
	9	N1A	0.75	5000	13	0.5
	9	N2A	0.5	6700	7.1	0.394
	9	N3A	0.35	6700	7.1	0.394

Accuracy using water at 20 °C as an example

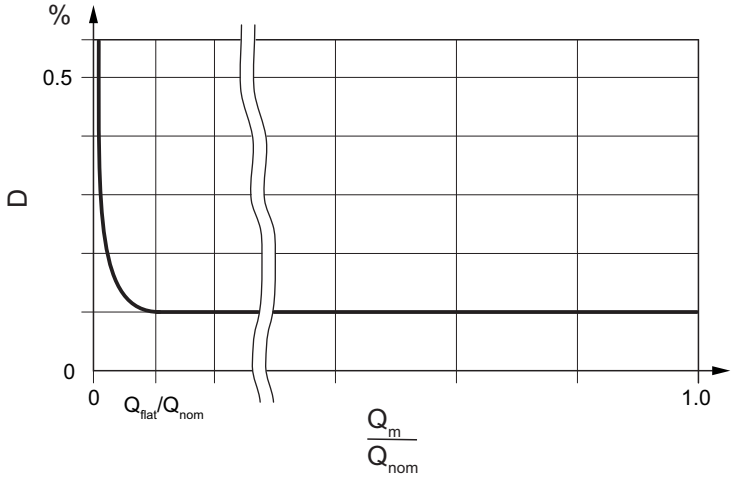


Fig. 11: Schematic dependency of the maximum deviation on the mass flow

D	Maximum deviation in %	Q_m	Mass flow in kg/h
Q_{nom}	Nominal mass flow in kg/h	Q_{flat}	Mass flow above which D_{flat} applies, in kg/h

8.4 Accuracy of density

8.4.1 For liquids

Meter size	Transmitter	Maximum deviation of density[1] in g/l (lb/ft³)
FCS600 DN15	SITRANS FCT020	Down to 4 (0.25)
FCS600 DN25		
FCS600 DN40		
FCS600 DN65		
FCS600 DN2	SITRANS FCT040	Down to 0.5 (0.03)
FCS600 DN4		
FCS600 DN15		
FCS600 DN25		
FCS600 DN40		
FCS600 DN65		

[1] Deviations possible depending on product version (meter size, type of calibration)

The maximum deviation depends on the product version selected, see also Accuracy of mass flow and density when combined.

8.4.2 For gases

In most applications, density at standard conditions is programmed into the transmitter and used to calculate the standard volume flow based on mass flow.

If gas pressure is a known value, after entering a reference density, the transmitter is able to calculate gas density from temperature and pressure as well (while assuming an ideal gas).

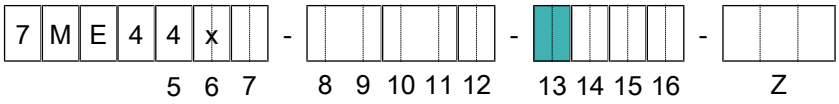
Alternatively, gas density can be measured. In order to do so, it is necessary to adapt the lower density limit value in the transmitter.

For most applications the direct measurement of the gas density will have less accuracy as stated for liquids.

8.5 Accuracy of mass flow and density according to the order code

Accuracy for flow rate as well as density is selected via order code position 13. Here a distinction is made between devices for measuring liquids and devices for measuring gases. No accuracy for density measurement is specified for gas measurement devices.

8.5.1 For liquids



SITRANS FCT020

Order code position 13	Maximum deviation of density[1] in g/l	Maximum deviation D_{flat} for mass flow in %			
		FCS600 DN15	FCS600 DN25	FCS600 DN40	FCS600 DN65
6	4	0.2	0.2	0.2	0.2

[1] Specified maximum deviation is achieved within the applicable measuring range for density.

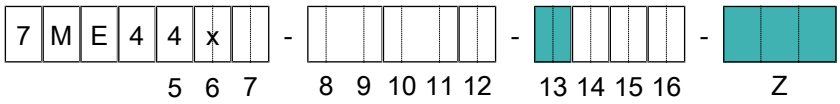
SITRANS FCT040

Order code position 13	Maximum deviation of density[1] in g/l	Maximum deviation D_{flat} for mass flow in %			
		FCS600 DN15	FCS600 DN25	FCS600 DN40	FCS600 DN65
6	4	0.2	0.2	0.2	0.2
4[2]	3	0.1	–	–	–
3[2]	2	–	0.1	0.1	0.1
2	1	0.1	0.1	0.1	0.1
1[2),3]	0.5	0.1	0.1	0.1	0.1

[1] Specified maximum deviation is achieved within the applicable measuring range for density.
[2] Notice: In case of a spare sensor combined with a transmitter in use, the original accuracy specification may be affected. For calibration services, please contact Siemens Service department.
[3] Specified deviation of density is achieved within the following limits, see table below:

	Limits for density specific D_{flat} for mass flow			
	FCS600 DN15	FCS600 DN25	FCS600 DN40	FCS600 DN65
Q_{min} of 1 in kg/h	300	700		
Ambient temperature range in °C (°F)	-10 – 50 (14 – 122)			

8.5.2 For gases



SITRANS FCT020

Order code position 13	Order code position -Z	Maximum deviation D_{flat} for mass flow in %
9	N1A	0.75

SITRANS FCT040

Order code position 13	Order code position -Z	Maximum deviation D_{flat} for mass flow in %
9[1)]	N2A	0.5
9[1)]	N3A	0.35

[1)] Notice: In case of a spare sensor combined with a transmitter in use, the original accuracy specification may be affected. For calibration services, please contact Siemens Service department.

8.6 Volume flow accuracy

8.6.1 For liquids

The following formula can be used to calculate the accuracy of liquid volume flow:

$$D_V = \sqrt{D^2 + \left(\frac{\Delta\rho}{\rho} \times 100\%\right)^2}$$

D_V	Maximum deviation of volume flow in %
$\Delta\rho$	Maximum deviation of density in kg/l
D	Maximum deviation of mass flow in %
ρ	Density in kg/l

8.6.2 For gases

Accuracy of standard volume flow for gas with a fixed reference density equals the maximum deviation *D* of the mass flow.

$$D_V = D$$

The specified accuracy is then only valid for reference gas density. Gas composition changes can have different reference density leading to accuracy deviation.

8.7 Accuracy of temperature

Accuracy of temperature depends on the sensor temperature range selected (see *Process fluid temperature range [▷ 39]*) and can be calculated as follows:

Formula for specified temperature range *Standard* and *Medium*

$$\Delta T = 0.5\ °C + 0.005 \times \left| T_{pro} - 20\ °C \right|$$

ΔT	Maximum deviation of temperature
T_{pro}	Process fluid temperature in °C measured by SITRANS FC

D_T	Sensor size				
	FCS600 DN2	FCS600 DN4	FCS600 DN15	FCS600 DN25	FCS600 DN40
	0.0075		0.0050		

D_T Deviation of temperature

Formula for specified temperature range *High* and *Low*

$$\Delta T = 1.0\ °C + 0.008 \times \left| T_{pro} - 20\ °C \right|$$

ΔT Maximum deviation of temperature

T_{pro} Process fluid temperature in °C

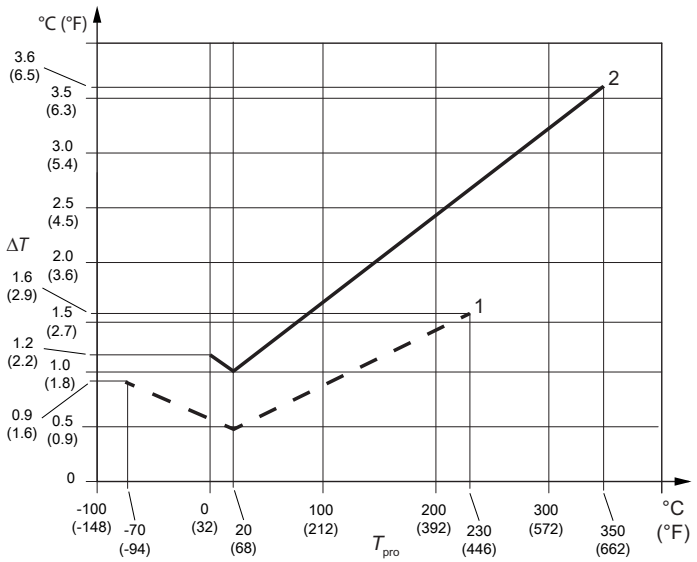


Fig. 12: Temperature accuracy

1 Temperature specifications Standard and Medium

2 Temperature specification High and Low

8.8 Repeatability

For liquids

When using default damping times, the specified repeatability of mass flow, density and temperature measurements equals half of the respective maximum deviation.

$$R = \frac{D}{2}$$

R Repeatability

D Maximum deviation

For gases

In deviation hereto, the following applies to mass and standard volume flow of gases:

$$R = \frac{D}{1.25}$$

8.9 Calibration conditions

8.9.1 Mass flow calibration and density adjustment

Each SITRANS FC device comes with a standard calibration certificate.

Calibration takes place at reference conditions. Specific values are listed in the standard calibration certificate.

	Reference conditions
Fluid	Water
Density	0.9 – 1.1 kg/l (56 − 69 lb/ft³)
Fluid temperature	10 – 35 °C (50 – 95 °F) Average temperature: 22,5 °C (72.5 °F)
Ambient temperature	10 – 35 °C (50 – 95 °F)
Process pressure (absolute)	1 – 5 bar (15 – 73 psi)

The accuracy specified is achieved at as-delivered calibration conditions stated.

8.9.2 Density calibration

Density calibration is performed for maximum deviation of 0.5 g/l (0.03 lb/ft³), (order code pos. 13: 1).

Density calibration includes:

- Determination of calibration constants for fluid densities at 0.7 kg/l (44 lb/ft³), 1 kg/l (62 lb/ft³) and 1.65 kg/l (103 lb/ft³) at 20 °C (68 °F) fluid temperature
- Check of results for fluid densities at 0.7 kg/l (44 lb/ft³), 1 kg/l (62 lb/ft³) and 1.65 kg/l (103 lb/ft³) at 20 °C (68 °F) fluid temperature
- Special flow meter configuration:
  - Specific insulation of temperature sensors
  - Preaging for long-term stability
- Creation of density calibration certificate

8.9.3 Calibration for gases

Same calibration conditions described in *Mass flow calibration and density adjustment [▷ 34]* apply for gas measurement according to AGA11 water calibration transferability[1)]. Specifications are determined based on evaluation at accredited ISO/IEC17025 calibration at following conditions:

Terms	Reference conditions
Fluid	Natural Gas
Fluid temperature	20 °C (68 °F)
Process pressure	16 barg (232 psig) and 50 barg (725 psig)

Different gases can be considered by entering characteristic gas sound velocity and related temperature coefficient[1)].

[1)] Only with SITRANS FC HART firmware rev.4 or later. For details please contact your local Siemens sales organization.

8.10 Process conditions

8.10.1 Process pressure effect

Process pressure effect is defined as the change in sensor flow and density deviation due to process pressure change away from 1barg reference condition. This effect can be corrected by dynamic pressure input or a fixed process pressure.

Tab. 2: Process pressure effect, wetted parts stainless steel 1.4404/ 316L and Ni alloy C-22/ 2.4602

Meter size	Material	Deviation of Flow		Deviation of Density	
		in % of rate per bar	in % of rate per psi	in g/l per bar	in g/l per psi
FCS600 DN2	1.4404/316L and C-22/2.4602	-0.0001	-0.00001	0.007	0.0014
FCS600 DN4	1.4404/316L and C-22/2.4602	-0.0001	-0.00126	0.02	-0.0023
FCS600 DN15	1.4404/316L	-0.0005	-0.00003	-0.066	-0.0046
	C-22/2.4602	-0.0005	-0.00003	-0.076	-0.0052
FCS600 DN25	1.4404/316L	-0.0024	-0.00017	-0.193	-0.0133
	C-22/2.4602	-0.0023	-0.00016	-0.192	-0.0132
FCS600 DN40	1.4404/316L	-0.0034	-0.00023	-0.378	-0.0261
	C-22/2.4602	-0.0035	-0.00024	-0.381	-0.0263
FCS600 DN65	1.4404/316L	-0.0084	-0.00058	-0.377	-0.0260
	C-22/2.4602	-0.0074	-0.00051	-0.350	-0.0241

8.10.2 Process fluid temperature effect

For mass flow and density measurement, process fluid temperature effect is defined as the change in sensor flow and density accuracy due to process fluid temperature change away from 20°C reference condition. For temperature ranges, see *Process fluid temperature range [39]*.

Temperature effect on Zero

Temperature effect on Zero of mass flow can be corrected by zeroing at the process fluid temperature.

Temperature effect on mass flow

The process fluid temperature is measured and the temperature effect compensated. However due to uncertainties in the compensation coefficients and in the temperature measurement an uncertainty of this compensation is left. The typical rest error of SITRANS FC temperature effect on mass flow is:

Tab. 3: All models

Temperature range	Uncertainty of flow
Standard, Medium High Low	±0.0011 % of rate / °C (±0.0006 % of rate / °F)

The temperature used for calculation of the uncertainty is the difference between process fluid temperature and the temperature 20 °C reference condition.

Temperature effect on density measurement (liquids)

Process fluid temperature influence:

Formula for metric values

$$D'_\rho = \pm k \times \text{abs}\,(T_{pro} - 20\ °C)$$

Formula for imperial values

$$D'_\rho = \pm k \times \text{abs}\,(T_{pro} - 68\ °F)$$

D'_ρ Additional density deviation due to the effect of fluid temperature in g/l (lb/ft^3)
T_{pro} Process fluid temperature in °C measured by SITRANS FC
k Constant for temperature effect on density measurement in g/l × 1/°C (lb/ft^3 × 1/°F)

Tab. 4: Constants for particular meter size and order code position (see also *Process fluid temperature range [39]* and *For liquids [32]*)

Meter size	**Order code** position 8+9	**Order code** position 12	**Order code** position 13	***k* in g/l × 1/°C (lb/ft³ × 1/°F)**
FCS600 DN2	0A, 0D	1, 6	6, 8	0.67 (0.0232)
FCS600 DN4	1A, 1D		2, 5, 7	0.56 (0.0194)
FCS600 DN15	2B, 2C, 2D, 2E, 2F, 2G	1, 3, 6, 7	2, 4, 7	0.15 (0.0052)
		2	4, 7	0.13 (0.0045)
		4, 8		0.4 (0.0139)
		1, 6	1	0.068 (0.0024)
		4, 8		0.218 (0.0076)
	6B, 6C, 6D, 6E, 6F, 6G	1, 3, 6, 7	2, 4, 7	0.17 (0.0059)
		4, 8		0.36 (0.0125)
		1, 6	1	0.027 (0.0009)
		4, 8		0.115 (0.0040)
FCS600 DN25	3E, 3F, 3G	1, 3, 6, 7	2, 3, 7	0.11 (0.0038)
		2	2, 3, 7	0.09 (0.0031)
		4, 8		0.27 (0.0094)
		1, 6	1	0.034 (0.0012)
		4, 8		0.13 (0.0045)
	7E, 7F, 7G	1, 3, 6, 7	2, 3, 7	0.09 (0.0031)
		4, 8		0.24 (0.0083)
		1, 6	1	0.019 (0.0007)
		3		0.079 (0.0027)

Meter size	**Order code** position 8+9	**Order code** position 12	**Order code** position 13	***k* in g/l × 1/°C (lb/ft³ × 1/°F)**
FCS600 DN40	4F, 4G, 4H, 4J	1, 3, 6, 7	2, 3, 7	0.07 (0.0024)
		4, 8		0.19 (0.0066)
		1, 6	1	0.028 (0.0010)
		2	2, 3, 7	0.07 (0.0024)
		4, 8		0.104 (0.0036)
	8F, 8G, 8H, 8J	1, 3, 6, 7	2, 3, 7	0.06 (0.0021)
		4, 8		0.14 (0.0049)
		1, 6	1	0.018 (0.0006)
		4, 8		0.068 (0.0024)
FCS600 DN65	5J, 5K, 5L	1, 3, 6, 7	2, 3, 7	0.07 (0.0024)
		2	2, 3, 7	0.06 (0.0021)
		4, 8		0.17 (0.0059)
		1, 6	1	0.027 (0.0009)
		4, 8		0.094 (0.0033)

9 Operating conditions

9.1 Process conditions

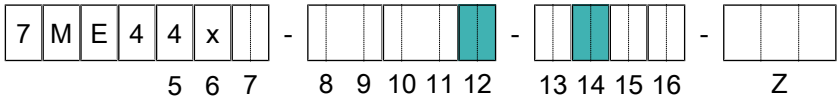
The pressure and temperature ratings presented in this section represent the design values for the devices. For individual applications (e.g. marine applications with option S2x) further limitations may apply according to the respective applicable regulations. For details see chapter *Application and industry related standards [▷ 185]* under the heading Marine approvals.

In this chapter, all values related to pressure are gauge pressure values.

9.1.1 Process fluid temperature range

Allowed process fluid and ambient temperature ranges in hazardous areas depend on classifications defined by applications, refer to *Temperature specification in hazardous areas [▷ 54]*.

For SITRANS FC6x0 the following process fluid temperature ranges are available:



Temperature range	**Order code** position 12	**Process fluid temperature in °C (°F)**	**Design type**	**Order code** position 14
Standard[1]	1, 6	-50 – 150 (-58 – 302)	Compact type	A, B
		-70 – 150 (-94 – 302)	Remote type	C, D, E, F, G, H
Low[2]	2	-196 – 150 (-321 – 302)		D, F, H
Medium	3, 7	-70 – 230 (-94 – 446)		
High	4, 8	0 – 350 (32 – 662)		

[1] With process connection type G2 and G6 temperature range is: -10 – 140 °C (14 – 284 °F)

[2] With SITRANS FC HART firmware rev.4 or later. For details please contact your local Siemens sales organization.

9.1.2 Density

Meter size	Measuring range of density in kg/l (lb/ft³)
FCS600 DN2	0 – 5 (0 – 312)
FCS600 DN4	
FCS600 DN15	
FCS600 DN25	
FCS600 DN40	
FCS600 DN65	0 – 2,5 (0 – 156)

Density measuring range for NTEP custody transfer approval

Tab. 5: Density measuring ranges (C16)

Option	Measuring range of density in kg/l (lb/ft³)
C16	0,74 – 1,40 (46 – 87)

Density of gases

Rather than being measured directly, density of gas is usually calculated using its reference density, process fluid temperature and process pressure.

9.1.3 Pressure

The maximum allowed process pressure depends on the selected process connection and process temperature.

The given process temperature and process pressure ranges are calculated and approved without corrosion or erosion effects.

The following diagrams shows the process pressure as a function of process temperature as well as the process connection used (type and size of process connection).

Calculations for ASME flanges are based on ASME B16.5 Material group 2.2 (316/316L dual certified).

ASME class 150, JPI class 150

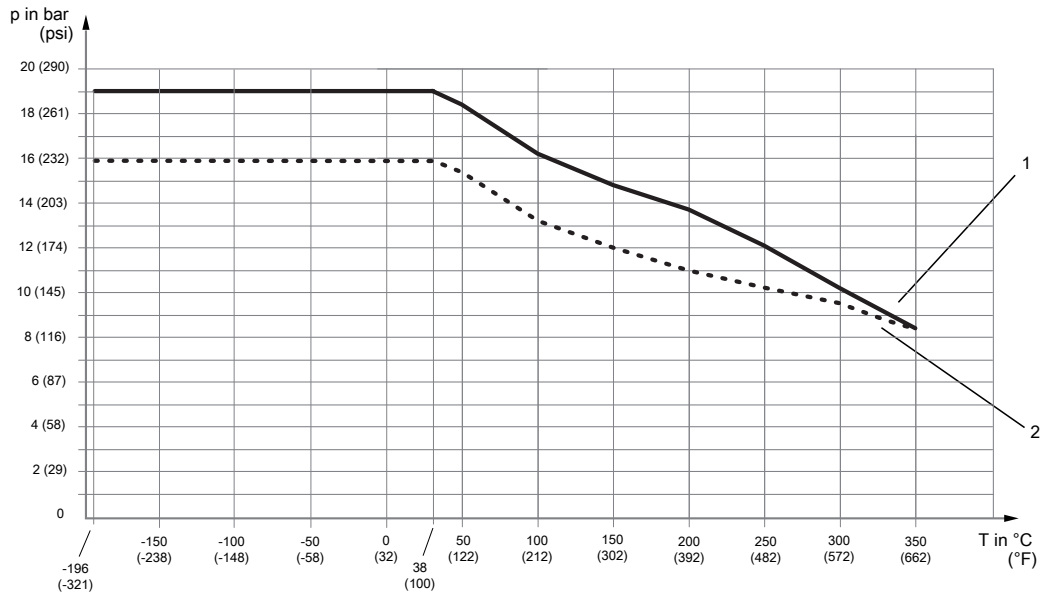


Fig. 13: Allowed process pressure as a function of process fluid temperature

1 Process connection compatible to ASME B16.5 class 150

2 Process connection compatible to JPI class 150 and heat tracing connection suitable for ASME B16.5 class 150

ASME class 300, EN PN40, JPI class 300

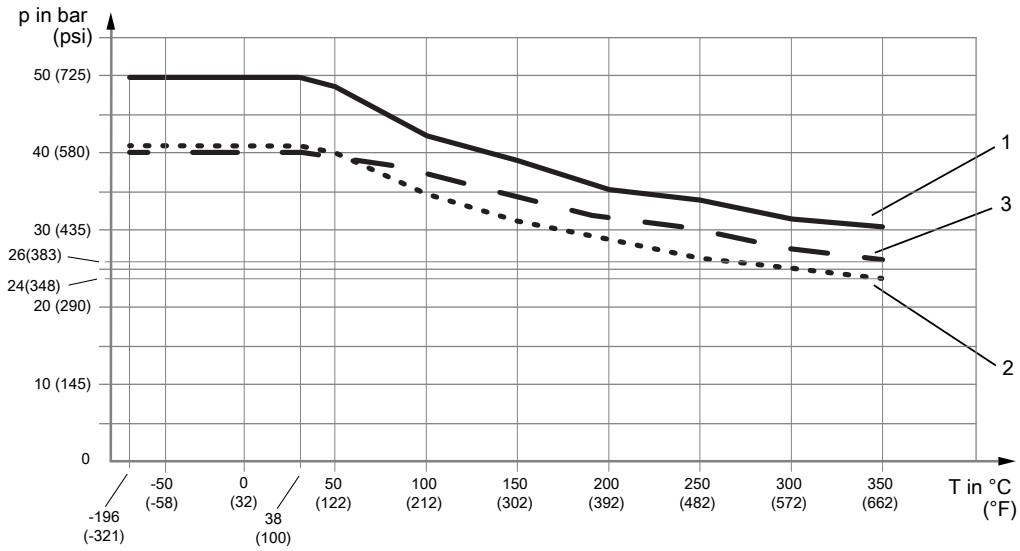


Fig. 14: Allowed process pressure as a function of process fluid temperature

1 Process connection compatible to ASME B16.5 class 300

2 Process and heat tracing connection compatible to EN 1092-1 PN40

3 Process connection compatible to JPI class 300 and process and heat tracing connection for ASME B16.5 class 300

ASME class 600, JPI class 600, EN PN63

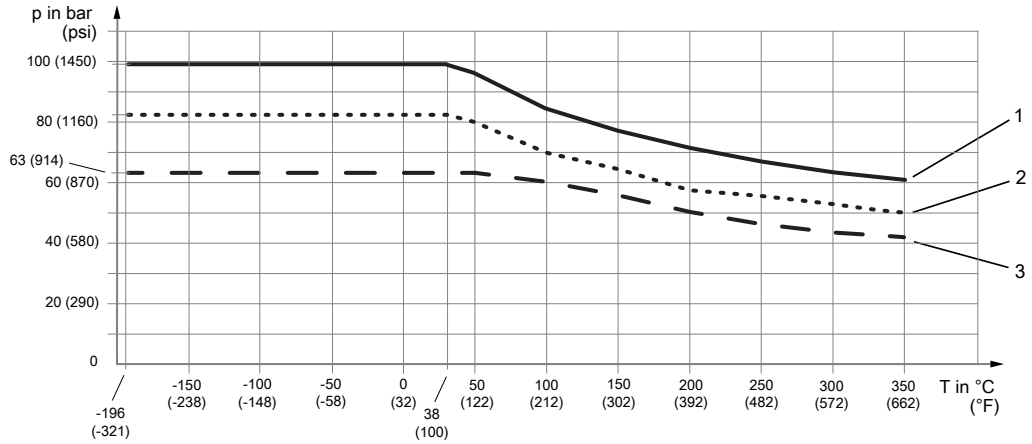


Fig. 15: Allowed process pressure as a function of process fluid temperature

1 Process connection compatible to ASME B16.5 class 600
2 Process connection compatible to JPI class 600
3 Process connection compatible to EN 1092-1 PN63

EN PN100

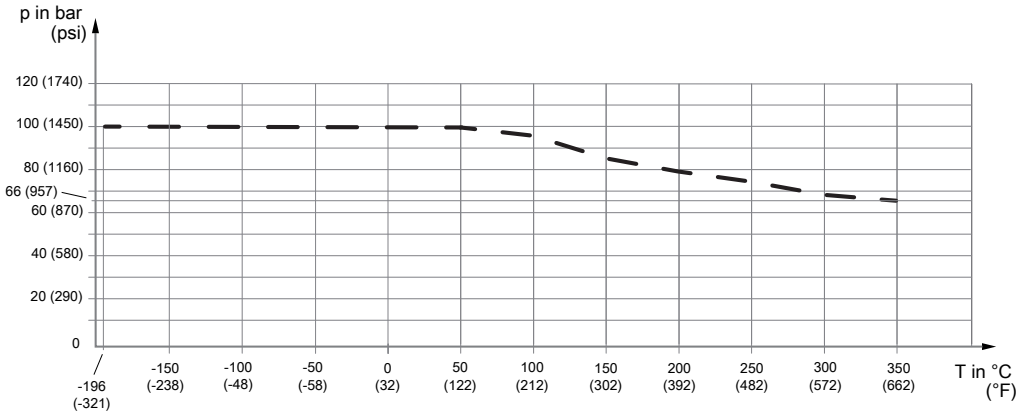


Fig. 16: Allowed process pressure as a function of process fluid temperature, compatible to flange EN 1092-1 PN100

JIS 10K, JIS 20K

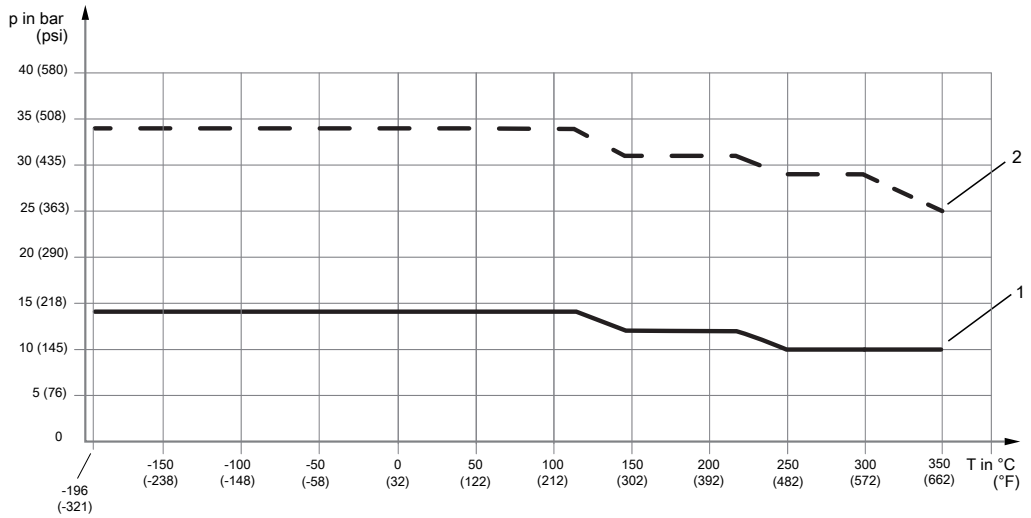


Fig. 17: Allowed process pressure as a function of process fluid temperature

1 Process connection compatible to JIS B 2220 10K
2 Process connection compatible to JIS B 2220 20K

Clamp process connection according to DIN 32676 series A

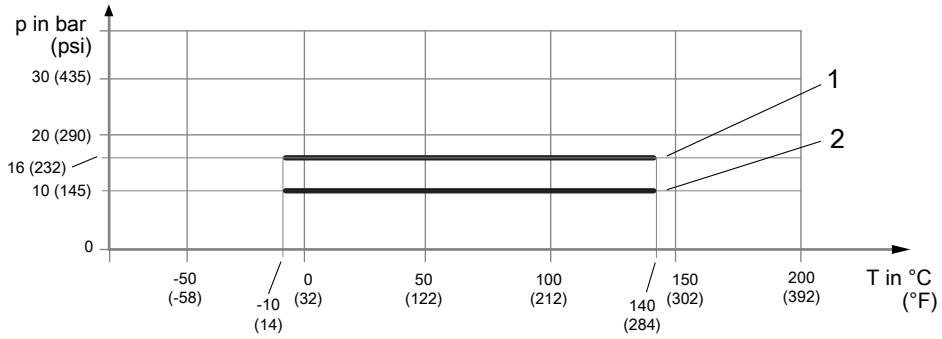


Fig. 18: Allowed process pressure as a function of process fluid temperature

1 Clamp connection compatible to DIN 32676 series A up to DN50
2 Clamp connection compatible to DIN 32676 series A above DN50

Clamp process connection according to DIN 32676 series C (Tri-Clamp)

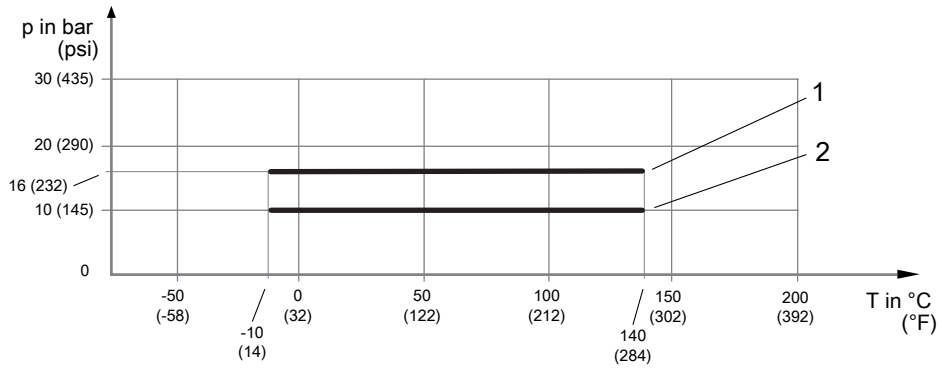


Fig. 19: Allowed process pressure as a function of process fluid temperature

1 Clamp connection compatible to DIN 32676 series C up to 2"
2 Clamp connection compatible to DIN 32676 series C above 2"

Clamp process connection according to JIS/ISO 2852

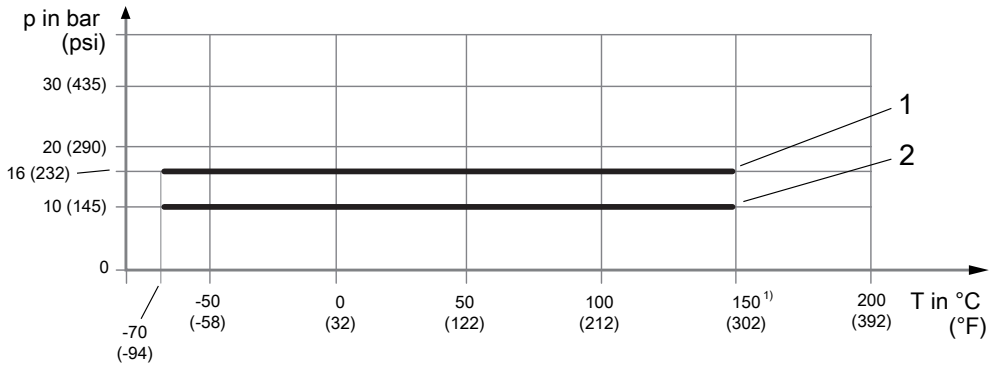


Fig. 20: Allowed process pressure as a function of process fluid temperature

1 Clamp process connection compatible to JIS/ISO 2852 up to 2"
2 Clamp process connection compatible to JIS/ISO 2852 above 2"

1) Under the restriction using suitable gaskets materials.

Process connection with internal thread G and NPT

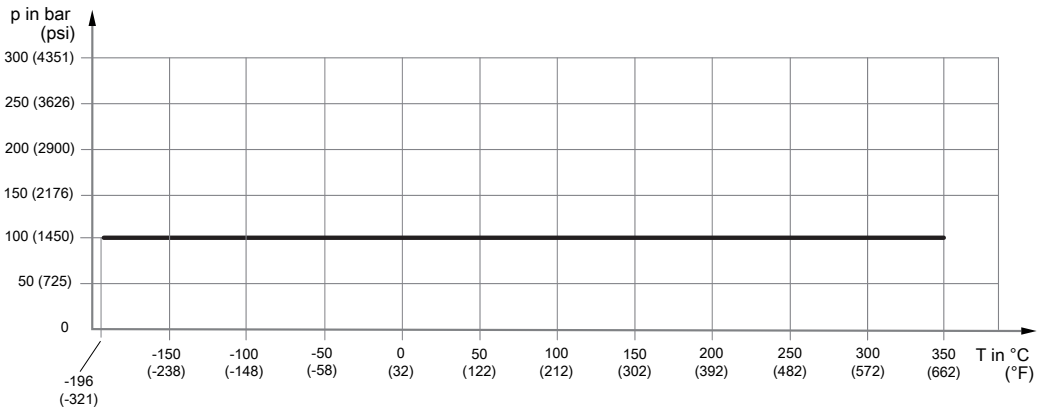


Fig. 21: Allowed process pressure as a function of process fluid temperature

Calculations for ASME flanges are based on ASME B16.5 Material group 2.2 (316/316L dual certified).

ASME class 900 compatible to process connection ASME B16.5

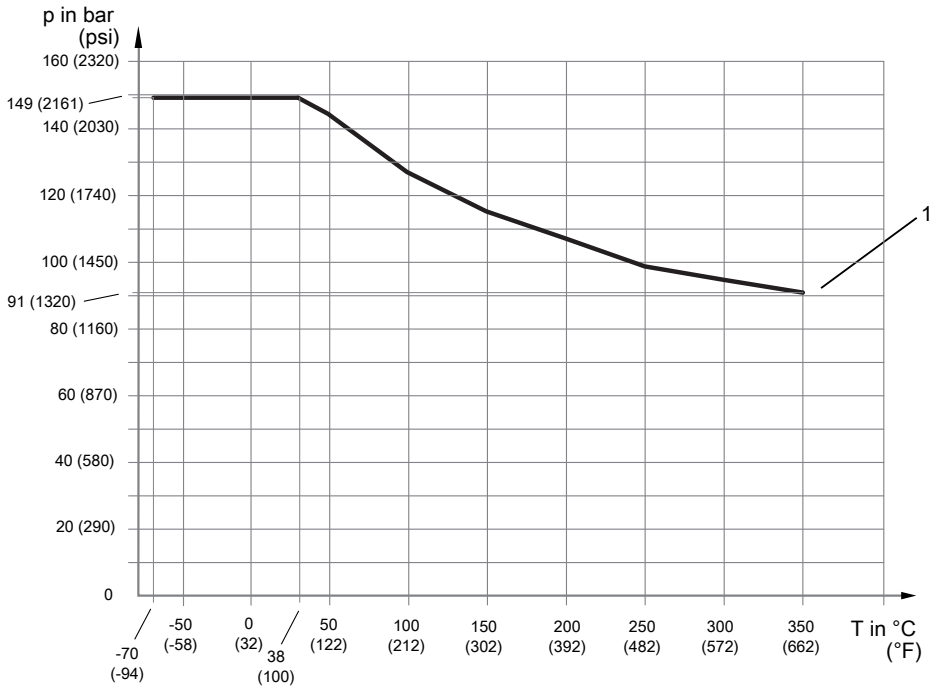


Fig. 22: Allowed process pressure as a function of process connection temperature

ASME class 1500 compatible to process connection ASME B16.5

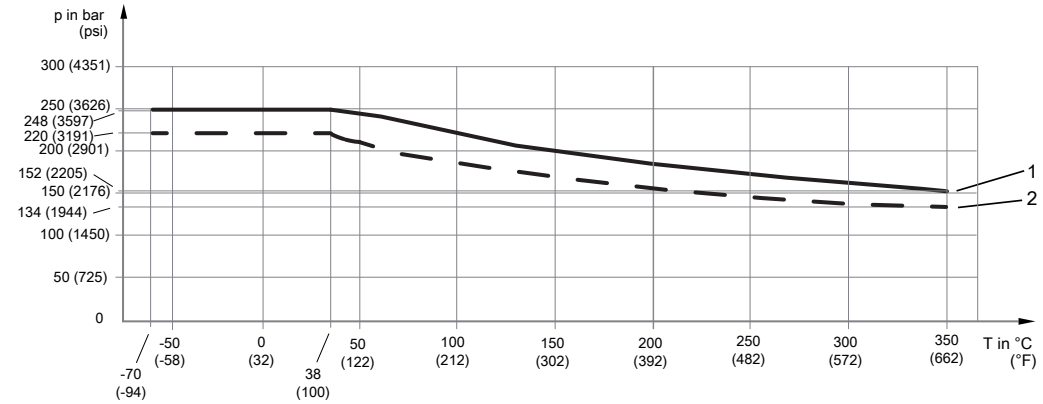


Fig. 23: Allowed process pressure as a function of process connection temperature

1 Process connection compatible to ASME B16.5 class 1500:
SITRANS FCS6x0 with material wetted parts C-22/2.4602 (without ASME compliance);
FCS600 with meter size DN15, material wetted parts 1.4404/316L (without ASME compliance);
FCS600 with meter size DN15, material wetted parts C-22/2.4602 (option C70)

2 Process connection compatible to ASME B16.5 class 1500:
FCS600 with meter size DN25, material wetted parts 1.4404/316L (without ASME compliance);
FCS600 with meter size DN15, material wetted parts 1.4404/316L (option C70);
FCS600 with meter size DN25, material wetted parts C-22/2.4602 (option C70)

Process connection with internal thread G and NPT

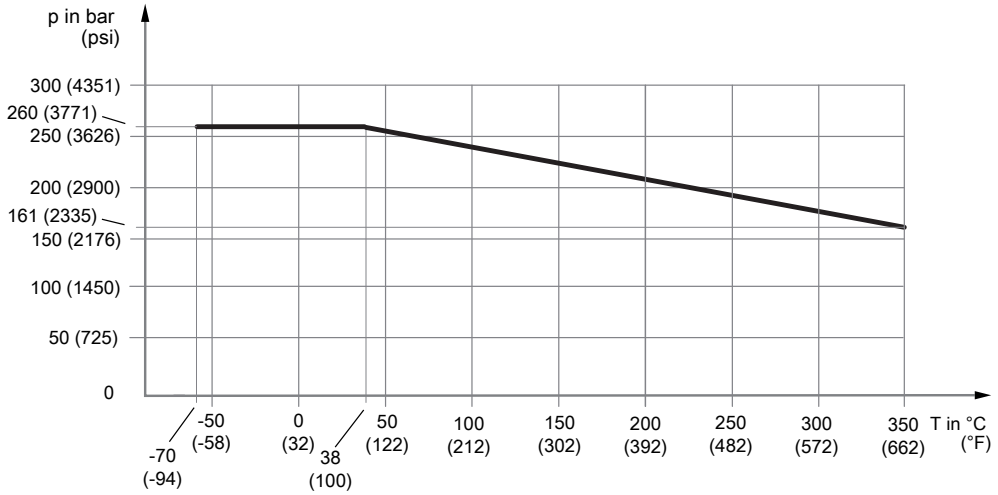


Fig. 24: Allowed process pressure as a function of temperature

Process connection compatible to medium pressure autoclave

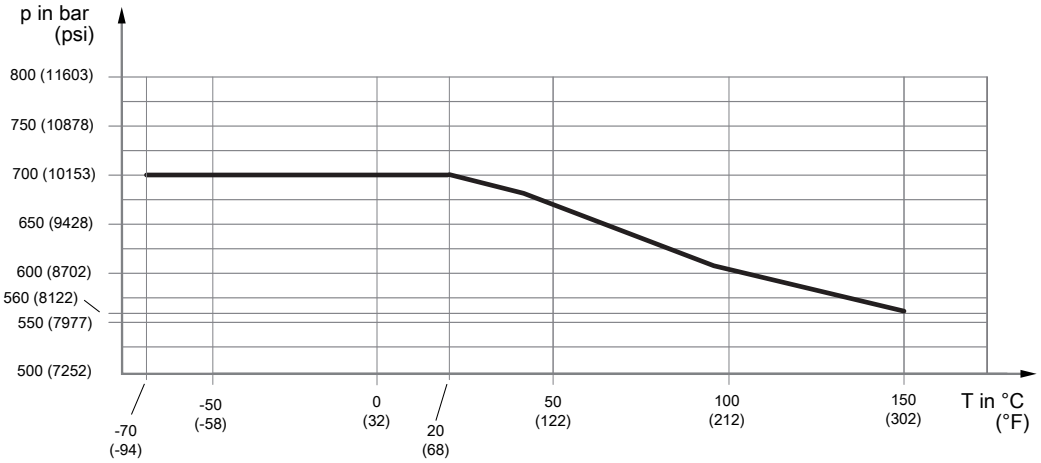


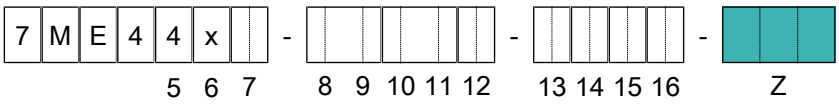
Fig. 25: Allowed process pressure as a function of process connection temperature

Rupture disc

The rupture disc is located on the sensor housing. It is available as an option, see order code position -Z in the table of chapter Order code description under the same heading Rupture disc. The rupture disc's bursting pressure is 20 bar (291 psi), the nominal diameter is 8 mm (0.315 in.). In the case of big nominal diameters and high pressures, it is not possible to ensure that the entire process pressure is released across the rupture disc. In such case it is possible to request a customized design from the responsible Siemens sales organization. In the event of a burst pipe, the rupture disc provides an acoustic signal in applications with gases.

9.1.4 Insulation and heat tracing

In case it is necessary fluid temperature deviates more than 80 °C (176 °F) from ambient temperature, sensor insulation is recommended to avoid negative effects from temperature fluctuations.



Overview of device options for insulation and heat tracing for remote type

Options				Description
FCS600 DN15	**FCS600 DN25**	**FCS600 DN40**	**FCS600 DN65**	
J10	J20	J30	J40	▪ Insulation
J12, J13, J14	J22, J23, J24	J32, J33, J34	J42, J43, J44	▪ Insulation ▪ Heat tracing without purging
J16, J17, J18	J26, J27, J28	J36, J37, J38	J46, J47, J48	▪ Insulation ▪ Heat tracing with purging

For details about the ordering information see order code position -Z in the table of chapter Order code description under the same heading Insulation and heat tracing.

In case of subsequent sensor insulation installed by the customer, the following must be noted:

- Do not insulate transmitter as well.
- In case of remote type, do not insulate the terminal box of the sensor.
- Do not expose transmitters to ambient temperatures exceeding 60 °C (140 °F).
- The preferred insulation is 80 mm (3.15 inch) thick with a heat transfer coefficient of 0.4 W/m² K
  (0.07 Btu/ ft² °F).

Maximum temperature of heat carrier

Temperature range	Order code position 12	Maximum temperature range of heat carrier in °C (°F)
Standard	1, 6	0 – 150 (32 – 302)
Medium	3, 7	0 – 230 (32 – 446)[1)]
High	4, 8	0 – 350 (32 – 662)

[1)] With Ex Approval 0 – 220 °C (32 – 428 °F)

Pressure ratings of heat tracing are defined based on heat tracing connection, refer to Pressure.

Subsequent installation of an electrical heat tracing to the sensor is possible. Electromagnetic insulation is required in case the heating device is controlled by phase-fired control or pulse train.

In hazardous areas, subsequent application of insulation, heating jacket or heating strips is not permitted.

9.1.5 Secondary containment

Some applications or environment conditions require secondary containment retaining the process pressure for increased safety. All SITRANS FC have a secondary containment filled with inert gas. The typical burst pressure values of the secondary housing are defined in the table below.

Typical burst pressure at room temperature

Burst pressure in bar (psi)					
FCS600 DN2	FCS600 DN4	FCS600 DN15	FCS600 DN25	FCS600 DN40	FCS600 DN65

Burst pressure in bar (psi)		
49 (710)	120 (1740)	80 (1160)

9.2 Ambient conditions

Allowed ambient and storage temperature of SITRANS FC depends on the below components and their own temperature limits:

- Sensor
- Transmitter
- Connecting cable between sensor and transmitter (for remote design type)

Ambient temperature

Device surrounding air temperature is considered as ambient temperature. If the device is operating outdoors make sure that the solar irradiation does not increase the surface temperature of the device higher than the allowed maximum ambient temperature. Transmitter display has limited legibility below -20 °C (-4 °F).

Maximum ambient temperature range		
compact type:		-40 – 60 °C (-40 – 140 °F)
remote type		
with standard cable (option L5x/L6x):	Sensor[1]:	-50 – 80 °C (-58 – 176 °F)
	Transmitter:	-40 – 60 °C (-40 – 140 °F)
with fire retardant cable[2] (option L7x/L8x):	Sensor[1]:	-35 – 80 °C (-31 – 176 °F)
	Transmitter:	-35 – 60 °C (-31 – 140 °F)

Ambient temperature range for NTEP custody transfer approval

Maximum ambient temperature range (C16)		
compact type:		-40 – 50 °C(-40 – 122 °F)
remote type		
with standard cable (option L5x/L6x):	Sensor[1]:	-50 – 80 °C(-58 – 176 °F)
	Transmitter:	-40 – 50 °C (-40 – 122 °F)
with fire retardant cable[2] (option L7x/L8x):	Sensor[1, 2]:	-35 – 80 °C(-31 – 176 °F)
	Transmitter:	-35 – 50 °C (-31 – 122 °F)

[1] Check derating for high fluid temperature, see *Process fluid temperature range [▷ 39]*, Process conditions and *Allowed ambient temperature for sensor [▷ 49]*

[2] Lower temperature specification valid for fixed installation only

Storage temperature

Maximum storage temperature range		
compact type		-40 – 60 °C (-40 – 140 °F)
remote type		
with standard cable (option L5x/L6x):	Sensor:	-50 – 80 °C (-58 – 176 °F)
	Transmitter:	-40 – 60 °C (-40 – 140 °F)
with fire retardant cable (option L7x/L8x):	Sensor:	-35 – 80 °C (-31 – 176 °F)
	Transmitter:	-35 – 60 °C (-31 – 140 °F)

Further ambient conditions

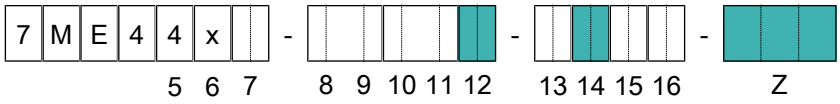
Ranges and specifications	
Relative humidity	0 – 95 %
IP code	IP66/67 for transmitters and sensors when using the appropriate cable glands
Allowable pollution degree in surrounding area acc.: EN 61010-1	4 (in operation)

Ranges and specifications	
Resistance to vibration acc.: IEC 60068-2-6 (not with option Jxx)	Transmitter: 10 – 500 Hz, 1g Sensor: 25 – 100 Hz, 4g
Electromagnetic compatibility (EMC) ▪ IEC/EN 61326-1, Table 2 ▪ IEC/EN 61326-2-3 ▪ IEC/EN 61326-2-5 ▪ NAMUR NE 21 recommendation ▪ DNV-CG-0339 Section 3, Chapter 14 This includes ▪ Surge immunity acc.: – EN 61000-4-5 for lightning protection ▪ Emission acc.: – IEC/EN 61000-3-2, Class A – IEC/EN 61000-3-3, Class A – NAMUR NE 21 recommendation – DNV-CG-0339 Section 3, Chapter 14	Immunity assessment criterion: The output signal fluctuation is within ±1 % of the output span.
Maximum altitude	2000 m (6600 ft) above mean sea level (MSL)
Overvoltage category according to IEC/EN 61010-1	II

9.2.1 Allowed ambient temperature for sensor

The allowed ambient temperature of the sensor depends on the following product properties:

- Process fluid temperature, see *Process fluid temperature range [▷ 39]*
- Design type
  - Compact type
  - Remote type
- Connecting cable type (options option L5x/L6x and L7x/L8x)



The allowed combinations of process fluid and ambient temperature for the sensor are illustrated as gray areas in the diagrams below.

Allowed process fluid and ambient temperature ranges in hazardous areas depend on classifications defined by applications, refer to *Temperature specification in hazardous areas [▷ 54]*.

Temperature range specification Standard, compact type

Order code:

Pos. 12: 1

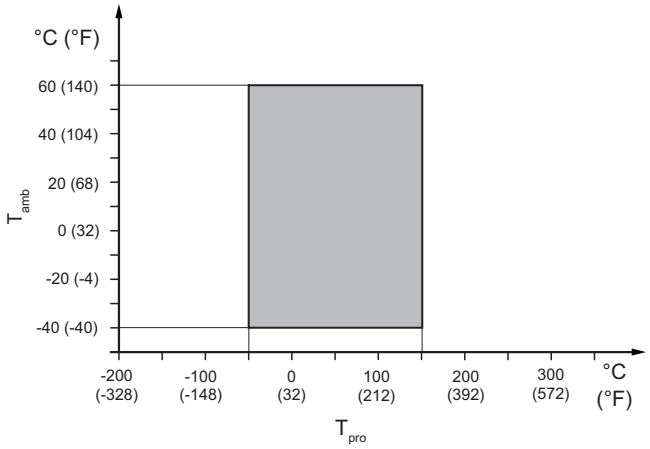


Fig. 26: Allowed process fluid and ambient temperatures, compact type (except process connection type G2 and G6)

T_{amb}	Ambient temperature
T_{pro}	Process fluid temperature

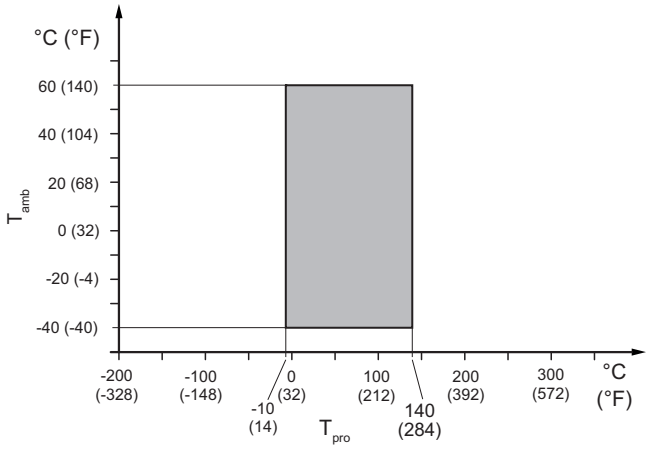


Fig. 27: Allowed process fluid and ambient temperatures, compact type for process connection type G2 and G6

Temperature range specification Low, remote type

Order code:

Pos. 12: 2

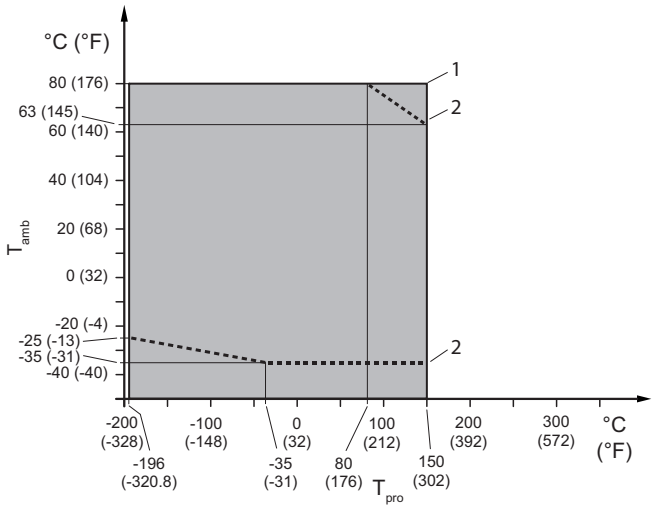


Fig. 28: Allowed process fluid and ambient temperatures, remote type

1	Standard cable option L5x/L6x
2	Limitation for fire retardant cable option L7x/L8x

Temperature range specification Standard, remote type

Order code:

Pos. 12: 1

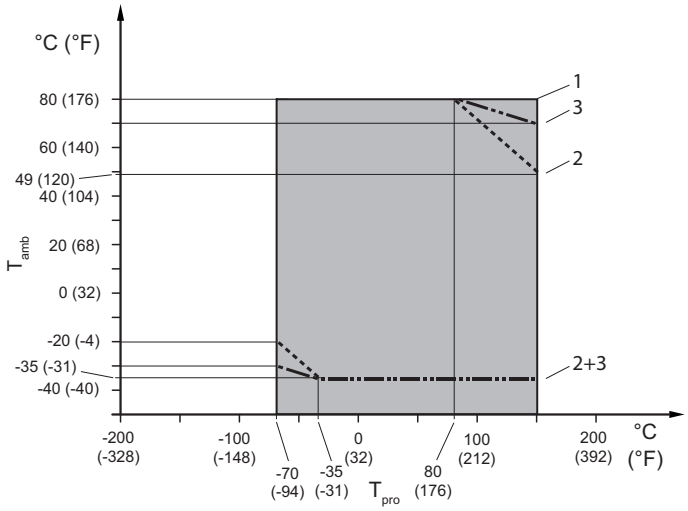


Fig. 29: Allowed process fluid and ambient temperatures, remote type (except process connection type G2 and G6)

1 Standard cable option L5x/L6x
2 Limitation for fire retardant cable option L7x/L8x for standard neck
3 Limitation for fire retardant cable option L7x/L8x for long neck

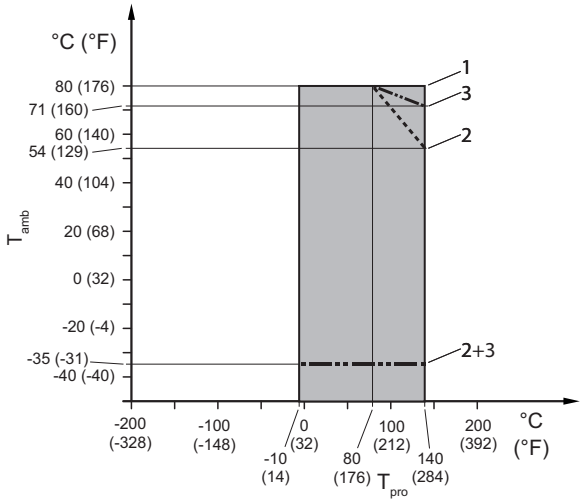


Fig. 30: Allowed process fluid and ambient temperatures, remote type for process connection type G2 and G6

1 Standard cable option L5x/L6x
2 Limitation for fire retardant cable option L7x/L8x for standard neck
3 Limitation for fire retardant cable option L7x/L8x for long neck

Temperature range specification Medium, remote type

Order code:

Pos. 12: 3

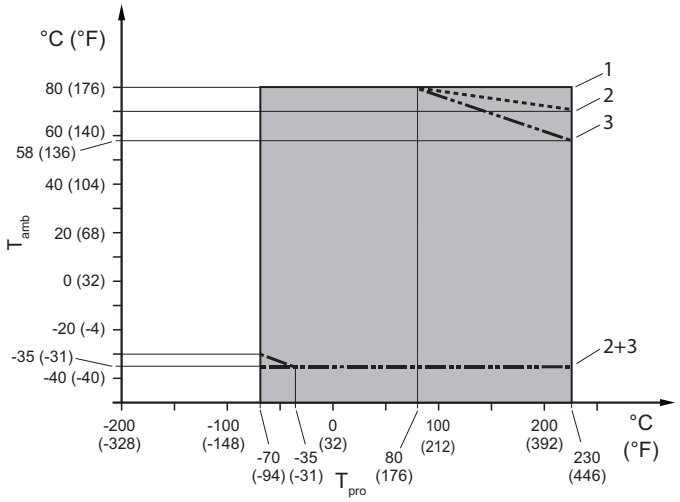


Fig. 31: Allowed process fluid and ambient temperatures, remote type

1 Standard cable option L5x/L6x
2 Limitation for fire retardant cable option L7x/L8x without option Jxx
3 Limitation for fire retardant cable option L7x/L8x with option Jxx

Temperature range specification High, remote type

Order code:

Pos. 12: 4

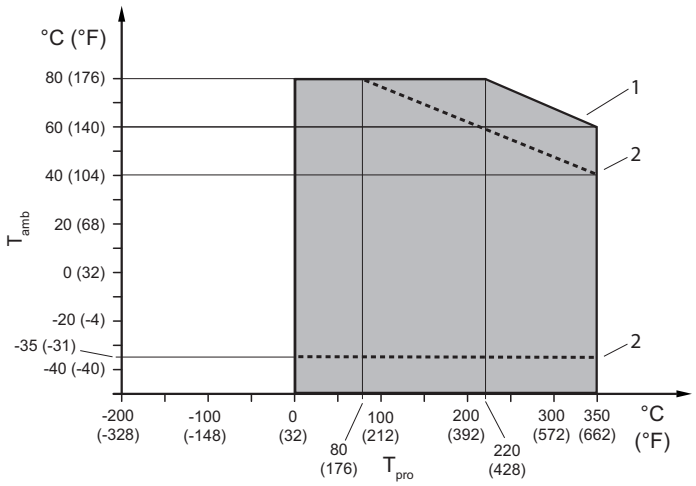


Fig. 32: Allowed process fluid and ambient temperatures, remote type

1 Standard cable option L5x/L6x
2 Limitation for fire retardant cable option L7x/L8x

Temperature range specification Standard, compact type

Order code:

Pos. 12: 6

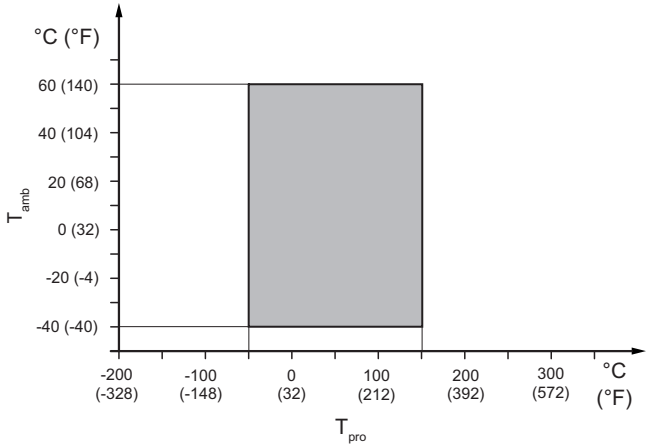


Fig. 33: Allowed process fluid and ambient temperatures, compact type

T_{amb} Ambient temperature

T_{pro} Process fluid temperature

Temperature range specification Standard, remote type

Order code:

Pos. 12: 6

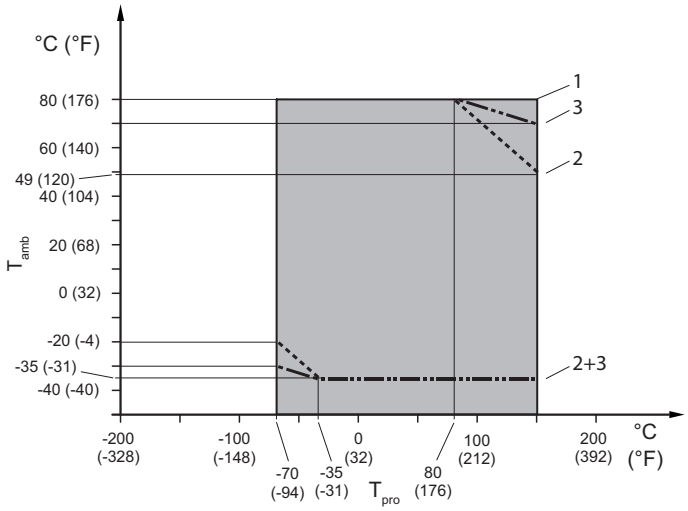


Fig. 34: Allowed process fluid and ambient temperatures, remote type

1 Standard cable option L5x/L6x

2 Limitation for fire retardant cable option L7x/L8x for standard neck

3 Limitation for fire retardant cable option L7x/L8x for long neck

Temperature range specification Medium, remote type

Order code:

Pos. 12: 7

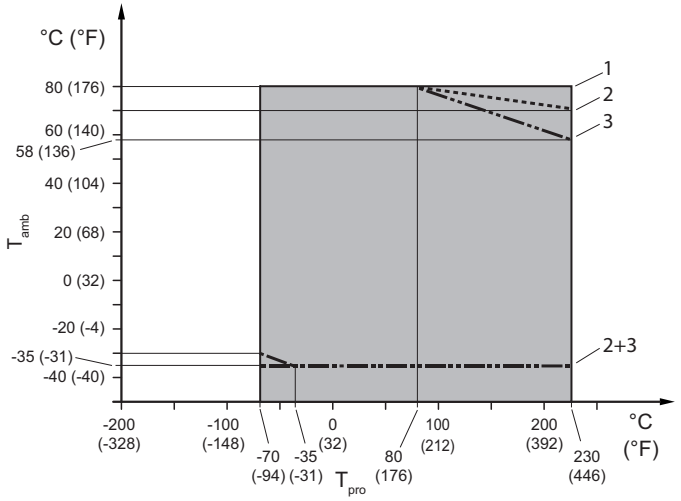


Fig. 35: Allowed process fluid and ambient temperatures, remote type

1 Standard cable option L5x/L6x

2 Limitation for fire retardant cable option L7x/L8x without option Jxx

3 Limitation for fire retardant cable option L7x/L8x with option Jxx

Temperature range specification High, remote type
Order code:
Pos. 12: 8

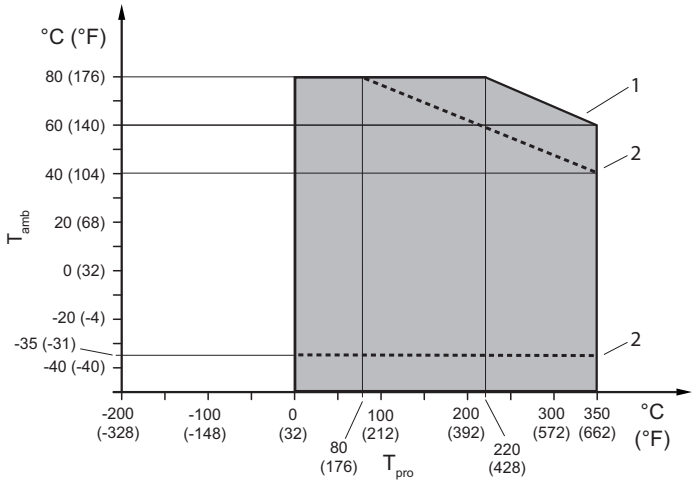


Fig. 36: Allowed process fluid and ambient temperatures, remote type

1 Standard cable option L5x/L6x
2 Limitation for fire retardant cable option L7x/L8x

9.2.2 Temperature specification in hazardous areas

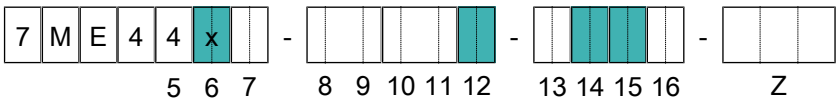
Please select appropriate equipment in accordance with the laws and regulations of the relevant country/region, when it is used in a location where explosive atmospheres may be present.

The maximum ambient and process fluid temperatures of Compact type and Remote Sensor depending on explosion groups and temperature classes can be determined via the order code or via the order code together with the Ex code (see the corresponding Explosion Proof Type Reference Manual).

Note: The maximum process fluid temperature could be further restricted due to process connection type see *Allowed ambient temperature for sensor [▶ 49]*.

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: A, B
Pos. 15: B, D, F, H, M, P, U
Ex code:
6.85.86.87.54.10

The following figure shows the relevant positions of the order code:



Tab. 6: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	43 (109)	66 (150)
T5	58 (136)	82 (179)
T4	60 (140)	118 (244)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: A, B
Pos. 15: C, E, G, J, N, Q, V
Ex code: 2.78.79.81.54.10

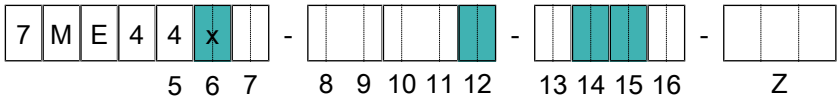
The following figure shows the relevant positions of the order code:

Tab. 7: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	59 (138)	59 (138)
T5	60 (140)	75 (167)
T4	60 (140)	112 (233)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: C, E, G
Pos. 15: B, D, F, H, M, P, U
Ex code: 6.85.86.87.54.10

The following figure shows the relevant positions of the order code:

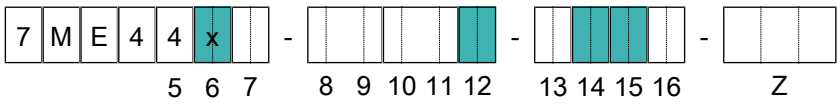


Tab. 8: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	41 (105)	41 (105)	66 (150)
T5	56 (132)	56 (132)	82 (179)
T4	80 (176)	62 (143)	118 (244)
T3	78 (172)	49 (120)	150 (302)
T2	78 (172)	49 (120)	150 (302)
T1	78 (172)	49 (120)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: C, E, G
Pos. 15: C, E, G, N, Q, V
Ex code: 2.78.79.81.54.10

The following figure shows the relevant positions of the order code:

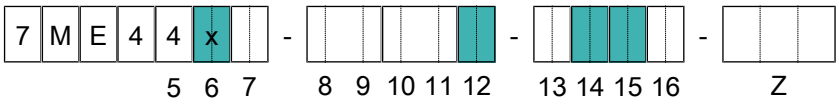


Tab. 9: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	75 (167)	75 (167)
T4	80 (176)	65 (149)	112 (233)
T3	78 (172)	49 (120)	150 (302)
T2	78 (172)	49 (120)	150 (302)
T1	78 (172)	49 (120)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: C, E, G
Pos. 15: J
Ex code:
2.78.79.81.54.10

The following figure shows the relevant positions of the order code:

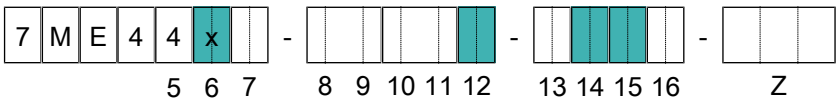


Tab. 10: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	70 (158)	75 (167)
T4	80 (176)	65 (149)	112 (233)
T3	78 (172)	49 (120)	150 (302)
T2	78 (172)	49 (120)	150 (302)
T1	78 (172)	49 (120)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: D, F, H
Pos. 15: B, D, F, M, P, U
Ex code:
6.85.86.87.54.10

The following figure shows the relevant positions of the order code:

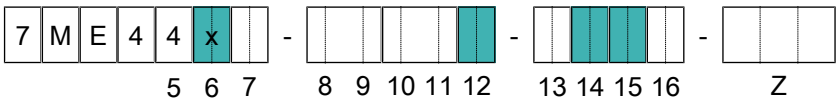


Tab. 11: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	47 (116)	47 (116)	66 (150)
T5	62 (143)	62 (143)	82 (179)
T4	80 (176)	74 (165)	118 (244)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: D, F, H
Pos. 15: H
Ex code:
6.85.86.87.54.10

The following figure shows the relevant positions of the order code:



Tab. 12: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	47 (116)	47 (116)	66 (150)
T5	62 (143)	62 (143)	82 (179)
T4	80 (176)	70 (158)	118 (244)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: D, F, H
Pos. 15: C, E, G, N, Q, V
Ex code:
2.78.79.81.54.10

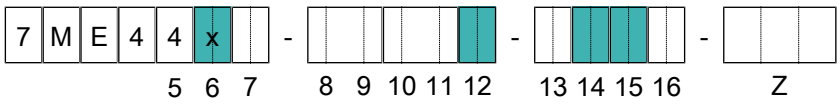
The following figure shows the relevant positions of the order code:

Tab. 13: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	75 (167)	75 (167)
T4	80 (176)	74 (165)	112 (233)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 1, 6
Pos. 14: D, F, H
Pos. 15: J
Ex code:
2.78.79.81.54.10

The following figure shows the relevant positions of the order code:

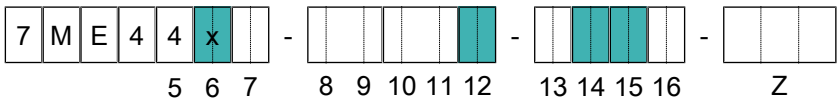


Tab. 14: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	70 (158)	75 (167)
T4	80 (176)	70 (158)	112 (233)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 2
Pos. 14: D, F, H
Pos. 15: B, D, F, M, P, U
Ex code:
3.79.80.82.54.10

The following figure shows the relevant positions of the order code:

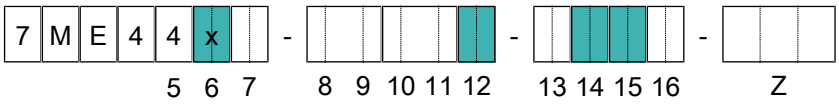


Tab. 15: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	60 (140)	60 (140)	60 (140)
T5	76 (168)	76 (168)	76 (168)
T4	80 (176)	74 (165)	113 (235)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 2
Pos. 14: D, F, H
Pos. 15: H
Ex code:
3.79.80.82.54.10

The following figure shows the relevant positions of the order code:

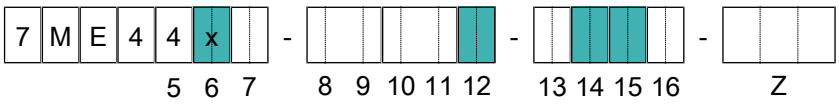


Tab. 16: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	60 (140)	60 (140)	60 (140)
T5	76 (168)	70 (158)	76 (168)
T4	80 (176)	70 (158)	113 (235)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 2
Pos. 14: D, F, H
Pos. 15: C, E, G, N, Q, V
Ex code:
2.77.78.80.54.10

The following figure shows the relevant positions of the order code:

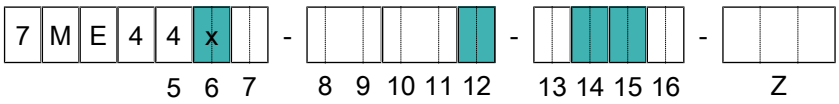


Tab. 17: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	58 (136)	58 (136)	58 (136)
T5	74 (165)	74 (165)	74 (165)
T4	80 (176)	74 (165)	111 (232)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 2
Pos. 14: D, F, H
Pos. 15: J
Ex code:
2.77.78.80.54.10

The following figure shows the relevant positions of the order code:



Tab. 18: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	58 (136)	58 (136)	58 (136)
T5	74 (165)	70 (158)	74 (165)
T4	80 (176)	70 (158)	111 (232)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Order code:
Pos. 6: 6
Pos. 12: 3, 7
Pos. 14: D, F, H
Pos. 15: B, D, F, M, P, U
Ex code:
6.85.86.87.89.80

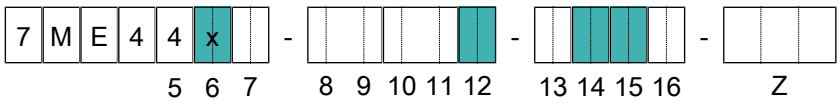
The following figure shows the relevant positions of the order code:

Tab. 19: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	47 (116)	47 (116)	66 (150)
T5	62 (143)	62 (143)	82 (179)
T4	80 (176)	74 (165)	118 (244)
T3	80 (176)	64 (147)	185 (365)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Order code:
Pos. 6: 6
Pos. 12: 3, 7
Pos. 14: D, F, H
Pos. 15: H
Ex code:
6.85.86.87.89.80

The following figure shows the relevant positions of the order code:

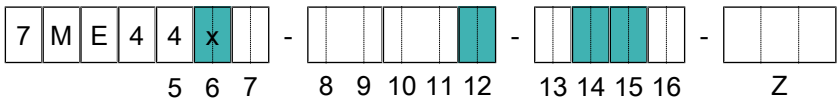


Tab. 20: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	47 (116)	47 (116)	66 (150)
T5	62 (143)	62 (143)	82 (179)
T4	80 (176)	70 (158)	118 (244)
T3	80 (176)	64 (147)	185 (365)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Order code:
Pos. 6: 6
Pos. 12: 3, 7
Pos. 14: D, F, H
Pos. 15: C, E, G, N, Q, V
Ex code:
2.78.79.81.85.80

The following figure shows the relevant positions of the order code:

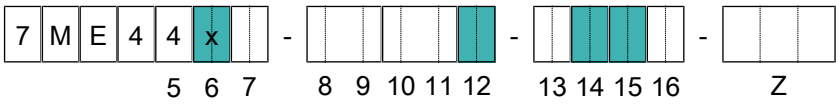


Tab. 21: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	75 (167)	75 (167)
T4	80 (176)	74 (165)	112 (233)
T3	80 (176)	64 (147)	181 (357)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Order code:
Pos. 6: 6
Pos. 12: 3, 7
Pos. 14: D, F, H
Pos. 15: J
Ex code:
2.78.79.81.85.80

The following figure shows the relevant positions of the order code:

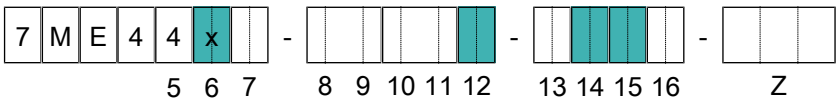


Tab. 22: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	70 (158)	75 (167)
T4	80 (176)	70 (158)	112 (233)
T3	80 (176)	64 (147)	181 (357)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Order code:
Pos. 6: 6
Pos. 12: 4, 8
Pos. 14: D, F, H
Pos. 15: B, C, D, E, F, G, M, N, P, Q, U, V
Ex code: -

The following figure shows the relevant positions of the order code:

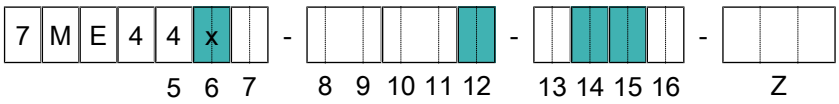


Tab. 23: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	62 (143)	62 (143)	65 (149)
T5	77 (170)	77 (170)	80 (176)
T4	80 (176)	74 (165)	115 (239)
T3	80 (176)	65 (149)	180 (356)
T2	73 (163)	50 (122)	275 (527)
T1	60 (140)	40 (104)	350 (662)

Order code:
Pos. 6: 6
Pos. 12: 4, 8
Pos. 14: D, F, H
Pos. 15: H, J
Ex code:
–

The following figure shows the relevant positions of the order code:



Tab. 24: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L5x/L6x	Option L7x/L8x	
T6	62 (143)	62 (143)	65 (149)
T5	77 (170)	70 (158)	80 (176)
T4	80 (176)	70 (158)	115 (239)
T3	80 (176)	65 (149)	180 (356)
T2	73 (163)	50 (122)	275 (527)
T1	60 (140)	40 (104)	350 (662)

10 Mechanical specification

10.1 Design

The SITRANS FC6x0 flow meter is available with two design types:

- Compact type, sensor and transmitter are firmly connected
- Remote type
  - Standard neck
  - Long neck

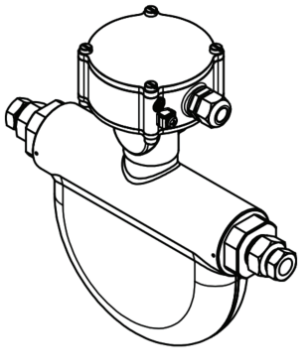


Fig. 37: Remote type sensor with standard neck for meter size DN2 and DN4

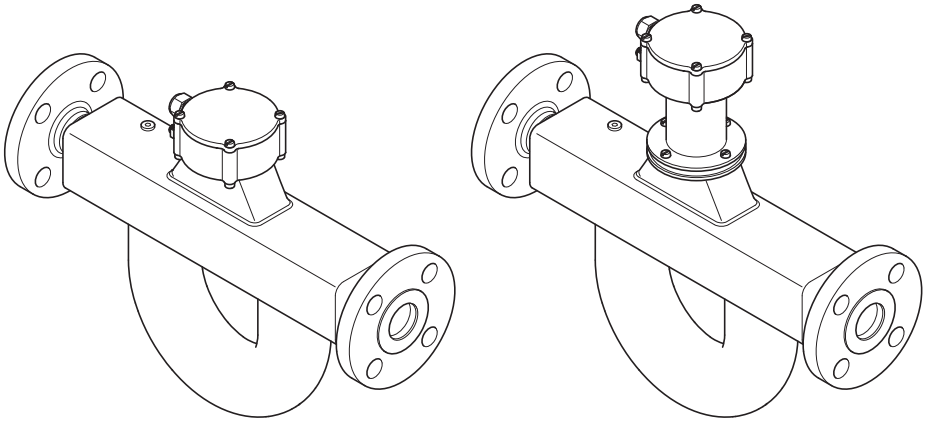
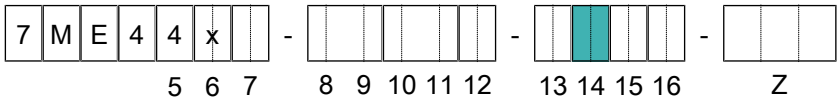


Fig. 38: Remote type sensor with standard and long neck for meter size DN15, DN25 and DN40



Design type	Design version	Process fluid temperature range	Order code position 14
Compact type	Direct connection	Standard	A, B
Remote type	Standard neck	Medium	C, E, G
	Long neck	Standard Medium High	D, F, H

The design influences the temperature specification for Ex-approved SITRANS FC, see Explosion Proof Type Reference Manual:

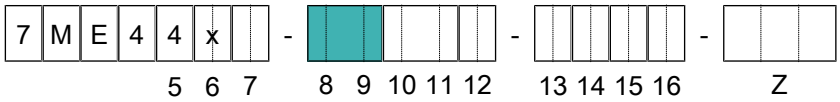
- ATEX A5E52487402
- IECEx A5E52595170
- FM/CSA A5E52487431
- NEPSI A5E52595174
- Korea Ex A5E52778071

10.2 Material

10.2.1 Sensor

Material wetted parts

Sensor parts which are wetted by process fluid are available with the following materials:



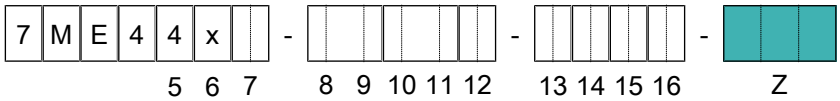
Material	Order code position 8+9
Measuring tubes made of nickel alloy C-22/2.4602, process connections of stainless steel alloy 1.4404/316L	0A, 0D, 1A, 1D
Stainless steel 1.4404/316L	2B, 2C, 2D, 2E, 2F, 2G, 3E, 3F, 3G, 4F, 4G, 4H, 4J, 5J, 5K, 5L
Nickel alloy C-22/2.4602	6B, 6C, 6D, 6E, 6F, 6G, 7E, 7F, 7G, 8F, 8G, 8H, 8J

The customer is responsible to ensure chemical compatibility of the material of the wetted parts with the measured process fluid.

For corrosive fluids, use of a corrosion-resistant nickel alloy (nickel alloy C-22/2.4602) is recommended for wetted parts. It is not recommended for gaseous hydrogen applications according to ASME B31.12.

Sensor housing material

Sensor housing is available in the following materials:



Housing part	Material	Order code position -Z
Junction box	Stainless steel 1.4404/316L	B01, B02, B03, B04
Neck	Stainless steel 1.4409 (CF3M)[1)]	B02, B03, B04
	Stainless steel 1.4404/316L[2)]	B01, B02, B03, B04
Body	Stainless steel 1.4301/304	B01
	Stainless steel 1.4404/316L	B02, B03, B04

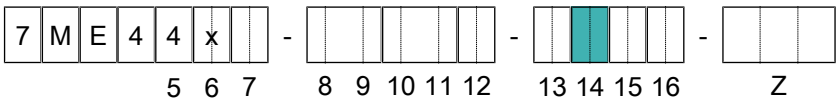
[1)] for meter sizes DN2 and DN4

[2)] for meter sizes DN15, DN25 and DN40

10.2.2 Transmitter

Transmitter housing

The transmitter housing is available with different materials and coatings:

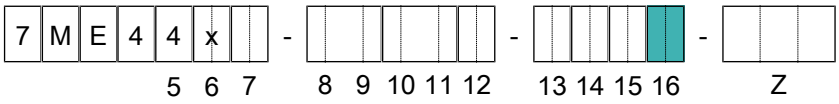


Housing material	Coating	Design type	Order code position 14
Aluminum Al-Si10Mg(Fe)	Standard coating	Compact type	A
		Remote type	C, D
	Corrosion protection coating	Compact type	B
		Remote type	E, F
Stainless steel CF8M	–	Remote type	G, H

- Standard coating: Urethane-cured polyester powder coating
- Corrosion protection coating: Three-layer coating with high chemical resistance (polyurethane coating on two layers of epoxy coating)
- Color Mint green (Munsell 5.6BG3.3/2.9)

Display window

This is relevant for all transmitters having a display:



Display material	Order code position 16
Glass	3

Bracket material

The bracket is available for remote type devices only:

Bracket material	Design type	Order code position 14
Stainless steel 1.4404/316L	Remote type	C, D, E, F, G, H

10.2.3 Nameplates

Sensor

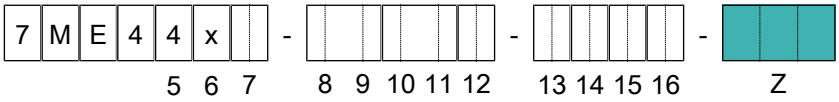
Sensor housing material	Process fluid temperature range	Sensor nameplate material
1.4301/304	Standard	Polyester film
	Medium, High	1.4404/316L
1.4404/316L	all	1.4404/316L

Transmitter

Transmitter housing material	Transmitter nameplate material
Aluminum AL-Si10MG(Fe)	Polyester film
Stainless steel CF8M	1.4404/316L

10.2.4 Heat tracing

These device options are available only for remote type with long neck.

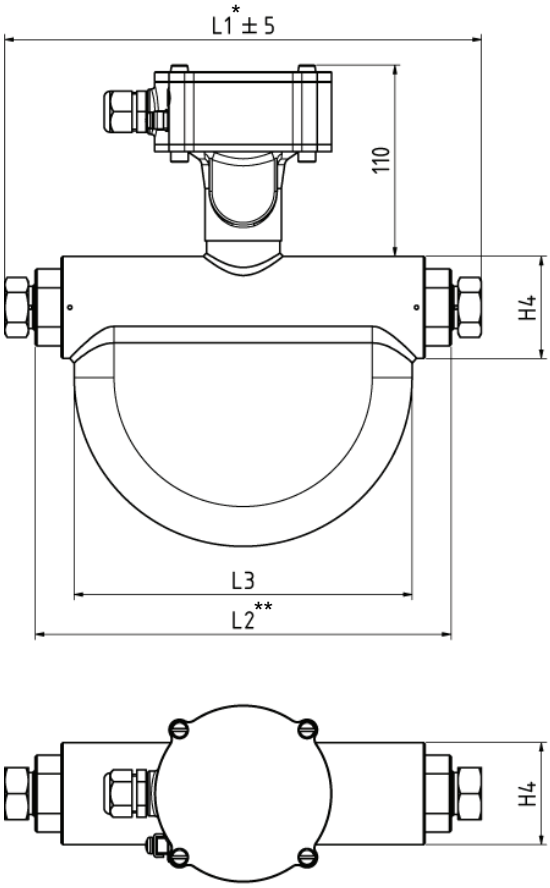


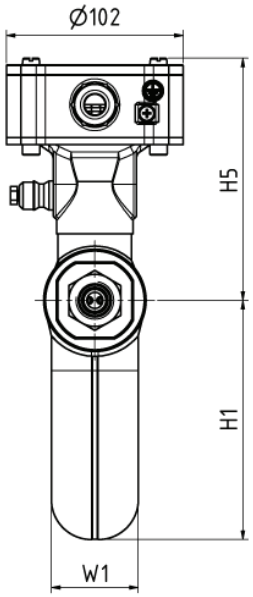
Material of components

Component	Material
Insulation housing	Stainless steel 1.4301/304
Insulation material	Mineral wool, RAL-quality label, approved acc. EU directive 97/69 note Q, European class A1 non-combustible (EN 13 501), termal conductivity 0,031 W/(m*K) at 0 °C (acc. P-MPA-E-99-521)
Heat tracing and purging lines	Stainless steel 1.4571/316Ti and 1.4404/316L
Heat tracing and purging connections	Stainless steel 1.4404/316L; flanges acc. ASME or EN

For dimensions of insulation and heat tracing components see Process connections, dimensions and weights of sensor.

10.3 Process connections, dimensions and weights of sensor





Remote type

(with standard neck)

*with process connection adapter 0AK1

**with process connection 0DK1

Fig. 39: Dimensions for FCS600 DN2 and DN4 in mm

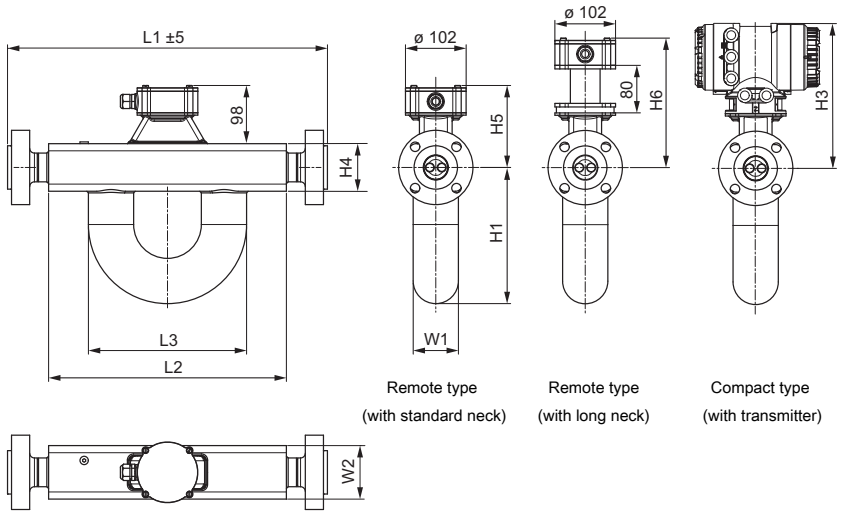


Fig. 40: Dimensions for meter sizes FCS600 DN15, DN25 and DN40

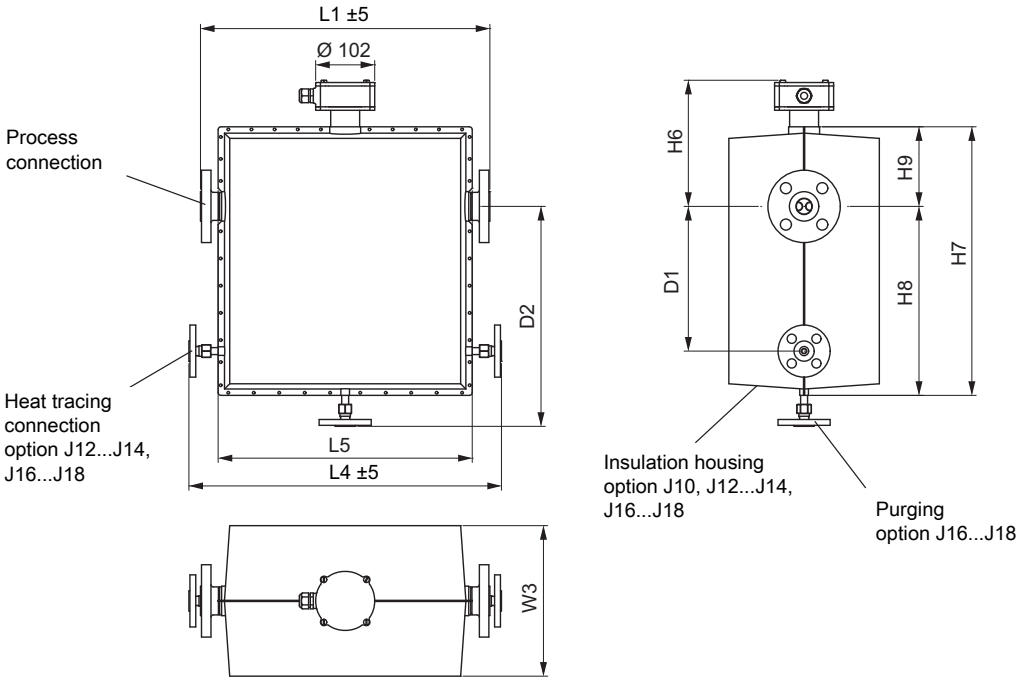


Fig. 41: Dimensions in mm: version with insulation housing for meter sizes FCS600 DN15, DN25 and DN40 only

Tab. 25: Dimensions without length L1

Meter size	L2	L3	L4	L5	W1	W2	W3	D1	-
	in mm (inch)								
FCS600 DN2	240 (9.5)	195 (7.7)	-	-					
FCS600 DN4	240 (9.5)	195 (7.7)	-	-					
FCS600 DN15	272 (10.7)	212 (8.3)	420 (16.5)	310 (12.2)	60 (2.4)	80 (3.1)	240 (9.4)	200 (7.9)	330 (13)
FCS600 DN25	400 (15.7)	266 (10.5)	540 (21.3)	439 (17.3)	76 (3)	90 (3.5)	260 (10.2)	250 (9.8)	380 (15)
FCS600 DN40	490 (19.3)	267 (10.5)	640 (25.2)	530 (20.9)	89 (3.5)	110 (4.3)	260 (10.2)	250 (9.8)	430 (16.9)

Meter size	L2	L3	L4	L5	W1	W2	W3	D1	-
	in mm (inch)								
FCS600 DN65	850 (33.5)	379 (14.9)	1000 (39.4)	894 (35.2)	129 (5.1)	160 (6.3)	302 (11.9)	350 (13.8)	545 (21.5)

Tab. 26: Dimensions without length L1

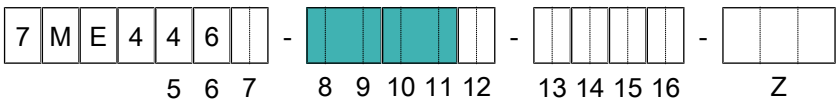
Meter size	H1	H3	H4	H5	H6	H7	H8	H9
	in mm (inch)							
FCS600 DN2	138 (5.4)	-	59 (2.3)	140 (5.5)				
FCS600 DN4	138 (5.4)	-	59 (2.3)	140 (5.5)				
FCS600 DN15	177 (7)	267 (10.5)	80 (3.1)	138 (5.4)	218 (8.6)	411 (16.2)	273 (10.7)	138 (5.4)
FCS600 DN25	230 (9.1)	267 (10.5)	80 (3.1)	138 (5.4)	218 (8.6)	464 (18.3)	326 (12.8)	138 (5.4)
FCS600 DN40	268 (10.6)	277 (10.9)	100 (3.9)	148 (5.8)	228 (9)	524 (20.6)	376 (14.8)	148 (5.8)
FCS600 DN65	370 (14.6)	294.5 (11.6)	135 (5.3)	165 (6.5)	246 (9.7)	668 (26.3)	503 (19.8)	165 (6.5)

Overall length L1 and weight

The overall length of the sensor depends on the selected process connection (type and size of flange). The following tables list the overall length and weight (without insulation or heat tracing and without customized installation length options) as functions of the individual process connection.

The weights in the tables are for the remote type with standard neck. Additional weight for the remote type with long neck: 1 kg (2.2 lb). Additional weight for the compact type: up to 3.2 kg (7.1 lb).

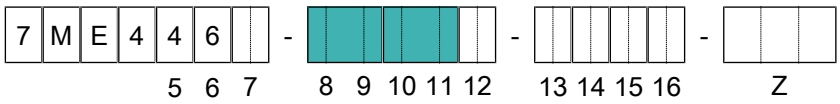
Process connections medium pressure autoclave compatible



Tab. 27: Overall length L1 and weight of sensor (process connections: medium pressure autoclave, wetted parts: stainless steel 1.4404/ 316L and Ni alloy C-22/ 2.4602) and for $^{9}/_{16}$ Autoclave adapter

Process connections	Order code position		FCS600 DN2		FCS600 DN4	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
Autoclave $^{9}/_{16}$" adapter	0A, 1A	K1	275 (10.8)	7 (15.4)	275 (10.8)	7 (15.4)
Autoclave ¾"	0D, 1D		240 (9.5)	7 (15.4)	240 (9.5)	7 (15.4)

Process connections compatible to ASME B16.5 (AISI 316/ AISI 316L dual certified)

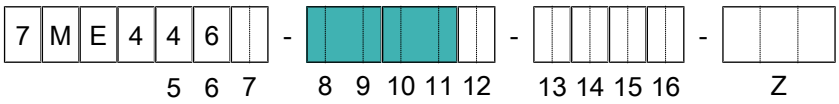


Tab. 28: Overall length L1 and weight of sensor (process connections: ASME, wetted parts: stainless steel)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
Option	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME ½" class 150, raised face (RF)	2C	D1	370 (14.6)	10 (22)	–	–	–	–	–	–
ASME ½" class 300, raised face (RF)		D2	370 (14.6)	10.4 (23)	–	–	–	–	–	–
ASME ½" class 600, raised face (RF)		D3	380 (15)	10.6 (23)	–	–	–	–	–	–
ASME ½" class 600, ring joint (RJ)		C3	380 (15)	10.6 (23)	–	–	–	–	–	–
ASME 1" class 150, raised face (RF)	2E, 3E	D1	370 (14.6)	10.8 (24)	500 (19.7)	14.8 (33)	–	–	–	–
ASME 1" class 300, raised face (RF)		D2	370 (14.6)	11.8 (26)	500 (19.7)	15.8 (35)	–	–	–	–
ASME 1" class 600, raised face (RF)		D3	390 (15.4)	12.2 (27)	520 (20.5)	16.2 (36)	–	–	–	–
ASME 1" class 600, ring joint (RJ)		C3	390 (15.4)	12.4 (27)	520 (20.5)	16.2 (36)	–	–	–	–
ASME 1½" class 150, raised face (RF)	2F, 3F, 4F	D1	380 (15)	11.8 (26)	500 (19.7)	15.8 (35)	600 (23.6)	25 (55)	–	–
ASME 1½" class 300, raised face (RF)		D2	380 (15)	14.2 (31)	510 (20.1)	18.2 (40)	600 (23.6)	27.2 (60)	–	–
ASME 1½" class 600, raised face (RF)		D3	400 (15.7)	15.4 (34)	530 (20.9)	19.2 (42)	620 (24.4)	28.2 (62)	–	–
ASME 1½" class 600, ring joint (RJ)		C3	400 (15.7)	15.4 (34)	530 (20.9)	19.4 (43)	620 (24.4)	28.2 (62)	–	–
ASME 2" class 150, raised face (RF)	2G, 3G, 4G	D1	–	–	510 (20.1)	17.4 (38)	600 (23.6)	26.4 (58)	–	–
ASME 2" class 300, raised face (RF)		D2	–	–	510 (20.1)	19 (42)	600 (23.6)	28 (62)	–	–
ASME 2" class 600, raised face (RF)		D3	–	–	540 (21.3)	20.8 (46)	630 (24.8)	29.8 (66)	–	–
ASME 2" class 600, ring joint (RJ)		C3	–	–	540 (21.3)	21.2 (47)	630 (47)	29.8 (47)	–	–
ASME 2½" class 150, raised face (RF)	4H	D1	–	–	–	–	610 (24)	29.6 (65)	–	–
ASME 2½" class 300, raised face (RF)		D2	–	–	–	–	610 (24)	31 (68)	–	–
ASME 2½" class 600, raised face (RF)		D3	–	–	–	–	640 (25.2)	33.4 (74)	–	–
ASME 2½" class 600, ring joint (RJ)		C3	–	–	–	–	640 (25.2)	34.4 (76)	–	–

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
Option	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME 3" class 150, raised face (RF)	4J, 5J	D1	–	–	–	–	610 (24)	30.6 (67)	1000 (39.4)	60.2 (133)
ASME 3" class 300, raised face (RF)		D2	–	–	–	–	620 (24.4)	34.6 (76)	1000 (39.4)	63.4 (140)
ASME 3" class 600, raised face (RF)		D3	–	–	–	–	640 (25.2)	38 (84)	1000 (39.4)	65.8 (145)
ASME 3" class 600, ring joint (RJ)		C3	–	–	–	–	640 (25.2)	38.6 (85)	1000 (39.4)	65.8 (145)
ASME 4" class 150, raised face (RF)	5K	D1	–	–	–	–	–	–	1000 (39.4)	64 (141)
ASME 4" class 300, raised face (RF)		D2	–	–	–	–	–	–	1000 (39.4)	71.4 (157)
ASME 4" class 600, raised face (RF)		D3	–	–	–	–	–	–	1030 (40.6)	82.6 (182)
ASME 4" class 600, ring joint (RJ)		C3	–	–	–	–	–	–	1030 (40.6)	82.8 (183)
ASME 5" class 150, raised face (RF)	5L	D1	–	–	–	–	–	–	1000 (39.4)	66 (146)
ASME 5" class 300, raised face (RF)		D2	–	–	–	–	–	–	1000 (39.4)	78.4 (173)
ASME 5" class 600, raised face (RF)		D3	–	–	–	–	–	–	1040 (40.9)	102.8 (227)
ASME 5" class 600, ring joint (RJ)		C3	–	–	–	–	–	–	1040 (40.9)	103.6 (228)

Meaning of "–": not available



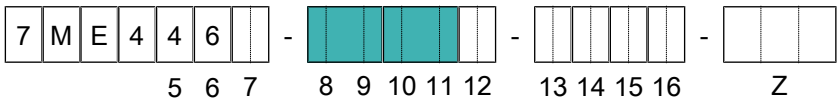
Tab. 29: Overall length L1 and weight of sensor (process connections: ASME, wetted parts: Ni alloy C-22/2.4602)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME 1" class 150, raised face (RF)	6E, 7E	D1	390 (15.4)	11.4 (25)	–	–	–	–	–	–
ASME 1" class 300, raised face (RF)		D2	390 (15.4)	12.6 (28)	–	–	–	–	–	–
ASME 1" class 600, raised face (RF)		D3	390 (15.4)	12.4 (27)	–	–	–	–	–	–

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME 1½" class 150, raised face (RF)	6F, 7F, 8F	D1	390 (15.4)	12.6 (28)	520 (20.5)	16.5 (36)	–	–	–	–
ASME 1½" class 300, raised face (RF)		D2	390 (15.4)	15.4 (34)	520 (20.5)	19.1 (42)	–	–	–	–
ASME 1½" class 600, raised face (RF)		D3	400 (15.7)	15.6 (34)	530 (20.9)	19.6 (43)	–	–	–	–
ASME 2" class 150, raised face (RF)	6G, 7G, 8G	D1	390 (15.4)	14.8 (33)	520 (20.5)	18.5 (41)	620 (24.4)	27.3 (60)	–	–
ASME 2" class 300, raised face (RF)		D2	390 (15.4)	16 (35)	520 (20.5)	20.5 (45)	620 (24.4)	29.1 (64)	–	–
ASME 2" class 600, raised face (RF)		D3	410 (16.1)	17.6 (39)	540 (21.3)	21.6 (45)	630 (24.8)	29.7 (66)	–	–
ASME 2½" class 150, raised face (RF)	8H	D1	–	–	–	–	620 (24.4)	30.9 (68)	–	–
ASME 2½" class 300, raised face (RF)		D2	–	–	–	–	620 (24.4)	32.5 (72)	–	–
ASME 2½" class 600, raised face (RF)		D3	–	–	–	–	640 (25.2)	33.9 (75)	–	–
ASME 3" class 150, raised face (RF)	8J	D1	–	–	–	–	620 (24.4)	32.8 (72)	1020 (40.2)	61.1 (135)
ASME 3" class 300, raised face (RF)		D2	–	–	–	–	620 (24.4)	36.6 (81)	1020 (40.2)	64.5 (142)
ASME 3" class 600, raised face (RF)		D3	–	–	–	–	640 (25.2)	38.9 (86)	1020 (40.2)	65.9 (145)

Meaning of "–": not available

Process connections compatible to ASME B16.5 (AISI 316/ AISI 316L dual certified)

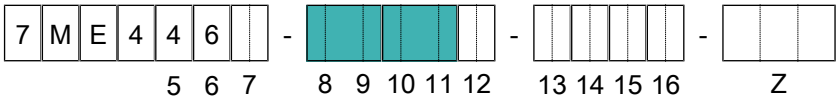


Tab. 30: Overall length L1 and weight of sensor (process connections: ASME, wetted parts: stainless steel)

Process connections	Order code position		FCS600 DN15		FCS600 DN25		FCS600 DN40	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME ½" class 900, raised face (RF)	2C	D4	400 (15.7)	12.6 (28)	–	–	–	–
ASME ½" class 900, ring joint (RJ)		C4	400 (15.7)	13 (29)	–	–	–	–
ASME ½" class 1500, raised face (RF)		D5	400 (15.7)	12.6 (28)	–	–	–	–
ASME ½" class 1500, ring joint (RJ)		C5	400 (15.7)	13 (29)	–	–	–	–

Process connections	Order code position		FCS600 DN15		FCS600 DN25		FCS600 DN40	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME 1" class 900, raised face (RF)	2E, 3E	D4	450 (17.7)	16.4 (36)	540 (21.3)	20.6 (45)	–	–
ASME 1" class 900, ring joint (RJ)		C4	450 (17.7)	16.6 (37)	540 (21.3)	20.4 (45)	–	–
ASME 1" class 1500, raised face (RF)		D5	450 (17.7)	16.4 (36)	–	–	–	–
ASME 1" class 1500, ring joint (RJ)		C5	450 (17.7)	16.6 (37)	–	–	–	–
ASME 2" class 900, raised face (RF)	2G, 3G, 4G	D4	–	–	660 (26)	35.2 (78)	720 (28.3)	43 (95)
ASME 2" class 900, ring joint (RJ)		C4	–	–	660 (26)	35.6 (78)	720 (28.3)	43.4 (96)

Meaning of "–": not available



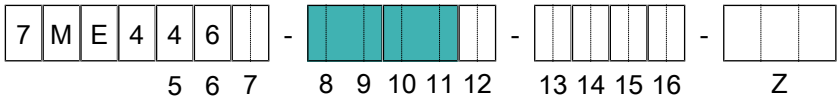
Tab. 31: Overall length L1 and weight of sensor (process connections: ASME, wetted parts: Ni alloy C-22/2.4602)

Process connections	Order code position		FCS600 DN15		FCS600 DN25		FCS600 DN40	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME 1" class 900, raised face (RF)	6E, 7E	D4	400 (15.7)	16.4 (36)	–	–	–	–
ASME 1" class 900,ring joint (RG)		C4	–	–	580 (23)	21 (46)	–	–
ASME 1" class 1500, raised face (RF)		D5	400 (15.7)	16.4 (36)	–	–	–	–
ASME 1" class 1500,ring joint (RG)		C5	–	–	580 (23)	21 (46)	–	–

Process connections	Order code position		FCS600 DN15		FCS600 DN25		FCS600 DN40	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
ASME 2" class 900,raised face (RF)	6G, 7G, 8G	D4	–	–	580 (23)	34 (75)	710 (28)	44 (97)
ASME 2" class 900,ring joint (RG)		C4	–	–	580 (23)	36 (80)	710 (28)	44 (97)
ASME 2" class 1500,ring joint (RG)		C5	–	–	580 (23)	36 (80)	710 (28)	44 (97)
ASME 3" class 900,raised face (RF)	8J	D4	–	–	–	–	710 (28)	50 (110)
ASME 3" class 900,ring joint (RG)		C4	–	–	–	–	710 (28)	52(115)

Meaning of "–": not available

Process connections compatible to EN 1092-1 (1.4404/ AISI 316 L)



Tab. 32: Overall length L1 and weight of sensor (process connections: EN, wetted parts: stainless steel)

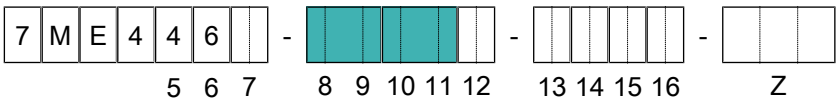
Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN15 PN40, type B1, raised face (RF)	2C	A1	370 (14.6)	10.6 (23)	–	–	–	–	–	–
EN DN15 PN40, type D, with groove		A5	370 (14.6)	10.4 (23)	–	–	–	–	–	–
EN DN15 PN40, type E, with spigot		B1	370 (14.6)	10.4 (23)	–	–	–	–	–	–
EN DN15 PN40, type F, with recess		B5	370 (14.6)	10.4 (23)	–	–	–	–	–	–
EN DN15 PN100, type B1, raised face (RF)		A3	380 (15)	11.4 (25)	–	–	–	–	–	–
EN DN15 PN100, type D, with groove		A7	380 (15)	17.4 (38)	–	–	–	–	–	–
EN DN15 PN100, type E, with spigot		B3	380 (15)	11.2 (25)	–	–	–	–	–	–
EN DN15 PN100, type F, with recess		B7	380 (15)	11.4 (25)	–	–	–	–	–	–

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN25 PN40, type B1, raised face (RF)	2E, 3E	A1	370 (14.6)	11.6 (26)	500 (19.7)	15.6 (34)	–	–	–	–
EN DN25 PN40, type D, with groove		A5	370 (14.6)	11.4 (25)	500 (19.7)	15.4 (34)	–	–	–	–
EN DN25 PN40, type E, with spigot		B1	370 (14.6)	11.2 (25)	500 (19.7)	15.2 (34)	–	–	–	–
EN DN25 PN40, type F, with recess		B5	370 (14.6)	11.4 (25)	500 (19.7)	15.4 (34)	–	–	–	–
EN DN25 PN100, type B1, raised face (RF)		A3	390 (15.4)	14 (31)	520 (20.5)	18.2 (40)	–	–	–	–
EN DN25 PN100, type D, with groove		A7	390 (15.4)	14 (31)	520 (20.5)	18 (40)	–	–	–	–
EN DN25 PN100, type E, with spigot		B3	390 (15.4)	13.6 (30)	520 (20.5)	17.6 (39)	–	–	–	–
EN DN25 PN100, type F, with recess		B7	390 (15.4)	14 (31)	520 (20.5)	18 (40)	–	–	–	–
EN DN40 PN40, type B1, raised face (RF)	2F, 3F, 4F	A1	370 (14.6)	13 (29)	500 (19.7)	17 (37)	600 (23.6)	26.2 (58)	–	–
EN DN40 PN40, type D, with groove		A5	370 (14.6)	13 (29)	500 (19.7)	17 (37)	600 (23.6)	26 (57)	–	–
EN DN40 PN40, type E, with spigot		B1	370 (14.6)	12.6 (28)	500 (19.7)	16.6 (37)	600 (23.6)	25.8 (57)	–	–
EN DN40 PN40, type F, with recess		B5	370 (14.6)	12.8 (28)	500 (19.7)	16.8 (37)	600 (23.6)	26 (57)	–	–
EN DN40 PN100, type B1, raised face (RF)		A3	450 (17.7)	17.6 (39)	560 (22)	21.2 (47)	620 (24.4)	29.8 (66)	–	–
EN DN40 PN100, type D, with groove		A7	450 (17.7)	17.4 (38)	560 (22)	21.2 (47)	620 (24.4)	29.6 (65)	–	–
EN DN40 PN100, type E, with spigot		B3	450 (17.7)	17 (37)	560 (22)	20.8 (46)	620 (24.4)	29.2 (64)	–	–
EN DN40 PN100, type F, with recess		B7	450 (17.7)	17.4 (38)	560 (22)	21 (46)	620 (24.4)	29.6 (65)	–	–

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN50 PN40, type B1, raised face (RF)	2G, 3G, 4G	A1	–	–	500 (19.7)	18.4 (41)	600 (23.6)	27.4 (60)	–	–
EN DN50 PN40, type D, with groove		A5	–	–	500 (19.7)	18.2 (40)	600 (23.6)	27.4 (60)	–	–
EN DN50 PN40, type E, with spigot		B1	–	–	500 (19.7)	18 (40)	600 (23.6)	27 (60)	–	–
EN DN50 PN40, type F, with recess		B5	–	–	500 (19.7)	18.2 (40)	600 (23.6)	27.2 (60)	–	–
EN DN50 PN63, type B1, raised face (RF)		A2	–	–	520 (20.5)	21.6 (48)	620 (24.4)	30.6 (67)	–	–
EN DN50 PN63, type D, with groove		A6	–	–	520 (20.5)	21.4 (47)	620 (24.4)	30.4 (67)	–	–
EN DN50 PN63, type E, with spigot		B2	–	–	520 (20.5)	21 (46)	620 (24.4)	30 (66)	–	–
EN DN50 PN63, type F, with recess		B6	–	–	520 (20.5)	21.2 (47)	620 (24.4)	30.2 (67)	–	–
EN DN50 PN100, type B1, raised face (RF)		A3	–	–	590 (23.2)	25.2 (56)	660 (26)	33.6 (74)	–	–
EN DN50 PN100, type D, with groove		A7	–	–	590 (23.2)	25 (55)	660 (26)	33.4 (74)	–	–
EN DN50 PN100, type E, with spigot		B3	–	–	590 (23.2)	24.4 (54)	660 (26)	33 (73)	–	–
EN DN50 PN100, type F, with recess		B7	–	–	590 (23.2)	24.8 (55)	660 (26)	33.4 (74)	–	–
EN DN80 PN40, type B1, raised face (RF)	4J, 5J	A1	–	–	–	–	610 (24)	31 (68)	1000 (39.4)	60.4 (133)
EN DN80 PN40, type D, with groove		A5	–	–	–	–	610 (24)	30.8 (68)	1000 (39.4)	60.2 (133)
EN DN80 PN40, type E, with spigot		B1	–	–	–	–	610 (24)	30.4 (67)	1000 (39.4)	59.8 (132)
EN DN80 PN40, type F, with recess		B5	–	–	–	–	610 (24)	30.6 (67)	1000 (39.4)	60 (132)
EN DN80 PN63, type B1, raised face (RF)		A2	–	–	–	–	620 (24.4)	34.4 (76)	1000 (39.4)	63.4 (140)
EN DN80 PN63, type D, with groove		A6	–	–	–	–	620 (24.4)	34.2 (75)	1000 (39.4)	63.2 (139)
EN DN80 PN63, type E, with spigot		B2	–	–	–	–	620 (24.4)	33.6 (74)	1000 (39.4)	62.8 (138)
EN DN80 PN63, type F, with recess		B6	–	–	–	–	620 (24.4)	33.8 (75)	1000 (39.4)	63 (139)
EN DN80 PN100, type B1, raised face (RF)		A3	–	–	–	–	730 (28.7)	41.8 (92)	1000 (39.4)	67.2 (148)
EN DN80 PN100, type D, with groove		A7	–	–	–	–	730 (28.7)	41.6 (92)	1000 (39.4)	67 (148)
EN DN80 PN100, type E, with spigot		B3	–	–	–	–	730 (28.7)	41 (90)	1000 (39.4)	66.4 (146)
EN DN80 PN100, type F, with recess		B7	–	–	–	–	730 (28.7)	41.4 (91)	1000 (39.4)	66.6 (147)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN100 PN40, type B1, raised face (RF)	5K	A1	–	–	–	–	–	–	1000 (39.4)	63.6 (140)
EN DN100 PN40, type D, with groove		A5	–	–	–	–	–	–	1000 (39.4)	63.2 (139)
EN DN100 PN40, type E, with spigot		B1	–	–	–	–	–	–	1000 (39.4)	62.4 (138)
EN DN100 PN40, type F, with recess		B5	–	–	–	–	–	–	1000 (39.4)	62.6 (138)
EN DN100 PN63, type B1, raised face (RF)		A2	–	–	–	–	–	–	1000 (39.4)	68 (150)
EN DN100 PN63, type D, with groove		A6	–	–	–	–	–	–	1000 (39.4)	67.8 (149)
EN DN100 PN63, type E, with spigot		B2	–	–	–	–	–	–	1000 (39.4)	67 (148)
EN DN100 PN63, type F, with recess		B6	–	–	–	–	–	–	1000 (39.4)	67.4 (149)
EN DN100 PN100, type B1, raised face (RF)		A3	–	–	–	–	–	–	1050 (41.3)	76.6 (169)
EN DN100 PN100, type D, with groove		A7	–	–	–	–	–	–	1050 (41.3)	76.2 (168)
EN DN100 PN100, type E, with spigot		B3	–	–	–	–	–	–	1050 (41.3)	75.4 (166)
EN DN100 PN100, type F, with recess		B7	–	–	–	–	–	–	1050 (41.3)	75.8 (167)
EN DN125 PN40, type B1, raised face (RF)	5L	A1	–	–	–	–	–	–	1000 (39.4)	67.6 (149)
EN DN125 PN40, type D, with groove		A5	–	–	–	–	–	–	1000 (39.4)	67.2 (148)
EN DN125 PN40, type E, with spigot		B1	–	–	–	–	–	–	1000 (39.4)	66.4 (146)
EN DN125 PN40, type F, with recess		B5	–	–	–	–	–	–	1000 (39.4)	66.6 (147)
EN DN125 PN63, type B1, raised face (RF)		A2	–	–	–	–	–	–	1000 (39.4)	77.8 (172)
EN DN125 PN63, type D, with groove		A6	–	–	–	–	–	–	1000 (39.4)	77.4 (171)
EN DN125 PN63, type E, with spigot		B2	–	–	–	–	–	–	1000 (39.4)	76.4 (168)
EN DN125 PN63, type F, with recess		B6	–	–	–	–	–	–	1000 (39.4)	76.8 (169)
EN DN125 PN100, type B1, raised face (RF)		A3	–	–	–	–	–	–	1100 (43.3)	93.2 (205)
EN DN125 PN100, type D, with groove		A7	–	–	–	–	–	–	1100 (43.3)	92.8 (205)
EN DN125 PN100, type E, with spigot		B3	–	–	–	–	–	–	1100 (43.3)	91.4 (202)
EN DN125 PN100, type F, with recess		B7	–	–	–	–	–	–	1100 (43.3)	92.4 (204)

Meaning of "–": not available

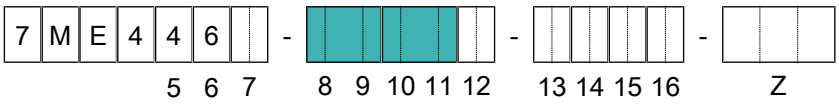


Tab. 33: Overall length L1 and weight of sensor (process connections: EN, wetted parts: Ni alloy C-22/2.4602)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
EN DN25 PN40, type B1, raised face (RF)	6E, 7E	A1	390 (15.4)	11.7 (26)	520 (20.5)	15.7 (35)	–	–	–	–
EN DN40 PN40, type B1, raised face (RF)	6F, 7F, 8F		390 (15.4))	13.7 (30)	520 (20.5)	17.5 (39)	–	–	–	–
EN DN50 PN40, type B1, raised face (RF)	6G, 7G, 8G		–	–	520 (20.5)	19.3 (43)	620 (24.4)	28 (62)	–	–
EN DN80 PN40, type B1, raised face (RF)	8J		–	–	–	–	620 (24.4)	32.6 (72)	1020 (40.2)	60.8 (134)

Meaning of "–": not available

Process connections compatible to JIS B 2220 (AISI 316/ AISI 316 L)

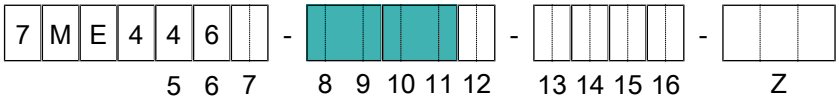


Tab. 34: Overall length L1 and weight of sensor (process connections: JIS, wetted parts: stainless steel)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
JIS DN15 10K	2C	L2	370 (14.6)	10.4 (23)	–	–	–	–	–	–
JIS DN15 20K		L4	370 (14.6)	10.4 (23)	–	–	–	–	–	–
JIS DN25 10K	2E, 3E	L2	370 (14.6)	11.4 (25)	500 (19.7)	15.6 (34)	–	–	–	–
JIS DN25 20K		L4	370 (14.6)	11.8 (26)	500 (19.7)	15.8 (35)	–	–	–	–
JIS DN40 10K	2F, 3F, 4F	L2	370 (14.6)	12.2 (27)	500 (19.7)	16.2 (36)	600 (23.6)	25.4 (56)	–	–
JIS DN40 20K		L4	370 (14.6)	12.6 (28)	500 (19.7)	16.6 (37)	600 (23.6)	25.8 (57)	–	–
JIS DN50 10K	2G, 3G, 4G	L2	–	–	500 (19.7)	17 (37)	600 (23.6)	26 (57)	–	–
JIS DN50 20K		L4	–	–	500 (19.7)	17.2 (38)	600 (23.6)	26.2 (58)	–	–
JIS DN80 10K	4J, 5J	L2	–	–	–	–	600 (23.6)	27.8 (61)	1000 (39.4)	57.8 (127)
JIS DN80 20K		L4	–	–	–	–	610 (24)	30.4 (67)	1000 (39.4)	60 (132)
JIS DN100 10K	5K	L2	–	–	–	–	–	–	1000 (39.4)	59 (130)
JIS DN100 20K		L4	–	–	–	–	–	–	1000 (39.4)	63 (139)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
JIS DN125 10K	5L	L2	–	–	–	–	–	–	1000 (39.4)	62.8 (138)
JIS DN125 20K		L4	–	–	–	–	–	–	1000 (39.4)	69 (152)

Meaning of "–": not available

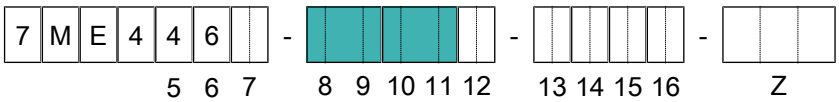


Tab. 35: Overall length L1 and weight of sensor (process connections: JIS, wetted parts: Ni alloy C-22/2.4602)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
JIS DN25 10K	6E, 7E	L2	390 (15.4)	12.1 (27)	–	–	–	–	–	–
JIS DN25 20K		L4	390 (15.4)	12.5 (28)	–	–	–	–	–	–
JIS DN40 10K	6F, 7F, 8F	L2	390 (15.4)	13.6 (30)	520 (20.5)	17.4 (38)	–	–	–	–
JIS DN40 20K		L4	390 (15.4)	14 (31)	520 (20.5)	17.6 (39)	–	–	–	–
JIS DN50 10K	6G, 7G, 8G	L2	–	–	520 (20.5)	18.6 (41)	620 (24.4)	27.3 (60)	–	–
JIS DN50 20K		L4	–	–	520 (20.5)	18.8 (41)	620 (24.4)	27.3 (60)	–	–
JIS DN80 10K	8J	L2	–	–	–	–	620 (24.4)	30.8 (68)	1020 (40.2)	58.8 (130)
JIS DN80 20K		L4	–	–	–	–	620 (24.4)	33.3 (73)	1020 (40.2)	61.3 (135)

Meaning of "–": not available

Process connections with internal thread G

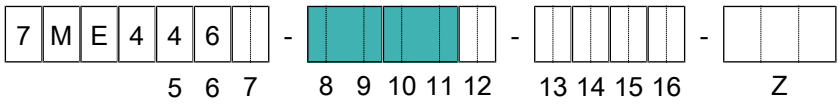


Tab. 36: Overall length L1 and weight of sensor (process connections: G thread, wetted parts: stainless steel)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
G ⅜"	2B	E1	390 (15.4)	9.4 (21)	–	–	–	–	–	–
G ½"	2C		390 (15.4)	9.4 (21)	–	–	–	–	–	–
G ¾"	2D		390 (15.4)	9.4 (21)	–	–	–	–	–	–

Meaning of "–": not available

Process connections with internal thread G

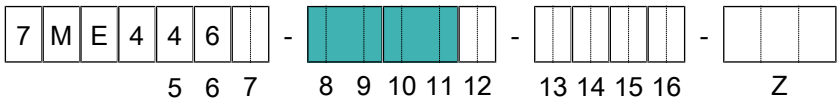


Tab. 37: Overall length L1 and weight of sensor (process connections: G thread, wetted parts: stainless steel)

Process connections	Order code position		FCS600 DN15		FCS600 DN25		FCS600 DN40	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
G ⅜"	2B	E1	390 (15.4)	9.4 (21)	–	–	–	–
G ½"	2C		390 (15.4)	9.4 (21)	–	–	–	–
G ¾"	2D		390 (15.4)	9.4 (21)	–	–	–	–

Meaning of "–": not available

Process connections with internal thread NPT

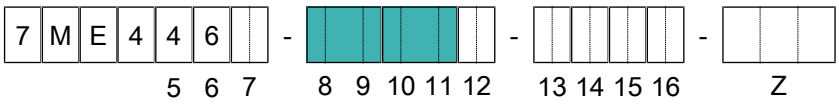


Tab. 38: Overall length L1 and weight of sensor (process connections: NPT thread, wetted parts: stainless steel)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
NPT ⅜"	2B	E3	390 (15.4)	9.4 (21)	–	–	–	–	–	–
NPT ½"	2C		390 (15.4)	9.4 (21)	–	–	–	–	–	–
NPT ¾"	2D		390 (15.4)	9.4 (21)	–	–	–	–	–	–

Meaning of "–": not available

Clamp process connections according to DIN 32676 series A

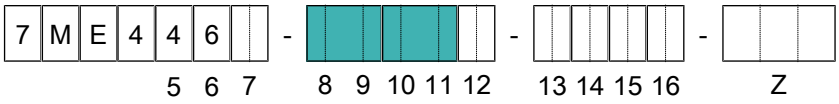


Tab. 39: Overall length L1 and weight of sensor (process connections: DIN 32676 series A clamp, wetted parts: stainless steel)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
DIN 32676 series A DN25	2E, 3E	G2	370 (14.6)	9.2 (20)	–	–	–	–	–	–
DIN 32676 series A DN40	2F, 3F, 4F		370 (14.6)	9.2 (20)	500 19.7	13.2 29	–	–	–	–
DIN 32676 series A DN50	2G, 3G, 4G		–	–	500 (19.7)	13.2 (29)	600 (23.6)	22.4 (49)	–	–
DIN 32676 series A DN65	4H		–	–	–	–	600 (23.6)	22.5 (50)	–	–
DIN 32676 series A DN100	5K		–	–	–	–	–	–	1000 (39.4)	52.1 (115)

Meaning of "–": not available

Clamp process connections according to DIN 32676 series C (Tri-Clamp)

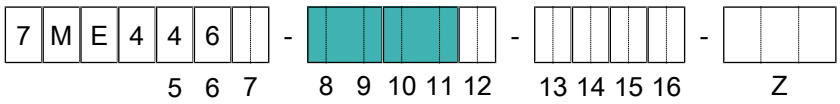


Tab. 40: Overall length L1 and weight of sensor (process connections: DIN 32676 series C Tri-Clamp, wetted parts: stainless steel)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
DIN 32676 series C 1"	2E, 3E	G6	370 (14.6)	9.2 (20)	–	–	–	–	–	–
DIN 32676 series C 1½"	2F, 3F, 4F		370 (14.6)	9.2 (20)	500 (19.7)	13.2 (29)	–	–	–	–
DIN 32676 series C 2"	2G, 3G, 4G		–	–	500 (19.7)	13.2 (29)	600 (23.6)	22.4 (49)	–	–
DIN 32676 series C 3"	4J, 5J		–	–	–	–	600 (23.6)	22.5 (50)	–	–
DIN 32676 series C 4"	5K		–	–	–	–	–	–	1000 (39.4)	52.2 (115)

Meaning of "–": not available

Clamp process connection according to JIS/ISO 2852

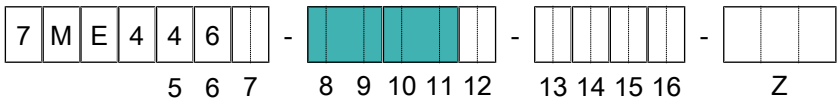


Tab. 41: Overall length L1 and weight of sensor (process connections: JIS/ISO 2852 clamp, wetted parts: stainless steel)

Process connections	Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
	8+9	10+11	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)	L1 in mm (inch)	Weight in kg (lb)
JIS/ISO 2852 1"	2E, 3E	J1	370 (14.6)	9.2 (20)	–	–	–	–	–	–
JIS/ISO 2852 1½"	2F, 3F, 4F		370 (14.6)	9.2 (20)	500 (19.7)	13.2 (29)	–	–	–	–
JIS/ISO 2852 2"	2G, 3G, 4G		–	–	500 (19.7)	13.3 (29)	600 (23.6)	22.4 (49)	–	–
JIS/ISO 2852 3"	4J, 5J		–	–	–	–	600 (23.6)	22.5 (50)	–	–

Meaning of "–": not available

NAMUR & Customer length



Overall length and weight for customized installation length

Tab. 42: Available process connections for options S31 and Y30 with minimum and maximum installation length

Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
8+9	10+11	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)
2C	D1, D2, A1, L2, L4, B1, B5, A5	430 (16.9)	510 (20.1)	–	–	–	–	–	–
	D3, C3	440 (17.3)	510 (20.1)	–	–	–	–	–	–
2E, 3E	D1, D2, A1, L2, L4, B1, B5, A5	430 (16.9)	600 (23.6)	560 (22)	600 (23.6)	–	–	–	–
	D3, C3	450 (17.7)	600 (23.6)	580 (22.8)	600 (23.6)	–	–	–	–
2F, 3F, 4F	BD4, BJ1, BJ2, ED4, FD4, GD4	430 (16.9)	600 (23.6)	560 (22)	600 (23.6)	–	–	–	–
	D1	440 (22)	600 (23.6)	560 (22)	600 (23.6)	–	–	–	–
	D2	440 (17.3)	600 (23.6)	570 (22.4)	600 (23.6)	–	–	–	–
	D3, C3	460 (18.1)	600 (23.6)	590 (23.2)	600 (23.6)	–	–	–	–
2G, 3G, 4G	BD4, BJ1, BJ2, ED4, FD4, GD4	–	–	560 (22)	715 (28.1)	660 (26)	715 (28.1)	–	–
	D1, D2	–	–	570 (22.4)	715 (28.1)	660 (26)	715 (28.1)	–	–
	D3, C3	–	–	600 (23.6)	715 (28.1)	690 (27.2)	715 (28.1)	–	–

Order code pos.		FCS600 DN15		FCS600 DN25		FCS600 DN40		FCS600 DN65	
8+9	10+11	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)	Y30 min in mm (inch)	Y30 max (S31) in mm (inch)
4H	D1, D2	–	–	–	–	670 (26.4)	715 (28.1)	–	–
	D3, C3	–	–	–	–	700 (27.6)	715 (28.1)	–	–
4J, 5J	L2	–	–	–	–	660 (26)	915 (36)	–	–
	BA1, BD4, BJ2, BP1, ED4, FD4, GD4	–	–	–	–	670 (26.4)	915 (36)	–	–
	D2	–	–	–	–	680 (26.8)	915 (36)	–	–
	D3, C3	–	–	–	–	700 (27.6)	915 (36)	–	–
5K	D1, D2, A1, L2, L4, B1, B5, A5	–	–	–	–	–	–	1060 (41.7)	1400 (55.1)
	D3, C3	–	–	–	–	–	–	1090 (42.9)	1400 (55.1)
5L	D1, D2, A1, L2, L4, B1, B5, A5	–	–	–	–	–	–	1060 (41.7)	1400 (55.1)
	BA4, CA4	–	–	–	–	–	–	1100 (43.3)	1400 (55.1)

Meaning of "–": not available, "Y30": Customer length, "S31": NAMUR length; S31 corresponds to Y30 max

Tab. 43: Additional weight in combination with options S31 and Y30

	FCS600 DN15	FCS600 DN25	FCS600 DN40	FCS600 DN65
Additional weight for customized installation length in kg/mm	0.003	0.005	0.008	0.014

Typical dimensions of measuring tubes

Tab. 44: Typical dimensions of measuring tubes

Meter size	Material of wetted parts	Order code pos. 8+9	Internal diameter in mm (inch)	Wall thickness in mm (inch)
FCS600 DN2	Measuring tubes made of nickel alloy C-22/2.4602, process connections of stainless steel alloy 1.4404/316L	0A, 0D	1.2 (0.05)	0.35 (0.022)
FCS600 DN4		1A, 1D	2.1 (0.08)	0.55 (0.022)
FCS600 DN15	Stainless steel 1.4404/316L	2B, 2C, 2D, 2E, 2F, 2G	7.75 (0.305)	0.89 (0.035)
	Nickel alloy C-22/2.4602	6B, 6C, 6D, 6E, 6F, 6G	7.70 (0.303)	0.91 (0.036)

Meter size	Material of wetted parts	Order code pos. 8+9	Internal diameter in mm (inch)	Wall thickness in mm (inch)
FCS600 DN25	Stainless steel 1.4404/316L	3E, 3F, 3G,	13.40 (0.528)	1.24 (0.049)
	Nickel alloy C-22/2.4602	7E, 7F, 7G	13.40 (0.528)	1.24 (0.049)
FCS600 DN40	Stainless steel 1.4404/316L	4F, 4G, 4H, 4J	22.10 (0.870)	1.65 (0.065)
	Nickel alloy C-22/2.4602	8F, 8G, 8H, 8J	22.10 (0.870)	1.65 (0.065)
FCS600 DN65	Stainless steel 1.4404/316L	5J, 5K, 5L	37.20 (1.485)	2.60 (0.102)

10.4 Transmitter dimensions and weights

Transmitter dimensions

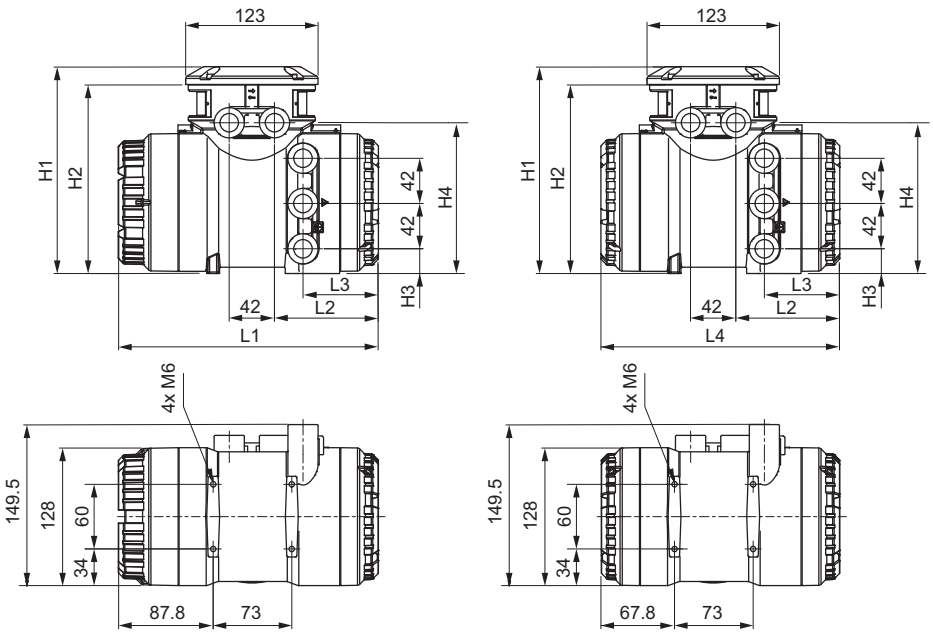


Fig. 42: Dimensions of transmitter in mm
(left: transmitter with display, right: transmitter without display)

Tab. 45: Overall length L1 - L4 and height H1 - H4 of transmitter (material: stainless steel, aluminum)

Material	L1 in mm (inch)	L2 in mm (inch)	L3 in mm (inch)	L4 in mm (inch)	H1 in mm (inch)	H2 in mm (inch)	H3 in mm (inch)	H4 in mm (inch)
Stainless steel	255.5 (10.06)	110.5 (4.35)	69 (2.72)	235 (9.25)	201 (7.91)	184 (7.24)	24 (0.94)	150.5 (5.93)
Aluminum	241.5 (9.51)	96.5 (3.8)	70 (2.76)	221 (8.7)	192 (7.56)	175 (6.89)	23 (0.91)	140 (5.51)

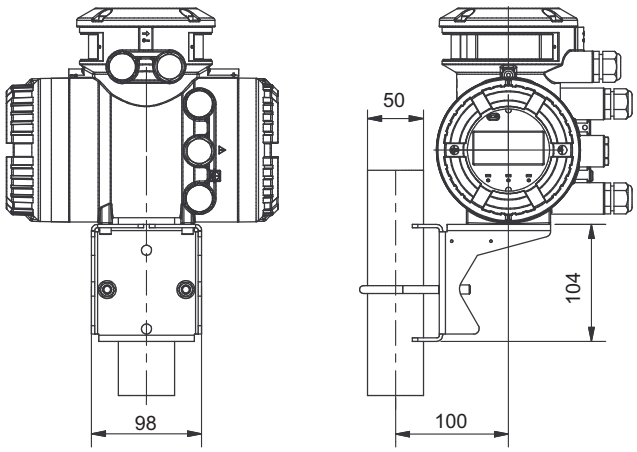
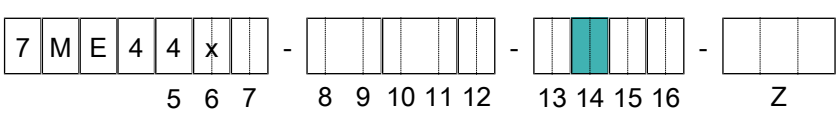


Fig. 43: Dimensions of transmitter in mm, attached to mounting bracket.

Transmitter weights

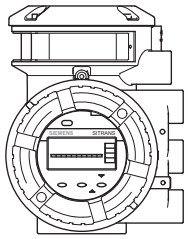


Order code pos. 14	Design type	Housing material of transmitter	Weight in kg (lb)
C, D, E, F	Remote	Aluminum	max. 4.4 (9.7)
G, H		Stainless steel	12.5 (27.6)

11 Transmitter

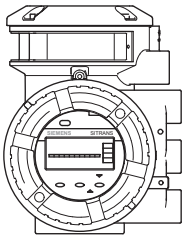
SITRANS FCT020 Transmitter

For general purpose application



SITRANS FCT040 Transmitter

For demanding and critical application



Transmitter type	Advanced functions	Total Health Check[1)]	Dynamic Pressure Compensation	Wizard for easy setup	Event Management acc. NAMUR NE107
SITRANS FCT020	-	•	-	•	•
SITRANS FCT040	•	•	•	•	•

[1)] Function is based on external software (Pactware).

Transmitter type	Universal Power Supply (VDC and VAC)	Housing material		MicroSD card	Display 4 line dot matrix
		Aluminum	Stainless steel		
SITRANS FCT020	•	•	•	•	•
SITRANS FCT040	•	•	•	•	•

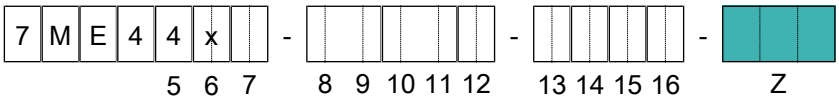
Transmitter type	Inputs		Outputs	
	Analog	Status	Analog	Pulse/frequency
SITRANS FCT020	-	•	•	•
SITRANS FCT040	•	•	•	•

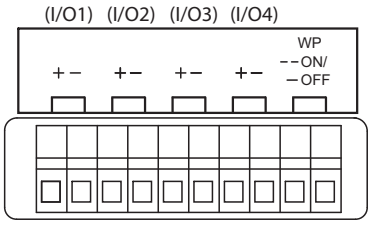
Transmitter type	Communication		
	HART	Modbus	Profibus PA
SITRANS FCT020	•	•	-
SITRANS FCT040	•	•	•

● Supported / - not supported

11.1 Electrical interfaces

Depending on the selected interface protocol up to 4 in and/or outputs (I/O) are available, partially configurable.





Order code position -Z	Interface protocol	IO1 +/-	IO2 +/-	IO3 +/-	IO4 +/-
E06, E07 + Fxx	HART	Active or Passive Analog Output + HART	Passive Pulse or Status Output	*Configurable*	*Configurable*
E14 + Fxx	Modbus	*Configurable*		Modbus	
E10 + Fxx[1)]	PROFIBUS PA	PROFIBUS PA	Passive Pulse Output	–	–

[1)] Only with SITRANS FCT040 Transmitter

Details about in and outputs and communication interfaces are specified in the following chapters.

Spare Sensor I/O

Order code position -Z	Specification
E00+F00	Spare sensor without transmitter, all communication types and I/Os apply

11.1.1 Analog inputs and outputs

11.1.1.1 Analog outputs

Active current output *Iout*

One or two current outputs are available depending on order code position -Z.

Depending on the measured value, the active current output delivers 4 – 20 mA.

It may be used for output of the following measured values:

- Flow rate (mass, volume, net partial component flow of a mixture)
- Density
- Temperature
- Pressure
- Concentration

For HART communication devices, it is supplied on the current output *Iout1*. The current output may be operated in compliance with the NAMUR NE43 standard.

	Value
Nominal output current	4 – 20 mA
Maximum output current range	2.4 – 21.6 mA
Load resistance	≤ 750 Ω
Load resistance for secure HART communication	230 – 600 Ω

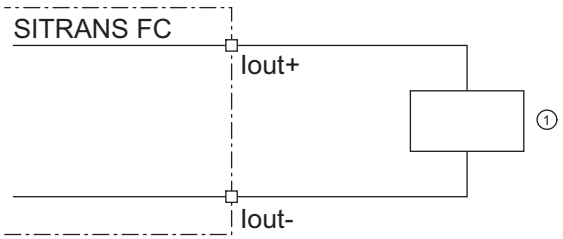


Fig. 44: Active current output connection *Iout* HART

① Receiver

Passive current output *Iout*

	Value
Nominal output current	4 – 20 mA
Maximum output current range	2.4 – 21.6 mA
External power supply	10.5 – 32 V_{DC}
Load resistance for secure HART communication	230 – 600 Ω
Load resistance at current output	≤ 911 Ω

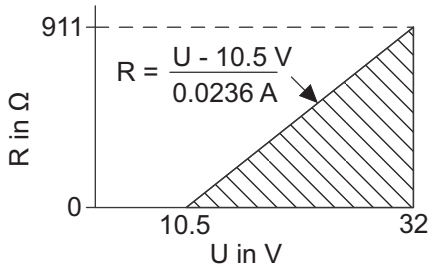


Fig. 45: Maximum load resistance as a function of an external power supply voltage

R Load resistance
U External power supply voltage

The diagram shows the maximum load resistance R as a function of voltage U of the connected voltage source. Higher load resistances are allowed with higher power supply values. The usable zone for passive power output operation is indicated by the hatched area.

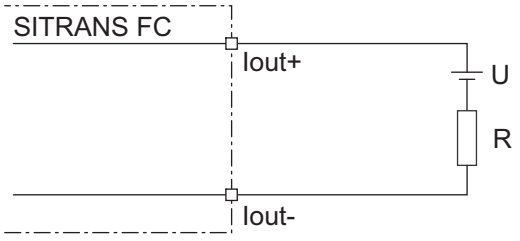


Fig. 46: Passive current output connection *Iout*

11.1.1.2 Analog inputs

Active current input *Iin*

An individual analog power input is available for external analog devices.

The active current input *Iin* is provided for connecting a two-wire transmitter with an output signal of 4 – 20 mA.

	Value
Nominal input current range	4 – 20 mA
Maximum input current range	2.4 – 21.6 mA
Internal power supply	24 V_{DC} ±20 %
Internal load resistance SITRANS FC	≤ 160 Ω

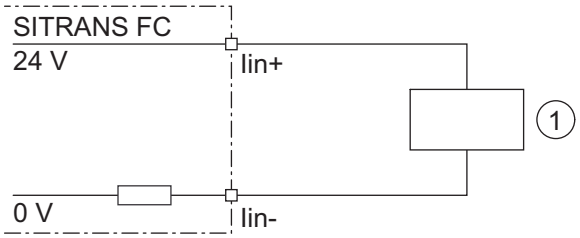


Fig. 47: Connection of external device with passive current output

① External passive current output device

Passive current input *Iin*

The passive current input *Iin* is provided for connecting a four-wire transmitter with an output signal of 4 – 20 mA.

	Value
Nominal input current range	4 – 20 mA
Maximum input current range	2.4 – 21.6 mA
Internal load resistance SITRANS FC	≤ 160 Ω

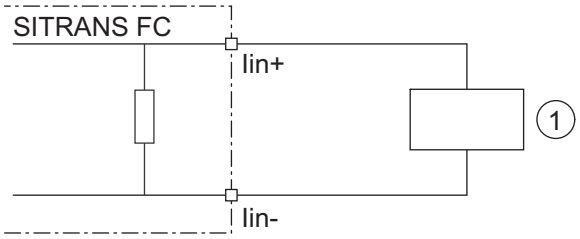


Fig. 48: Connection of external device with active current output

① External active current output device

11.1.1.3 Analog output specification

Analog output specification *Iout*

If mass- or volume flow, density, temperature, pressure or concentration is measured via current output *Iout* two additional deviation effects have to be taken into account.

- The *Iout* –base specification ΔI_{base} contains all combined effects of output adjustment, linearity, power supply variation, load resistance variation, short and long term drift for one year.
- The *Iout* –ambient temperature specification $\Delta I(T_{amb})$ gives an additional deviation effect if the ambient temperature of the transmitter differs from 20 °C.

Both additional output deviation effects have to be added to the basic mass- or volume flow, density, temperature, pressure or concentration deviation. They are based on a 95 % (2σ) confidence level.

Deviation of mass- or volume flow, density, temperature, pressure or concentration by *Iout*

The following formula can be used to calculate the deviation of mass- or volume flow:

$$D_I = \sqrt{D^2 + \left(\frac{\Delta I_{base}}{I\,(Q)} \times 100\ \%\right)^2 + \left(\frac{\Delta I(T_{amb})}{I\,(Q)} \times 100\ \%\right)^2}$$

D_I	Maximum deviation of mass- or volume flow, density, temperature, pressure or concentration by I*out* in %
D	Maximum deviation of mass- or volume flow, density, temperature, pressure or concentration[1)] by pulse/frequency output in %
$I(Q)$	I*out* depending on mass- or volume flow, density, temperature, pressure or concentration in µA
ΔI_{base}	Maximum deviation of I*out* by combined effects $\Delta I_{base} = a \times I(Q) + b$
$\Delta I(T_{amb})$	Maximum deviation of I*out* by deviation of the transmitter ambient temperature from 20 °C $\Delta I(T_{amb}) = (c \times I(Q) + d) \times (T - 20\ °C)$
a, b, c, d	Constants

Description	Order code pos. -Z	a in ppm	b in µA	c in ppm/°C	d in µA/°C
Non-intrinsically safe I*out* (active or passive)	E06+F11...F 23 E14+F37	170	2.3	7	0
Intrinsically safe I*out* (passive)	E07+F01… F04				0.06

[1)] Formula or value for accuracy of specific output parameter, please see chapters:

- 3.4 *Accuracy of density* [▷ 31]
- 3.6 *Volume flow accuracy* [▷ 33]
- 3.7 *Accuracy of temperature* [▷ 33]

11.1.2 Digital inputs and outputs

11.1.2.1 Digital outputs

Active pulse output *P/Sout*

Connection of an electronic counter

Maximum voltage and correct polarity must be observed for wiring.

Terms	Value
Load resistance	> 1 kΩ

Terms	Value
Internal power supply	24 V_{DC} ±20 %
Maximum pulse rate	10000 pulses/s
Frequency range	0 – 12.5 kHz

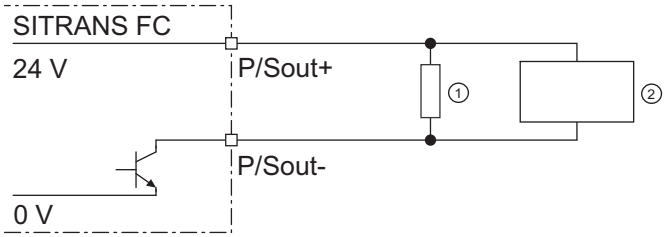


Fig. 49: Active pulse output connection *P/Sout*

① Load resistance
② Electronic counter

Connection of an electromechanical counter

Terms	Value
Maximum current	150 mA
Average current	≤ 30 mA
Internal power supply	24 V_{DC} ±20 %
Maximum pulse rate	2 pulses/s
Pulse width	20, 33, 50, 100 ms

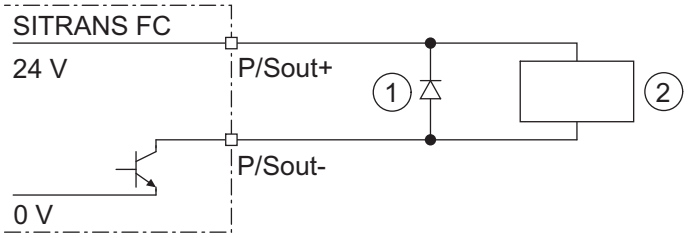


Fig. 50: Active pulse output *P/Sout* connection with electromechanical counter

① Protective diode
② Electromechanical counter

Active pulse output *P/Sout* with internal pull-up resistor

	Value
Internal power supply	24 V_{DC} ±20 %
Internal pull-up resistor	2.2 kΩ
Maximum pulse rate	10000 pulses/s
Frequency range	0 – 12.5 kHz

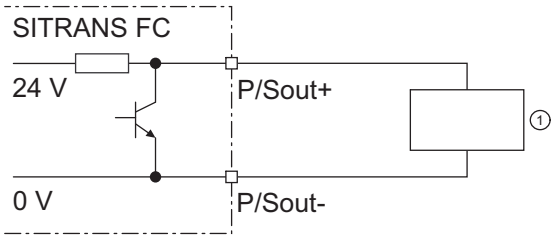


Fig. 51: Active pulse output *P/Sout* with internal pull-up resistor

① Electronic counter

Passive pulse output *P/Sout*

Maximum voltage and correct polarity must be observed for wiring.

	Value
Maximum load current	≤ 200 mA
Power supply	≤ 30 V_{DC}
Maximum pulse rate	10000 pulses/s
Frequency range	0 – 12.5 kHz

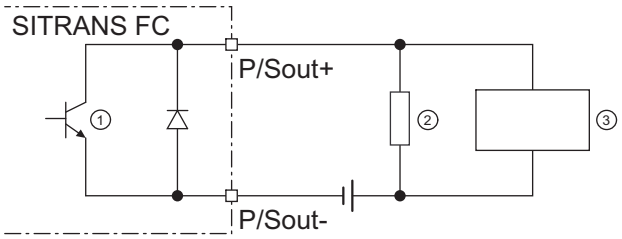


Fig. 52: Passive pulse output connection *P/Sout* with electronic counter

① Passive pulse or status output
② Load resistance
③ Electronic counter

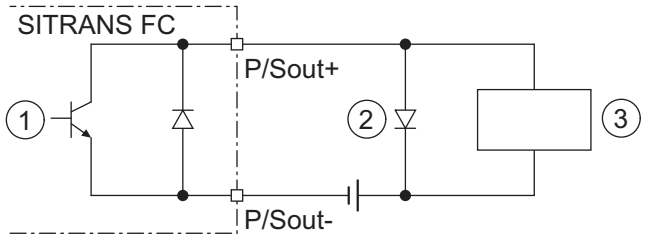


Fig. 53: Passive pulse output *P/Sout* connection with electromechanical counter

① Passive pulse or status output
② Protective diode
③ Electromechanical counter

Active status output *P/Sout*

Since this is a transistor contact, maximum allowed current as well as polarity and level of output voltage must be observed during wiring.

	Value
Load resistance	> 1 kΩ
Internal power supply	24 V_{DC} ±20 %

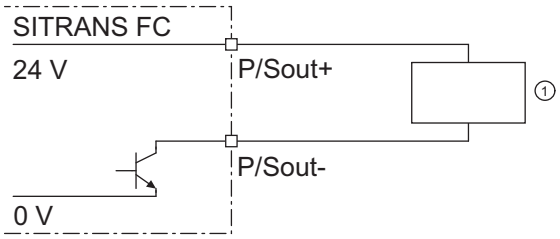


Fig. 54: Active status output connection *P/Sout*

① External device with load resistance

Active status output *P/Sout* with internal pull-up resistor

	Value
Internal pull-up resistor	2.2 kΩ
Internal power supply	24 V_{DC} ±20 %

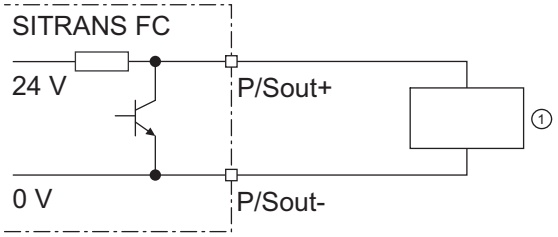


Fig. 55: Active status output *P/Sout* with internal pull-up resistor

① External device

Passive status output *P/Sout* or *Sout*

	Value
Output current	≤ 200 mA
Power supply	≤ 30 V_{DC}

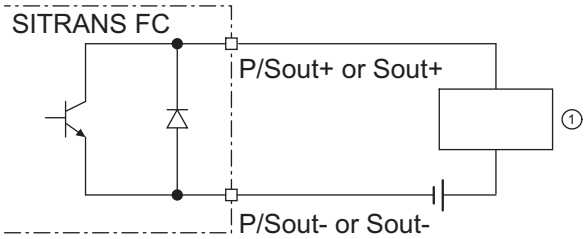


Fig. 56: Passive status output connection *P/Sout* or *Sout*

① External device

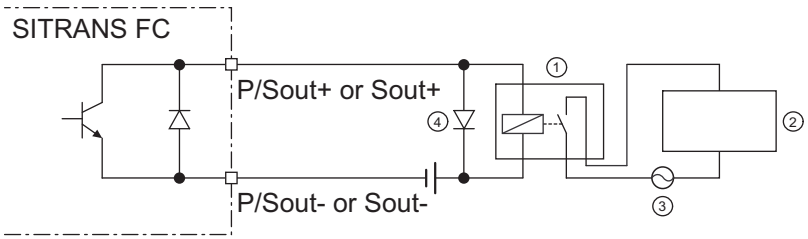


Fig. 57: Passive status output connection *P/Sout* or *Sout* for solenoid valve circuit

① Relay
② Solenoid valve
③ Magnetic valve power supply
④ Protective diode

A relay must be connected in series to switch alternating voltage.

Passive pulse or status output *P/Sout* (NAMUR)

Output signals according to EN 60947-5-6 (previously NAMUR, worksheet NA001):

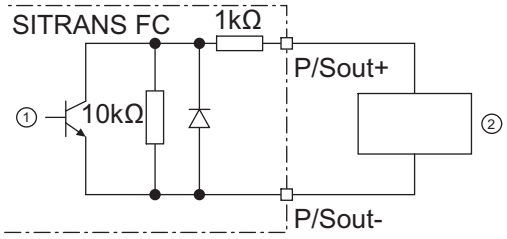


Fig. 58: Passive pulse or status output with switching amplifier connected in series

① Passive pulse or status output
② Switching amplifier

11.1.2.2 Digital inputs

Status input *Sin*

Do not connect a signal source with electric voltage.

The status input is provided for use of voltage-free contacts with the following specification:

Switching status	Resistance
Closed	< 200 Ω
Open	> 100 kΩ

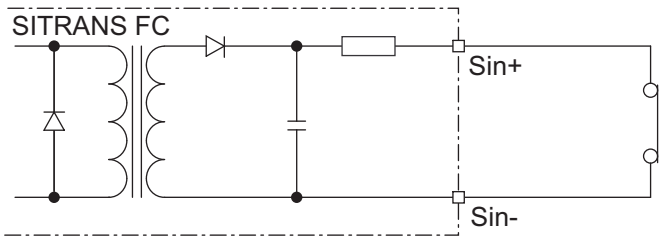


Fig. 59: Status input connection

11.1.3 HART

For HART communication devices, it is supplied on the current output Iout1. The current output may be operated in compliance with the NAMUR NE43 standard. HART is available with non-intrinsically and intrinsically safety outputs.

HART I/O

Order code position -Z	Connection terminal assignment				
	I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-	WP
E06+F11	Iout1 Active	P/Sout1 Passive	–	–	Write-protect
E06+F22	Iout1 Active	P/Sout1 Passive	P/Sout2 Passive	Iout2 Active	Write-protect
E06+F23	Iout1 Active	P/Sout1 Passive	Sin	Iout2 Active	Write-protect

Order code position -Z	Connection terminal assignment				
	I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-	WP
E06+F12	Iout1 Active	P/Sout1 Passive	Sout Passive	P/Sout2 Passive	Write-protect
E06+F13	Iout1 Active	P/Sout1 Passive	Sin	P/Sout2 Passive	Write-protect
E06+F21	Iout1 Active	P/Sout1 Passive	Sin	P/Sout2 Active Internal pull-up resistor	Write-protect
E06+F20	Iout1 Active	P/Sout1 Passive	Sin	P/Sout2 Active	Write-protect
E06+F16	Iout1 Active	P/Sout1 Passive	Iout2 Passive	Iin Active	Write-protect
E06+F14	Iout1 Active	P/Sout1 Passive	P/Sout2 Passive	Iin Active	Write-protect
E06+F18	Iout1 Active	P/Sout1 Passive	Sin	Iin Active	Write-protect
E06+F17	Iout1 Active	P/Sout1 Passive	Iout2 Passive	Iin Passive	Write-protect
E06+F15	Iout1 Active	P/Sout1 Passive	P/Sout2 Passive	Iin Passive	Write-protect
E06+F19	Iout1 Active	P/Sout1 Passive	Sin	Iin Passive	Write-protect

Iout1	Analog current output with HART communication
Iout2	Analog current output
Iin	Analog current input
P/Sout1	Pulse or status output
P/Sout2	Pulse or status output
Sin	Status input
Sout	Status output

HART I/O intrinsically safe

Order code position -Z	Connection terminal assignment				
	I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-	WP
E07+F01	Iout1 Passive	P/Sout1 Passive	Iout2 Passive	–	Write-protect
E07+F02	Iout1 Passive	P/Sout1 Passive	Iout2 Passive	P/Sout2 Passive	Write-protect
E07+F03	Iout1 Passive	P/Sout1 Passive NAMUR	Iout2 Passive	–	Write-protect
E07+F04	Iout1 Passive	P/Sout1 Passive NAMUR	Iout2 Passive	P/Sout2 Passive NAMUR	Write-protect

Iout1	Analog current output with HART communication

Iout2	Analog current output
P/Sout1	Pulse or status output
P/Sout2	Pulse or status output

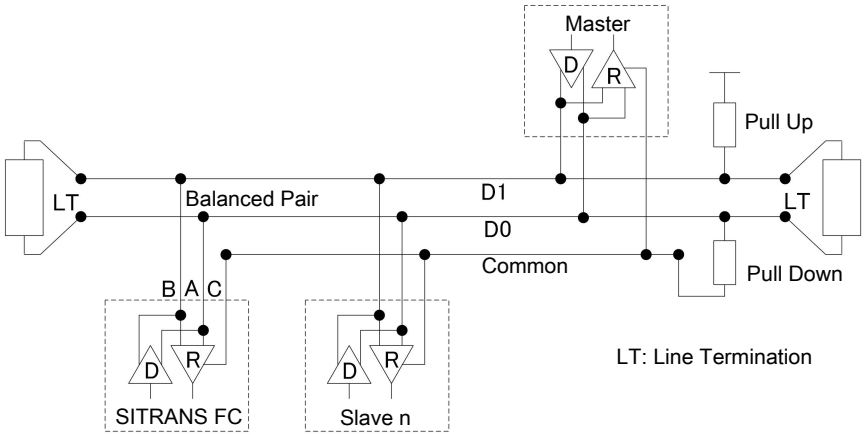
Intrinsically safe outputs are only available in combination with selecting Ex approval of the device, see order code position 15 in the table of chapter Order code description.

11.1.4 Modbus

Modbus interface is available with configurable I/O option.

Output Signal

Digital communication signal according to EIA485 standard (RS485).



11.1.5 PROFIBUS PA

PROFIBUS PA interface is available with and without intrinsically safety.

Order code position -Z	Connection terminal assignment				
	I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-	WP
E010+F41	PROFIBUS PA	Pulse Passive	–	–	Write-protect
E010+F42	PROFIBUS PA (IS)	Pulse Passive (IS)	–	–	Write-protect

PROFIBUS PA	PA communication
Pulse Passive	Pulse / Frequency output

Intrinsically safe (IS) outputs are only available in combination with selecting Ex approval of the device, see order code position 15 of the table in chapter Order code description.

Output Signal

Digital communication signal according to IEC 61158/61784.

Maximum voltage and correct polarity must be observed for wiring.

	Value
Power supply	9 – 32 V_{DC}
Current draw	15 mA (maximum)

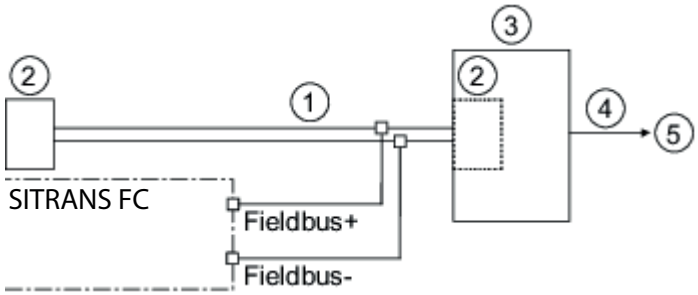


Fig. 60: PROFIBUS PA connection

① PROFIBUS PA
② Termination
③ DP/PA-Coupler
④ PROFIBUS DP
⑤ HOST

Supported Functions

Profile PA Rev. 3.02 compliant, supporting:

- Condensed Status (NE107)
- Device identification number (IDENT_NUMBER) adaption

Function Blocks	Description	
Transducer	FTB	Flow
	CTB	Concentration
	LTB	LCD Indicator
	MTB	Maintenance
	ADTB	Advanced Diagnostics
Analog Input[1)]	AI1	Mass flow
	AI2	Density
	AI3	Temperature
	AI4	Volume flow
	AI5	Reference density
	AI6	Corrected volume flow
Totalizer[1)]	TOT1	Mass
	TOT2	Volume
	TOT3	Corrected volume
Analog Output[1)]	AO	Pressure

[1)]Factory default setting. Assignment can be changed by parameter "channel".

ID	Description	Device description file (GSD)	Applicable function blocks						
			AI1	AI2	AI3	AI4-6	TOT1	TOT2-3	AO
0x81F0	Manufacturer specific	SI81F0.gsd	●	●	●	●	●	●	●
0x9740	Profile specific	pa139740.gsd	●				●		
0x9741		pa139741.gsd	●	●			●		
0x9742		pa139742.gsd	●	●	●		●		

meaning of "●": available

11.2 Power supply

Power supply

Alternating-current voltage (rms):

- Power supply[1)]: 24 V_{AC} +20 % -15 % or 100 – 240 V_{AC} +10 % -20 %
- Power frequency: 47 – 63 Hz

Direct-current voltage:

- Power supply[1)]: 24 V_{DC} +20 % -15 % or 100 – 120 V_{DC} +8.3 % -10 %

[1)] for option S2x (Marine approval) supply voltage is limited to 24 V; in addition NE21 testing indicates a tolerable area of 24 V_{DC} ±20 % under NE21 test conditions.

Power consumption

P ≤ 10 W (including sensor)

Power supply failure

In the event of a power failure, the flow meter data are backed up on a non-volatile internal memory. In case of devices with display, the characteristic sensor values, such as nominal diameter, serial number, calibration constants, zero point, etc. and the error history are also stored on a microSD card.

Galvanic isolation

All circuits for inputs, outputs and power supply are galvanically isolated from each other.

11.3 Cable specifications

For remote type devices, a connecting cable has to be used to connect the sensor to the transmitter. The device specifications, stated in this document, are valid only if one of the original Siemens connecting cables is used.

Cable length limitations to be considered:

Cable type	Option code	Maximum length to keep the specification	Maximum allowable length in hazardous areas
Standard connecting cable	L5x/L6x	30 m	171 m
Fire retardant connecting cable	L7x/L8x	30 m	95 m

Cables longer than 30 m must be ordered as separate item. For this purpose please consult our Siemens Service team.

If Marine option S22...S27 is ordered, a Marine certified cable will be delivered.

12 Installation

12.1 Location and position of installation

SITRANS FC Coriolis flow meters can be mounted horizontally, vertically and at an incline. The measuring tubes should be completely filled with the fluid during flow measurement as accumulations of air or formation of gas bubbles in the measuring tube may result in errors in measurement. Straight pipe runs at inlet or outlet are usually not required.

Avoid the following installation locations and positions:

- Measuring tubes as highest point in piping when measuring liquids
- Measuring tubes as lowest point in piping when measuring gases
- Immediately in front of a free pipe outlet in a downpipe
- Lateral positions

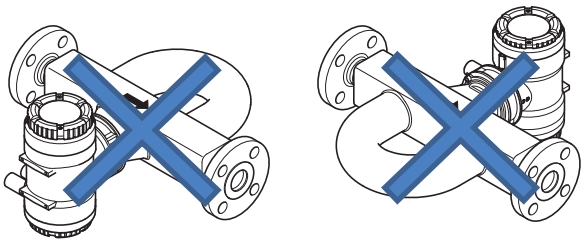
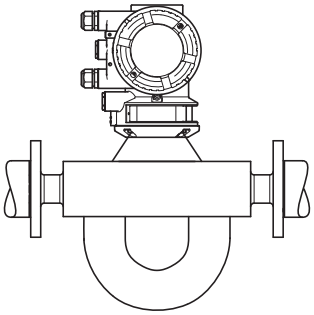
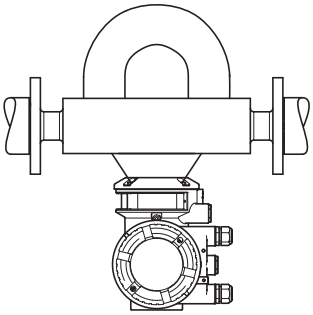
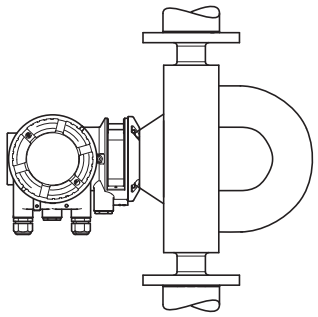


Fig. 61: Installation position to be avoided: Flow meter in sideways position

12.1.1 Sensor installation position

Sensor installation position as a function of the fluid

Installation position	Fluid	Description
Horizontal, measuring tubes at bottom 	Liquid	The measuring tubes are oriented toward the bottom. Accumulation of gas bubbles is avoided.
Horizontal, measuring tubes at top 	Gas	The measuring tubes are oriented toward the top. Accumulation of liquid, such as condensate is avoided.

Installation position	Fluid	Description
Vertical, direction of flow towards the top (recommended) 	Liquid/gas	The sensor is installed on a pipe with the direction of flow towards the top. Accumulation of gas bubbles or solids is avoided. This position allows for complete self-draining of the measuring tubes.

12.2 Installation instructions

⚠ WARNING

Risk of injury during installation due to insufficiently trained personnel

- Only have skilled personnel install the flow meter.

NOTICE

Risk of damage to the flow meter due to excessive mechanical stress

- The flow meter must not be used as a support for climbing (e.g. during installation work on the tube system). The flow meter must not be used to support external loads (e.g. as a support for pipes) or as a surface for depositing heavy tools (e.g. during installation work on the pipe system).
- The weight of the flow meter may generate additional mechanical forces on the piping that might lead to tensions at process connections. Design measures must be taken to prevent the above.

NOTICE

Risk of damage to the flow meter due to mechanical influences

- Protect the flow meter from vibration, shocks and mechanical strain.

NOTICE

Meet the environmental conditions of the respective Operating Instructions to prevent disturbance of other sensitive electrical equipment due to increased electromagnetic emissions.

12.2.1 Installation dimensions

Dimensions and installation lengths of sensor and transmitter are listed in the chapter *Mechanical specification*.

12.2.2 Installation site

In order to ensure stability while operating the flow meter, the following rules regarding placement must be followed:

⚠ CAUTION

Risk of injury during installation, if space for free movement is insufficient

- Select an installation site that offers enough space for installation, electrical installation, maintenance, etc.

NOTICE

Risk of damage to the flow meter due to extreme environmental conditions

- Do not install flow meter in locations subject to severe temperature fluctuations.
- Do not install flow meter in locations subject to direct insolation or install additional sun protection.

- Avoid installation sites susceptible to cavitation, such as immediately behind a control valve.
- Install flow meter far removed from motors, transformers or other transmitters.
- If the plan calls for installing two sensors of the same kind back-to-back, use a customized design. Contact the responsible Siemens sales organization.
- Operate the flow meter below an elevation of 2000 m above sea level.
- If possible, avoid installing the flow meter at the end of a downpipe.
- When installing in a hazardous area, the separate Explosion Proof Type Manual must be considered.
- Install flow meter away from magnetic compasses as it contains no precaution to prevent it from causing compass deviations.
- Density indication of the Coriolis flow meter depends on installation orientation and has to be corrected. For vertical and horizontal orientation (maximum deviation ± 5°) of the sensor this can be done by the transmitter automatically if the appropriate sensor orientation is selected. For other orientations (inclinations to vertical or horizontal orientation ≥ 5°) this can not be automatically corrected and has to be taken into account. For highest density accuracy it is recommended to avoid sensor orientations different to horizontal or vertical installation.

12.2.3 Instructions

Observe the following general installation instructions during installation:

- Install the flow meter avoiding shock and vibration as much as possible.
- Use closing valves and bypass line to facilitate zero point setting.

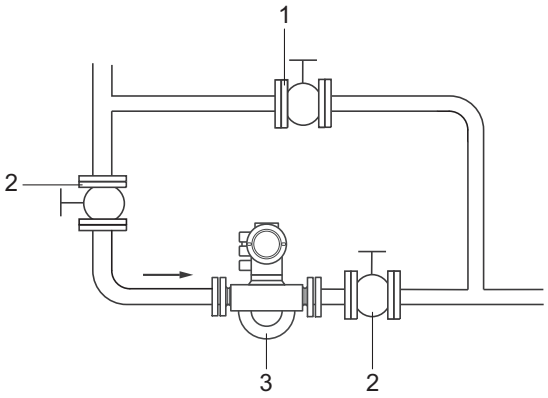


Fig. 62: Closing valves and bypass line

1 Bypass valve
2 Closing valve
3 Coriolis flow meter

- For application involving fluids, avoid installation at highest point of piping. Formation of gas bubbles and accumulation of gas in measuring tube may result in increased measurement uncertainties.
- In case of gas measurements, avoid installation directly in front of lowest point in piping. Accumulation of fluids, such as condensate, may result in lower accuracy.
- Do not install immediately in front of a free pipe outlet in a downpipe.

- Avoid letting the sensor run idle while taking the measurement, e.g. when installed in front of an air gap to containers in case of filling applications. Doing so may result in incorrect measurements. To avoid this, install a restriction in the open downpipe or use an orifice gauge with a diameter smaller than the nominal pipe width.
- Each device is tested for pressure prior to delivery.

12.2.4 Sanitary installation

EHEDG compliant installation

In order to comply with the requirements of the European Hygienic Engineering and Design Group (EHEDG), the following aspects need to be considered:

- The installation must ensure a self-draining of the device (see figure below). A vertical installation is recommended.
- An EHEDG compliant process connection requires a combination of process connections and gaskets according to the latest version of the EHEDG Position Paper: "Easy cleanable Pipe couplings and Process connections".

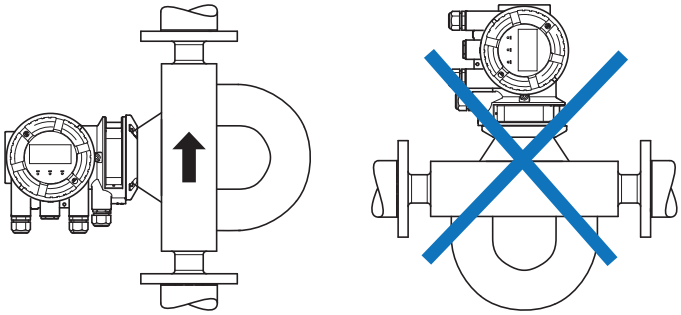


Fig. 63: EHEDG compliant installation position

3-A compliant installation

Remote transmitter installation

- For compliance with 3-A sanitary standards, remote transmitter is restricted to hanging installation, as shown in figure below.

NOTICE

Fixation of the transmitter

For fixation of the transmitter at the bracket either hexagon head srews (M6x10) or socket head screws with rubber cap must be used.

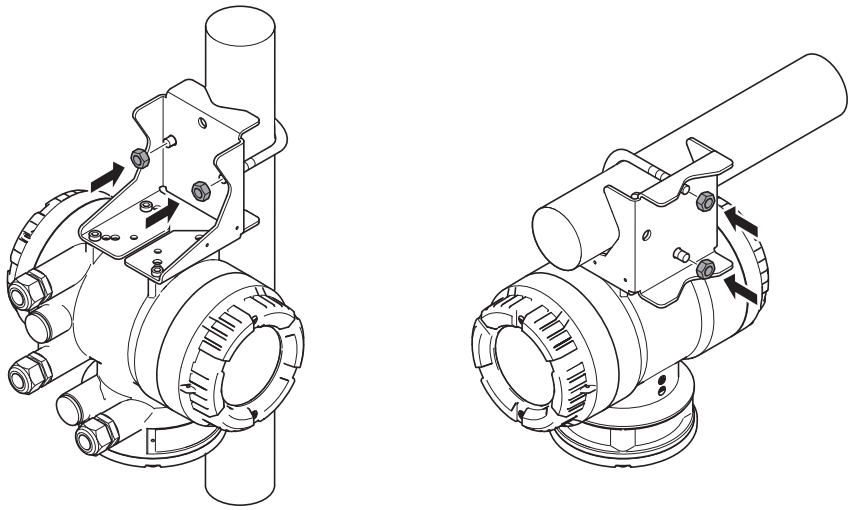


Fig. 64: Hanging installation for remote transmitter

Sensor installation (remote or compact version)

- For compliance with 3-A sanitary standards, a vertical installation of sensor with fluid flowing upwards (self-draining) is recommended, as shown in figure below.

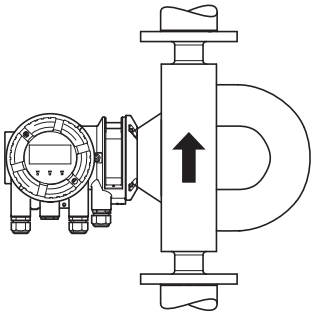


Fig. 65: Vertical (self-draining) installation

- A horizontal installation of sensor with tubes down, as shown in figure below, shall be drained via air purge.

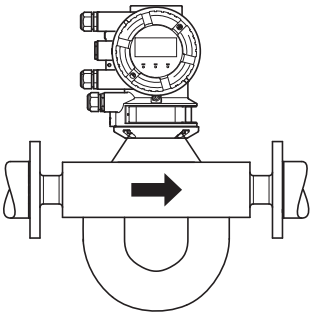


Fig. 66: Horizontal installation with tubes down

- For Cleaning-In-Place (CIP) application, the standard minimum flow velocity of 1.5 m/s shall be used for cleaning the sensor. Volumetric flow shall be determined by using the cross-sectional area at process connection.

Notes on fittings and gasket

- General note: It must be ensured that the inner diameter (ID) of adjacent pipe matches the ID of process connection of the sensor fitting to ensure 3-A compliance.
- For compliance of DIN 11851 process connection (process connection HS2) with 3-A standards, a special sanitary gasket such as the k-flex gasket system by Kieselmann GmbH, or similar must be used to retain 3-A compliance.

12.3 Unpacking

Note the following rules prior to installation:

- Check packaging and contents for damage.
- Do not remove protective materials such as protective stickers or caps on process connections until the start of the installation process.
- Dispose packaging materials in compliance with country-specific regulations.

12.4 Sensor installation

12.4.1 General installation rules

⚠ DANGER

Risk of injury due to escaping fluids, if pipe connection is faulty

- Correct slope and mismatch of pipe connections before inserting the sensor.

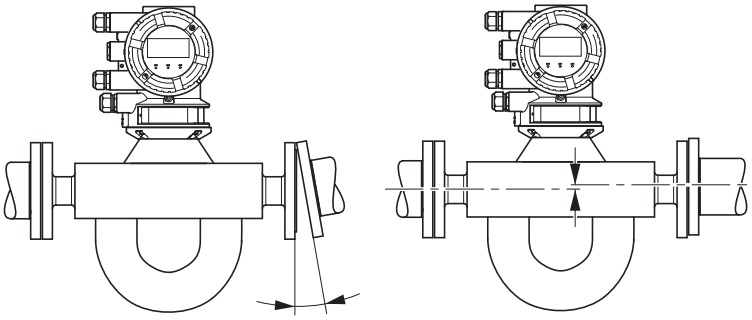


Fig. 67: Avoid: Slope and mismatch

- Avoid fixing anything directly to the sensor. Doing so may result in increased deviations.

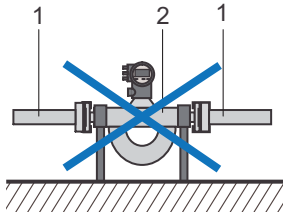


Fig. 68: Installation to be avoided: Fixing the sensor

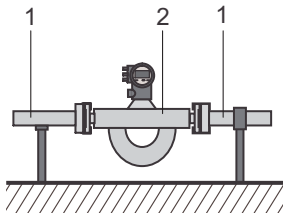


Fig. 69: Recommended installation: use the piping to support the sensor

1 Pipe
2 Sensor

- Secure pipes before installing the flow meter.
- Avoid damaging the process connections.
- Flush new pipes before installing the flow meter to remove foreign matter, such as shavings or other residues.

12.4.1.1 Avoiding creation of noise

Zero point stability is a prerequisite for exact mass flow measurement. Insufficient installation may lead to mechanical tensions or flow noise which impact zero point stability.

Countermeasures to help avoid noise creation:

- Support sensor weight by using soft coupling (silicone or other types of cushioning materials).
- Avoid bending or tensioning the sensor while aligning the pipe.
- Avoid reductions or expansions in pipe directly up- or downstream of flow meter.
- Avoid placing control valves, apertures or other devices generating noise near the sensor.

12.4.2 Installation in pipe

Depending on process connections, the sensor is connected to the pipe by means of flanges, terminals or thread. The order code provides information on the process connections selected.

⚠ DANGER

Risk of injury due to escaping fluids and damage, if fixing materials are inappropriate or not professionally installed

- Fixing materials (screws, nuts, terminals, terminal connectors, gaskets, etc.) are not included in the delivery and must be provided by the customer. The operator is responsible for selecting suitable gaskets and defining corresponding torque values.

- Protective materials such as protective stickers or caps on process connections must be removed immediately before installation.
- The direction in which the fluid flows through the pipe is indicated by an arrow on the flow meter. The sensor must be installed in accordance with the flow direction indicated to ensure optimal measuring results for density measurements.

  Otherwise, the parameter *flow direction* in the transmitter menu must be changed, see applicable Function Manual.

Clamp connection

The clamp connection must be installed as shown in the figure below.

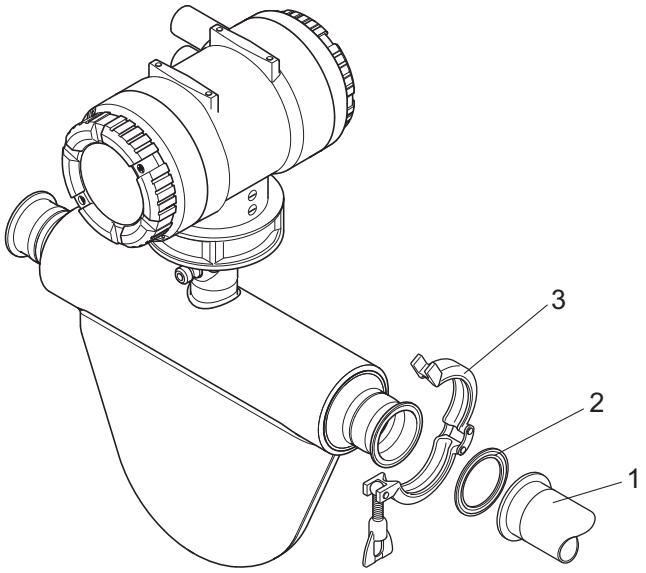


Fig. 70: Clamp connection

1 Terminal
2 Gasket
3 Terminal connector

Fixing the flange

- Use screws and nuts suitable for the flanges.
- In case the nominal width of the piping deviates from the flow meter, use the appropriate reductions.
- Inner gasket diameters should not fall below the inner diameters of the flange.

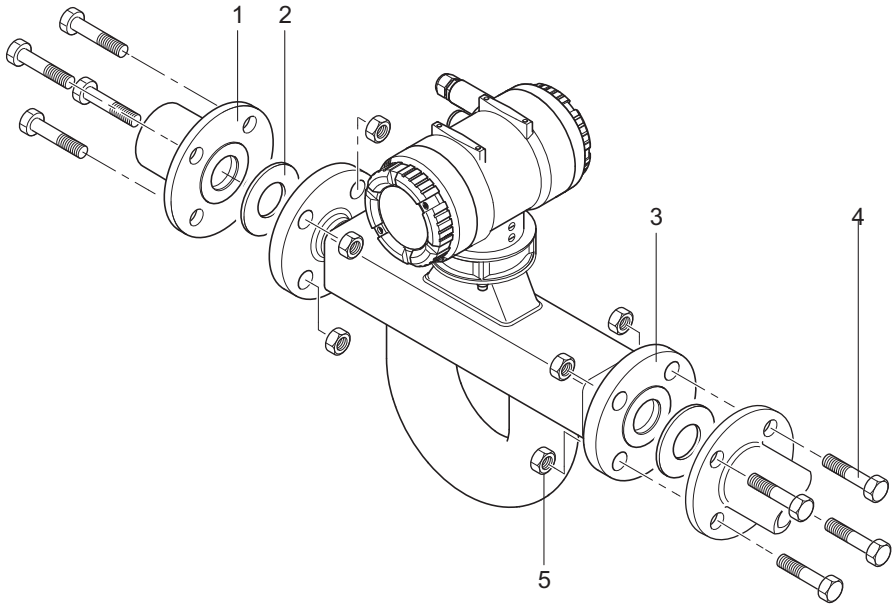


Fig. 71: Fixing the flange

1	Pipe flange
2	Gasket
3	Sensor flange
4	Bolt
5	Nut

Internal thread connection

For process connections with an internal thread, the connection must be installed in accordance with the following figure.

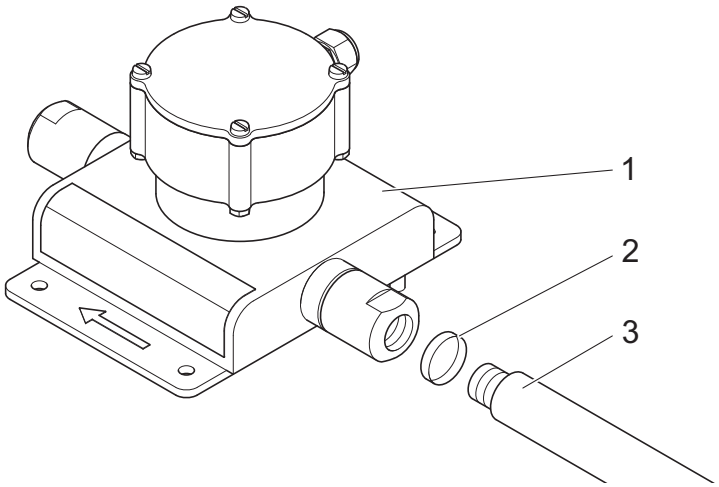


Fig. 72: Internal thread connection

1	Sensor
2	Gasket (not use in case of NPT)
3	Pipe

NOTICE

Use of seal tape for installation

In case of process connection with internal thread NPT you have to use a seal tape for installation.

12.4.3 Installation recommendation for viscosity function

In order to use this function an external differential pressure transmitter (separate order) measuring the pressure difference at the flow line is necessary. The accuracy of the estimated viscosity is strongly depending on the accuracy of the pressure transmitter and the correct position and implementation of the pressure taps.

NOTICE	The needed pressure taps have to be placed at the flow line at approximately 4D – 5D upstream and downstream of the SITRANS FC sensor. The differential pressure transmitter is directly connected via analog input to the SITRANS FC transmitter (analog input function must be available).

HART

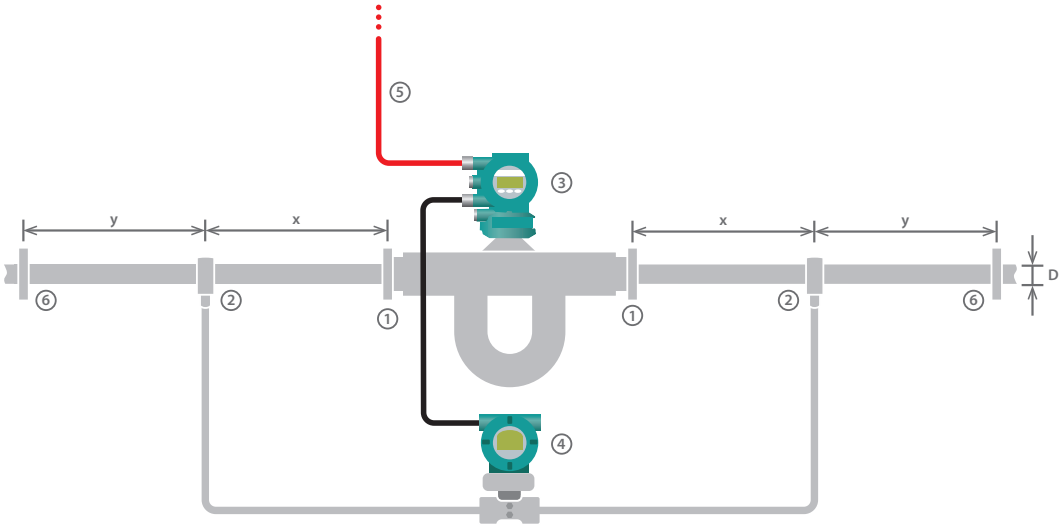


Fig. 73: Positioning of pressure taps / HART communication line

①	Mounting flanges	④	Differential pressure transmitter with HART
②	Pressure taps	⑤	HART communication
③	SITRANS FC with HART	⑥	Other flow elements

PROFIBUS PA

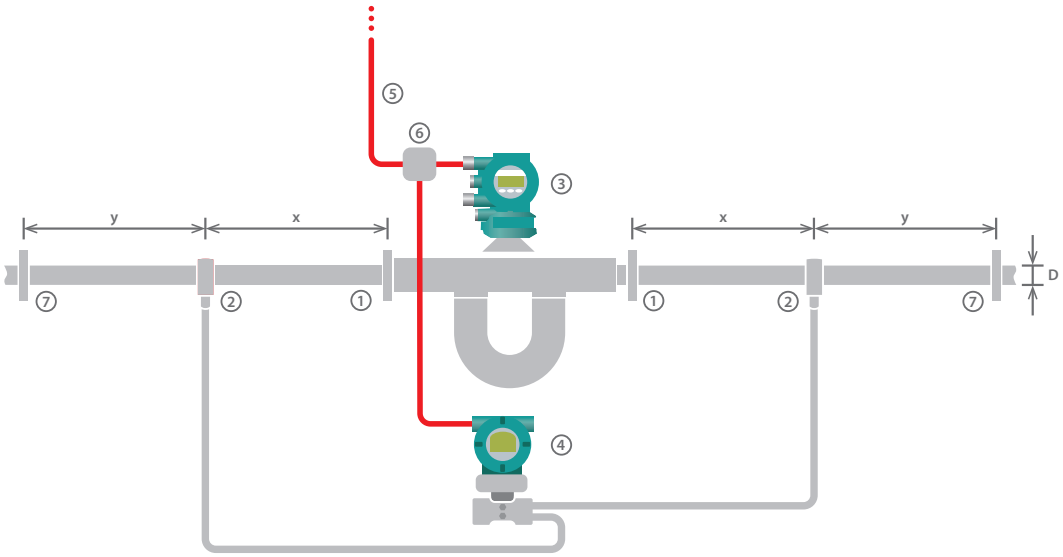


Fig. 74: Positioning of pressure taps / PROFIBUS PA communication line

①	Mounting flanges	⑤	PROFIBUS PA Communication line
②	Pressure taps	⑥	PROFIBUS PA Junction box
③	SITRANS FC PROFIBUS PA	⑦	Other flow elements
④	Differential pressure transmitter with PROFIBUS PA		

x, y = minimum 4 to 5 x D

x	Flow line upstream or downstream of the SITRANS FC sensor
y	Flow line upstream or downstream of the pressure transmitter
D	Inner diameter of process line

12.5 Insulation and heat tracing

12.5.1 Heat tracing

The majority of applications do not require or provide insulation or heat tracing for the sensor. Product versions with insulation and/or heat tracing are available for specific technical applications, see applicable Operating Instructions. Starting with fluid temperatures of approx. 80 °C above or below the ambient temperature, insulating the sensor is recommended if the goal is to maintain utmost accuracy. These measures are also sensible with increased requirements for fluid temperature stability.

The sensor is heated by means of heat tracing via a heat transfer fluid running through stainless steel pipes. The heat transfer fluid is supplied through process connections that can be selected. The operator is responsible for temperature control of the heat carrier. Here the specifications for pressure and the temperature of the heat transfer fluid must be met, see applicable Operating Instructions.

Heat tracing is only available for the remote type of flow meter and must be selected by including an appropriate device option when placing the order, see applicable Operating Instructions.

⚠ WARNING

Risk of overheating the transmitter due to increased ambient temperature

Failure of measuring electronics

- Observe the maximum allowable ambient temperature for the transmitter.
- Install the transmitter at a sufficient distance from heat sources.

12.5.2 Customer-supplied insulation

For insulation provided by the customer it is important to select a sensor with the appropriate design type (remote type, sensor with long neck). The space between upper insulation edge and lower edge of the sensor's terminal box must be at least 40 mm.

Recommended insulation thickness is 80 mm and recommended heat transfer coefficient 0.4 W/m² K.

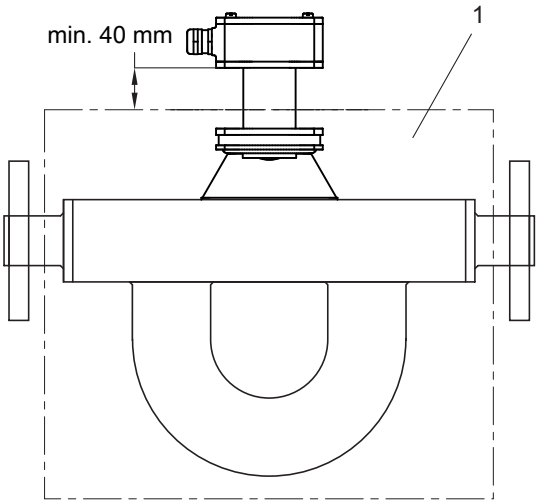


Fig. 75: Customer-supplied insulation

1 Insulation box

⚠ DANGER

When installing in hazardous areas, the applicable Explosion Proof Type Manual must be considered.

12.6 Transmitter installation

12.6.1 Rotating and replacing the display

The transmitter display can be oriented in line with the flow meter installation position.

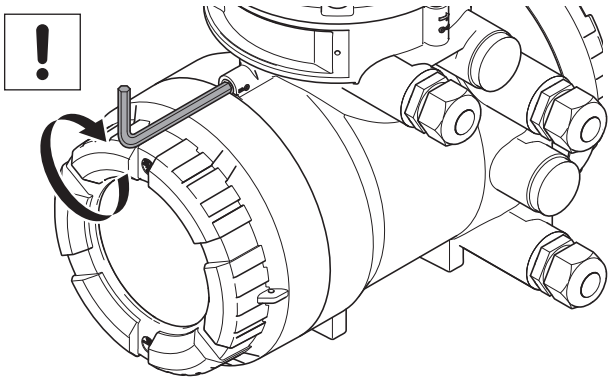
NOTICE

The following instruction must only be performed at the following ambient conditions:

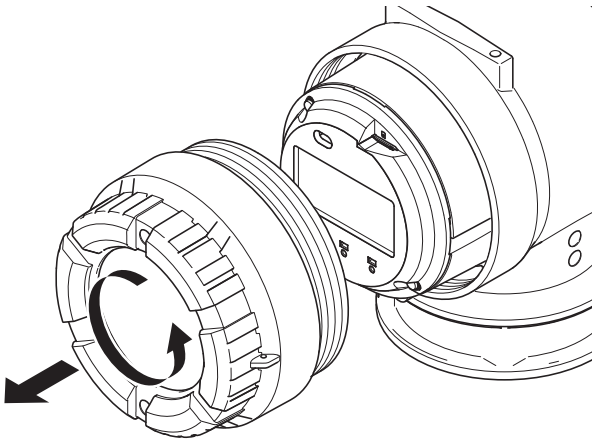
- at temperatures up to 31 °C: relative humidity maximum 80 %
- at temperatures between 31 °C and 40 °C: from 80 % linearly decreasing to 50 % of maximum relative humidity

1. Switch off power supply.

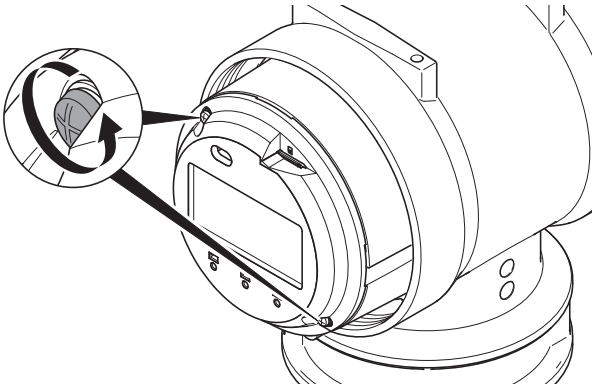
2. Using an Allen wrench (size: 3.0), turn the locking screw on display screw plug clockwise to remove.



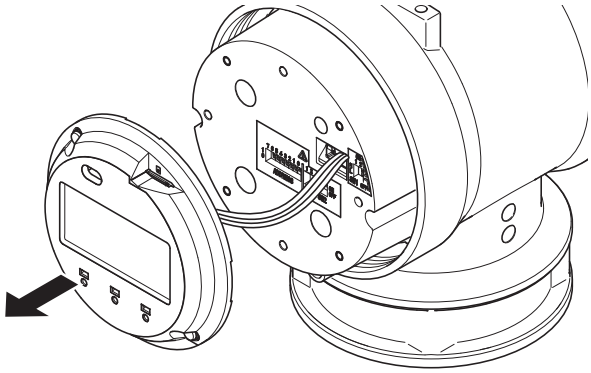
3. Unscrew display cover from transmitter housing.



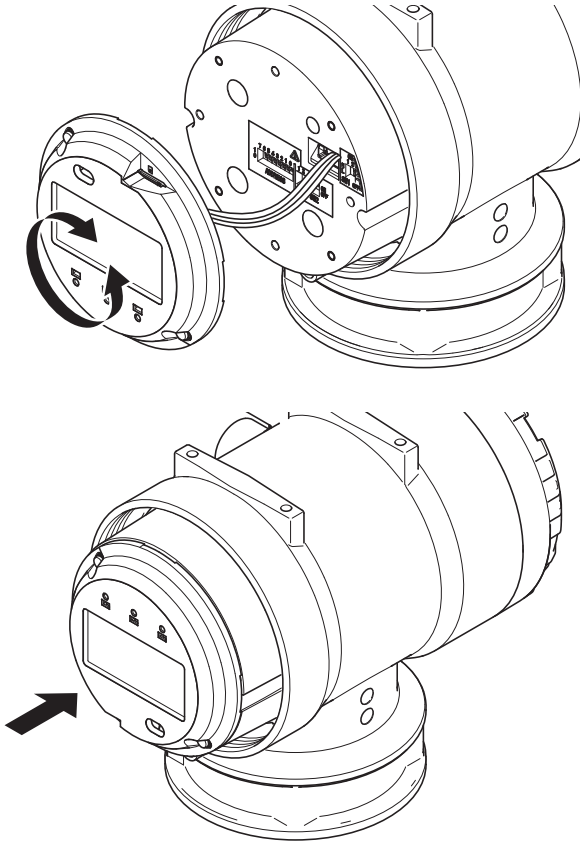
4. Remove the two screws from the display.



5. Remove the display from housing by pulling forward.

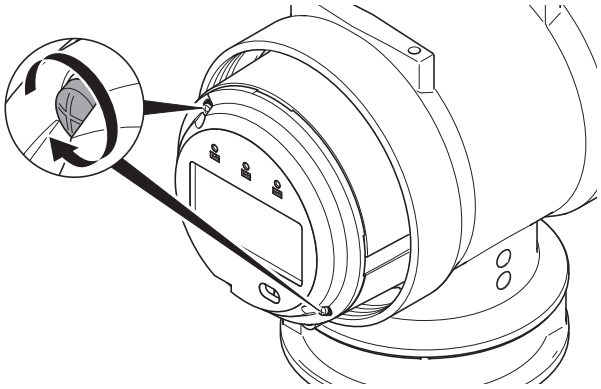


6. Rotate display and push back into housing in the orientation desired.

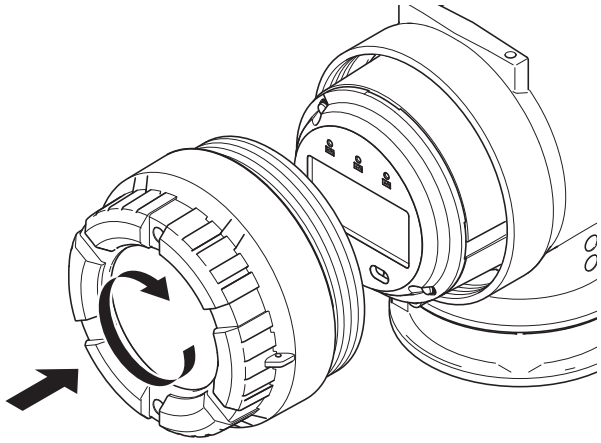


NOTICE The display can be removed and replaced by loosening the connector.

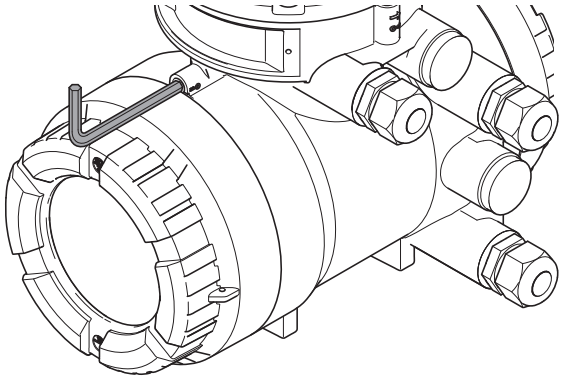
7. Tighten screws.



8. Screw display cover back onto transmitter housing.



9. Using an Allen wrench (size: 3.0), turn the locking screw on display screw plug counter-clockwise to tighten.



12.6.2 Rotating transmitter housing (compact type)

The transmitter housing can be installed in any one of four orientations.

⚠ WARNING

Short-circuit hazard caused by penetrating water

Failure of measuring electronics

- In order to prevent any water from penetrating the flow meter by way of the cable, install the transmitter in a way so that the cable gland is not pointed upward.

⚠ WARNING

Insufficient sensor grounding connection

Electric shock and ignition in hazardous areas

- Use a minimum torque of 4.3 Nm when tightening the screws.

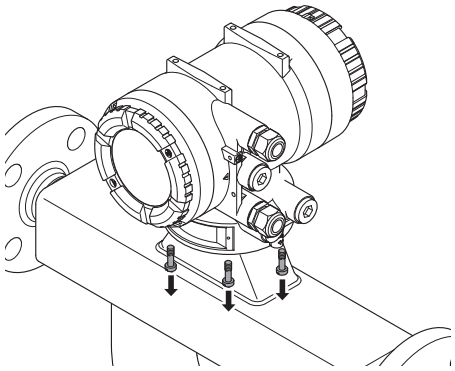
NOTICE

Damage to flow meter

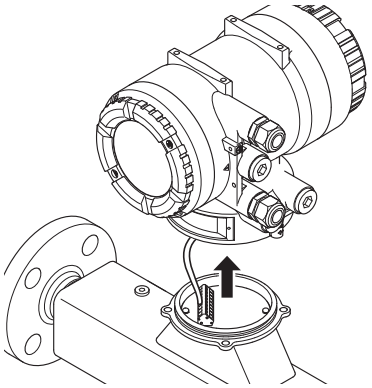
Rotating the transmitter housing several times in the same direction may damage the connection between sensor and transmitter.

- Do not turn transmitter housing more than 270° in the same direction.

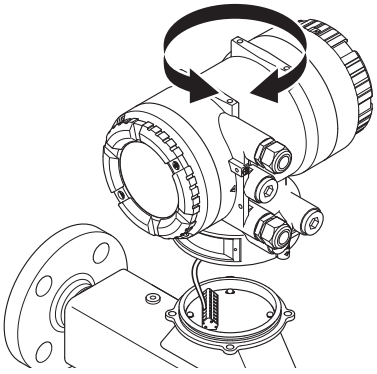
1. By using an Allen wrench, remove the four fixing screws.



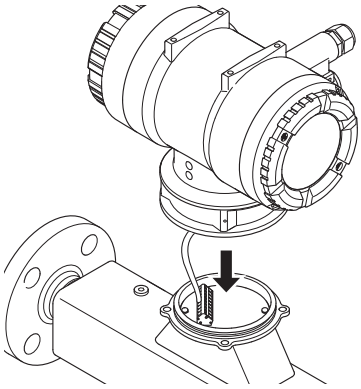
2. Lift transmitter housing.



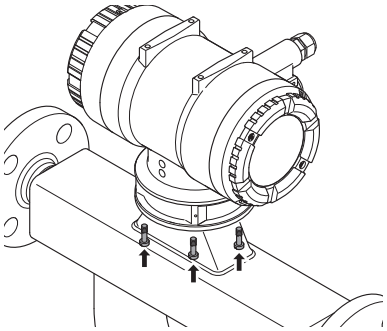
3. Rotate transmitter housing at angles of 90°, 180° or 270°.



4. Place transmitter housing.



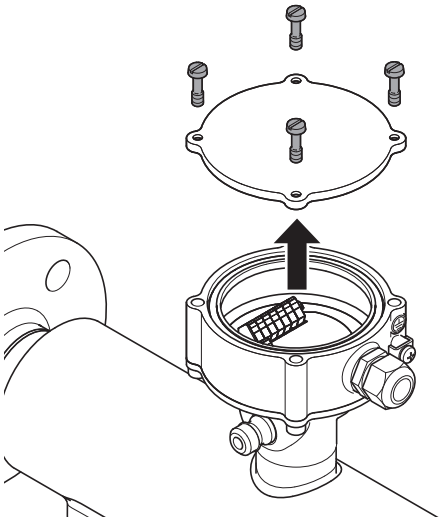
5. Tighten the four fixing screws.



12.6.3 Rotating the terminal box (remote type)

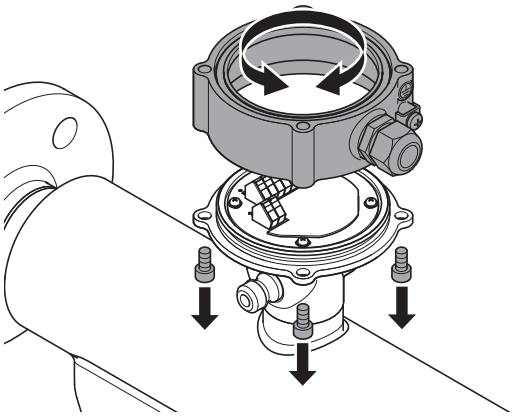
The terminal box can be installed in any one of four orientations.

1. Loosen the four fixing screws and remove the cover.

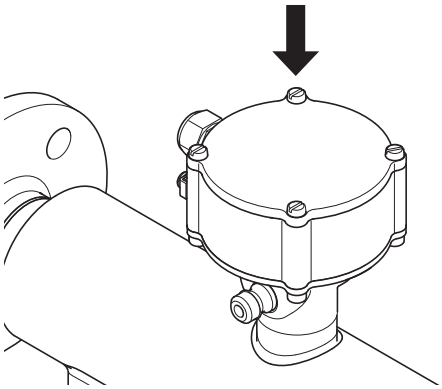


2. Remove the cables so that none of the cables inside can accidentally become trapped and damaged.

3. By using an Allen wrench, remove the bottom fixing screws and rotate the terminal box at an angle of 90°, 180° or 270°.



4. Place the terminal box and tighten the bottom fixing screws using a minimum torque of 7.4 Nm.
5. Attach the cover and tighten the fixing screws using a minimum torque of 7.4 Nm.



12.6.4 Installing transmitter on pipe (remote type)

⚠ WARNING

Risk of overheating the transmitter due to increased ambient temperature

Failure of measuring electronics

- Observe the maximum allowable ambient temperature for the transmitter.
- Install the transmitter at a sufficient distance from heat sources. Also note the temperature of the fixing pipe.

⚠ WARNING

Short-circuit hazard caused by penetrating water

Failure of measuring electronics

- In order to prevent any water from penetrating the flow meter by way of the cable, install the transmitter in a way so that the cable gland is not pointed upward.

⚠ CAUTION

Risk of injury and damage to the flow, meter if it is insufficiently attached to the pipe

- Observe the installation notes below.
- Tighten screws by using a minimum torque of 7.4 Nm.

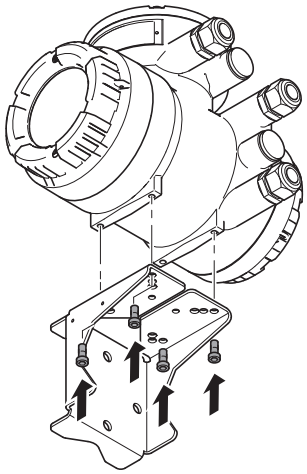
NOTICE

Installation at high vibration levels

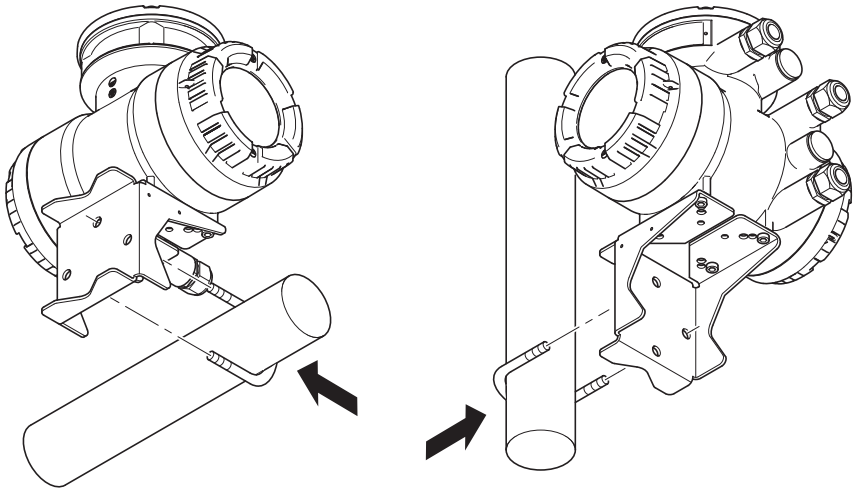
The mounting bracket for the pipe installation of the transmitter may not be suitable for installation environments with very high levels of vibration. In this case the user is advised to employ more rugged methods of fixation using the threaded bottom holes directly.

If it is a remote type transmitter, it can be mounted to a pipe size DN50 (2") using the angle bracket and retaining clip included in the delivery.

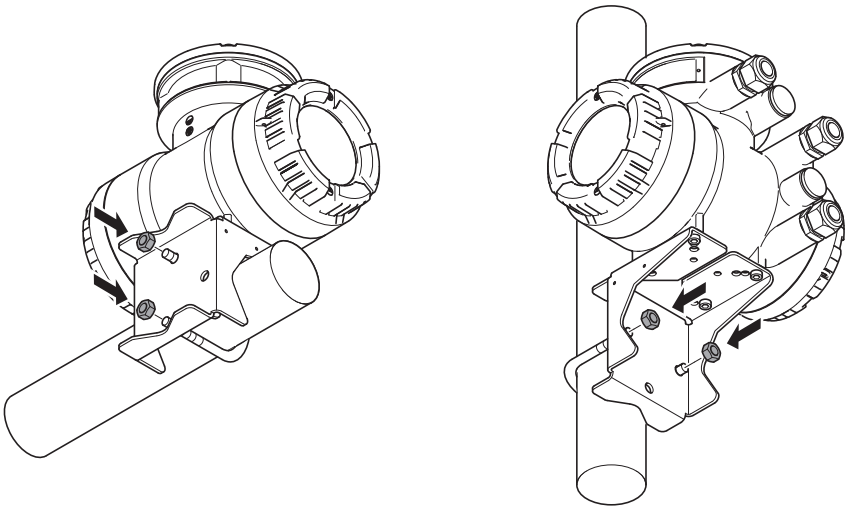
1. Screw angle bracket to bottom of transmitter.



2. Place retaining clip around pipe and slide through drill holes on angle bracket.



3. Fasten retaining clip to bracket using the nuts.



12.7 Installation check list

The following checks must be performed once the flow meter is installed in the pipe:

Check	Performed?
State and specification of device	
▪ Flow meter checked for external damage?	
▪ Does flow meter meet the specifications of the measuring point (process fluid temperature, process pressure, ambient temperature, measuring range, etc.)?	
Installation	
▪ Does flow direction on flow meter correspond to the actual flow direction in the pipe? ▪ If not, has the appropriate parameter in the transmitter menu been switched?	
▪ Do measuring point number and nameplate labeling match the installation site?	
▪ Do mounting position and installation match usage (measurement of gas, liquid) in the process environment and under process conditions?	
▪ Is meeting the permissible ambient temperature for the transmitter ensured?	
Process environment and conditions	
▪ Is the flow meter protected from environmental influences (precipitation, direct insolation)?	

13 Wiring

13.1 General wiring rules

Be sure to handle the transmitter cover carefully so that there are no damages and foreign matter adhesion at its thread and O-ring when it is opened or attached.

⚠ DANGER

Explosion hazard in hazardous areas from electrostatic discharge or brush discharge

Life-threatening injuries or ignition of explosive atmospheres.

- Avoid actions that could lead to electrostatic discharges. For example, do not wipe the coated surface of the transmitter using a piece of cloth.

⚠ DANGER

Improper wiring in hazardous areas

When connecting flow meters in hazardous areas, the applicable Explosion Proof Type Manual must be observed.

⚠ WARNING

Risk of injury due to electrical shock

- Only have skilled personnel to connect the flow meter.
- Do not perform wiring outdoors if it is raining.

⚠ WARNING

Risk of injury due to electrical shock, as well as sparking and damage to the flow meter, if an inappropriate connecting cable is used

- It is imperative that an original connecting cable and original glands from Siemens are used.
- Install cables tension-free.

⚠ WARNING

Risk of sparking and damage to the flow meter due to incorrect wiring

- Observe connection diagram for the connecting cable according to chapter *Connection terminals [▷ 121]*.

⚠ WARNING

Risk of injury due to electrical shock, as well as damage to the flow meter due to insufficient clamping of the connecting wires

- Completely open connection terminal by using the operating tool.
- Insert connecting wires with wire end ferrules into the corresponding connection terminal up to the stop.
- Close connection terminal.

⚠ CAUTION

Don't install the connecting cable at ambient temperatures below -10 °C.

NOTICE

Wiring work must only be performed at max. 80 % humidity and temperatures up to 31 °C, linearly decreasing to 50 % relative humidity at 40 °C.

NOTICE

Although Siemens considers the guidelines of EMC, please be aware that conducted and radiated electromagnetic emission may effect the EMC of adjacent areas.

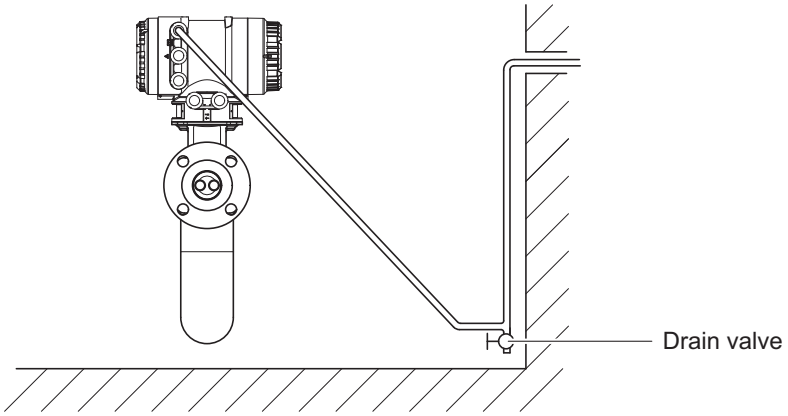
NOTICE

Be aware that improper earthing, false wiring and use of cable out of specification may lead to instrument damage and/or disturbance of other sensitive electrical equipment due to increased electromagnetic emissions/immunity.

NOTICE

Be aware that wrong input voltage may lead to disturbance of other sensitive electrical equipment due to increased electromagnetic emissions.

- The applicable national standards must be considered for installation.
- Only sensors and transmitters with compatible order codes may be interconnected. If these instructions are not observed, flawless function of the flow meter cannot be guaranteed.
- In case of cabling in pipes (Conduit), guide the pipe through the opening in the wiring and use watertight gaskets to avoid that water runs in. Install the installation pipe at an angle, as shown in the figure below. Install a drain valve in the bottom end of the vertical pipe and regularly open that valve.



- Unused cable entries must be closed using blind plugs.
- Install cables hanging down to prevent water from flowing along the cable into the flow meter.
- The electrical connection between potential equalization system and grounding connection must be safe, see *Grounding connections [▶ 119]*.
- Ensure that housing gaskets are positioned in the lining grooves and not damaged.

13.2 Grounding connections

⚠ WARNING

Risk of injury from electrical shock due to inadequate grounding

- Perform potential equalization at the grounding terminals provided for this purpose according to the figure “Grounding connections on transmitter and sensor”.

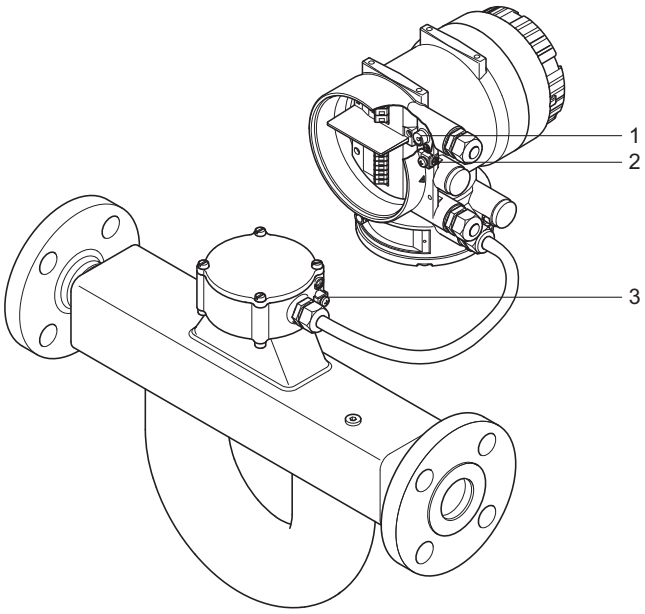


Fig. 76: Grounding connections on transmitter and sensor

1	Grounding screw in transmitter terminal box for grounding conductor
2	Grounding terminal on transmitter for potential equalization
3	Grounding terminal on sensor for potential equalization

13.3 Connecting cable installation

With remote type flow meters, sensors and transmitters are connected by means of connecting cables.

⚠ CAUTION

Risk of damage to the flow meter due to incorrect sealing

In case of metric cable entry ensure appropriate IP rating and suitability of O-ring of used accessory (e.g. cable glands).

In case of NPT cable entry ensure appropriate sealing measures (e.g. use of sealing tape).

In order to obtain optimum measuring results and ensure compliance with the specification, it is imperative that an original connecting cable and original glands from Siemens are used. In order to ensure the IP code, the cable must be professionally installed at the entries. If necessary, the cable may be shortened using the enclosed termination kit. Refer to the cable termination instructions enclose to each termination kit that is attached to each cable.

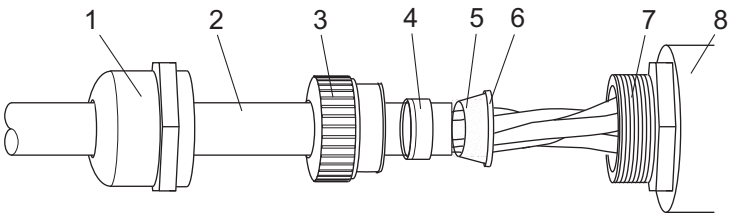


Fig. 77: Cable gland parts mounting

1	Cap nut	5	Outer cable shield
2	Connecting cable	6	Outer cone part
3	Plastic part	7	Mounting thread
4	Inner cone part	8	Housing cable entry

If the connecting cable, included in the delivery, is too short, additional lengths can be procured through the Siemens sales organization.

13.3.1 Connection terminals

The delivery includes an operating tool for connecting the connecting cable to the connection terminals.

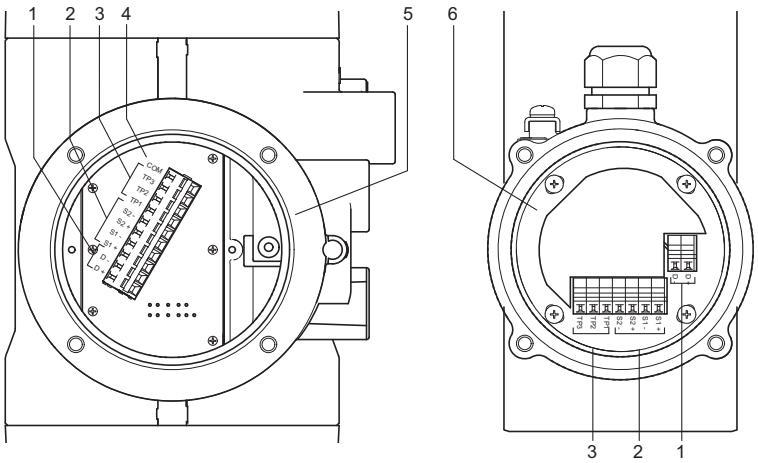


Fig. 78: Connection terminal circuits (transmitter on the left side, sensor on the right side)

1	Driver circuit (D+/D-)	4	Signal grounding
2	Sensor circuits (S1+/S1-, S2+/S2-)	5	Transmitter
3	Temperature measurement circuit (TP1, TP2, TP3)	6	Sensor

Installation of standard connecting cable option L5x/L6x

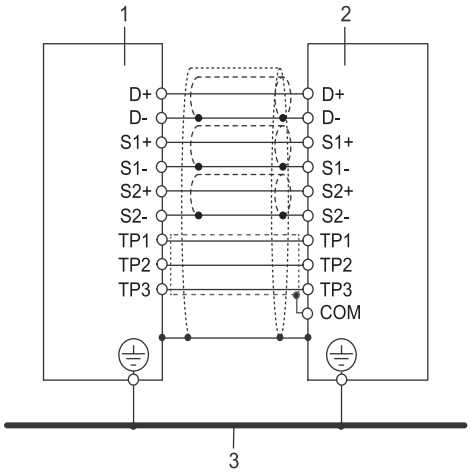


Fig. 79: Transmitter and sensor interconnection diagram

1	Sensor
2	Transmitter
3	Potential equalization system

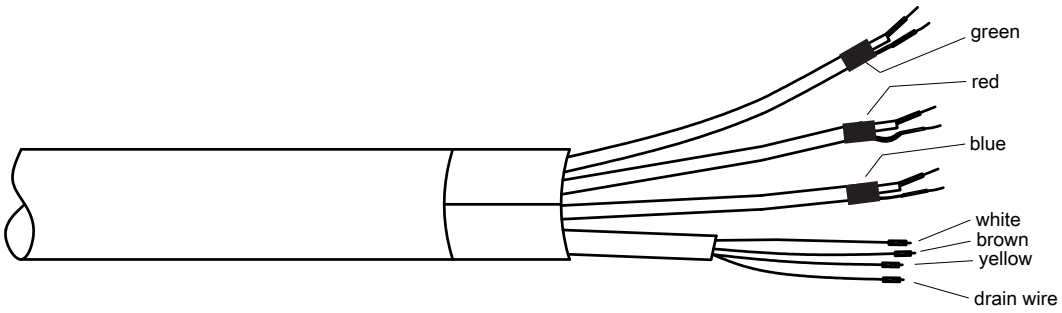


Fig. 80: Terminated standard connecting cable L5x/L6x, transmitter side

Connection scheme of standard connecting cable option L5x/L6x

Tab. 46: Version coaxial wire

Standard connecting cable option L5x/L6x			
Signal	**Coaxial wire**		
	Coaxial wire pair colour	**Wire type**	**Wire colour**
D+	green	Core wire	transparent
D-		Shield	black
S1+	red	Core wire	transparent
S1-		Shield	black
S2+	blue	Core wire	transparent
S2-		Shield	black

Tab. 47: Version single wire

Standard connecting cable option L5x/L6x		
Signal	**Single wire**	
	Wire type	**Wire colour**
TP1	Conductor	white
TP2		brown
TP3		yellow
COM[1)]	Drain wire[1)]	–

[1)] Present only at transmitter side

Installation of fire retardant connecting cable option L7x/L8x

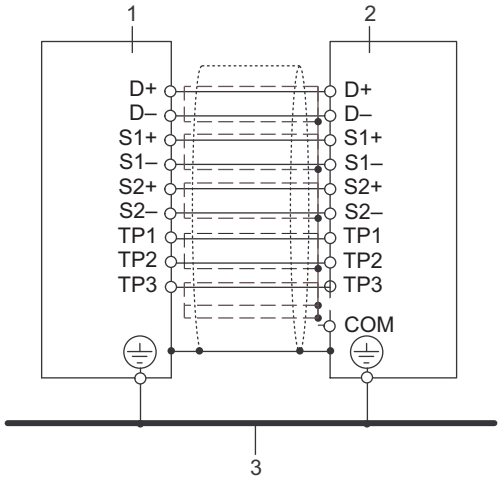


Fig. 81: Transmitter and sensor interconnection diagram

1 Sensor
2 Transmitter
3 Potential equalization system

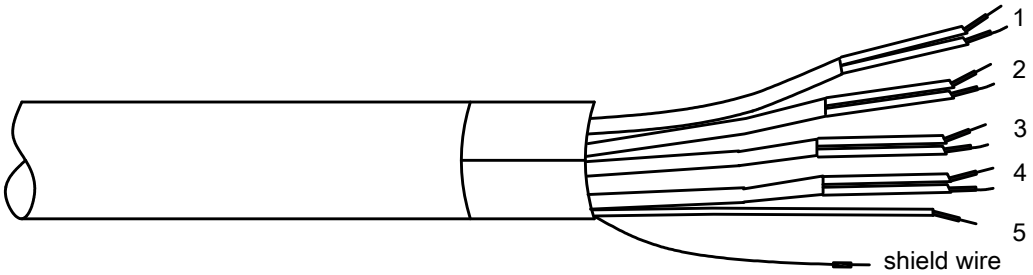


Fig. 82: Terminated fire retardant connecting cable L7x/L8x, transmitter side

Connection scheme of fire retardant connecting cable option L7x/L8x

Tab. 48: Version L7x/L8x

L7x/L8x cable		
Signal	**Conductor pair number[1)]**	**Conductor colour**
D+	1	white
D-		blue
S1+	2	white
S1-		blue
S2+	3	white
S2-		blue
TP1	4	white
TP2		blue
TP3	5	white
COM[2)]	Shield wire[2)]	–

[1)] Conductor pair number refers to the numbers printed on the single conductors

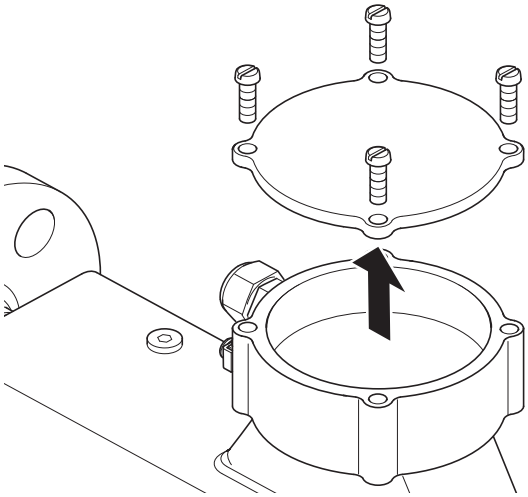
[2)] Present only at transmitter side

13.3.2 Connecting the connecting cable to sensor

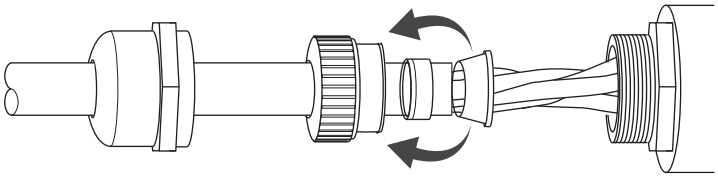
NOTICE Use the cable end without shield wire to connect to the sensor (observe labeling).

NOTICE If the cable is not terminated or was shortened, observe the separate instructions in the included terminating set.

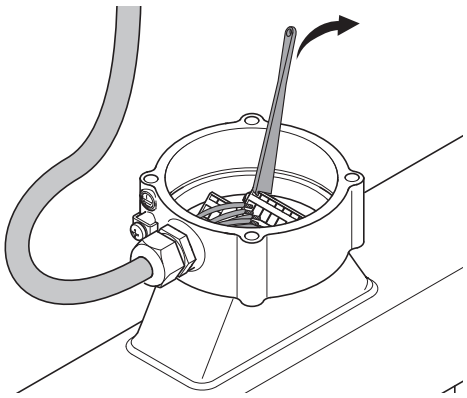
1. Loosen the four screws from the neck cover and remove cover.



2. Remove connector nut from cable gland and pull out clamped insert.
3. Push cable through connector nut and clamped insert.
4. Remove precut outer casing of cable.
5. Pull back outer shield of cable over clamped insert.



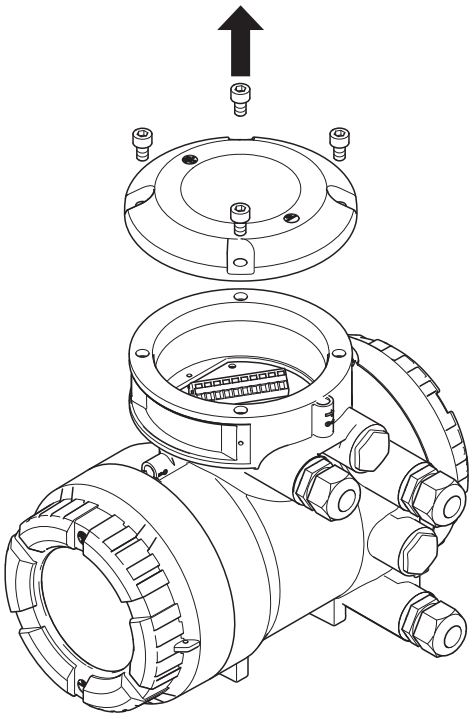
6. Feed cable through cable entry into sensor.
7. Use the operating tool to connect wires to connection terminals in accordance with terminal diagram, see *Connection terminals [▷ 121]*.



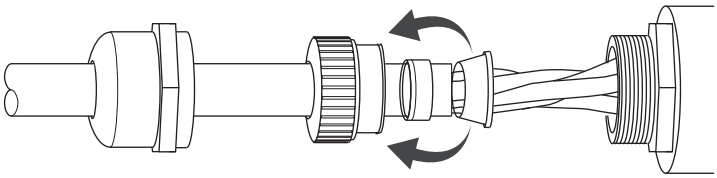
8. Assemble the cable gland and tighten connector nut.
9. Place cover onto sensor and fasten with four screws.

13.3.3 Connecting the connecting cable to transmitter

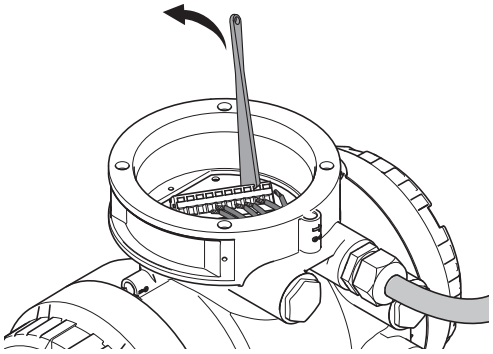
1. Loosen the four screws from the sensor connection cover and remove cover.



2. Remove connector nut from cable gland and pull out clamped insert.
3. Push cable through connector nut and clamped insert.
4. Remove precut outer casing of cable.
5. Pull back outer shield of cable over clamped insert.



6. Feed cable through cable entry into transmitter.
7. Use the operating tool to connect wires to connection terminals in accordance with terminal diagram, see *Connection terminals [▷ 121]*.



8. Assemble the cable gland and tighten connector nut.
9. Place sensor connection cover onto transmitter and fasten with four screws.

13.4 Transmitter

13.4.1 HART and Modbus communication

13.4.1.1 HART communication

HART interface

For devices with HART communication, the HART interface, along with the analog signal, is available at the output *Iout1*. A load resistance of 230 – 600 Ω at *Iout1* is recommended.

How to connect to the communication tools is described in the applicable Function Manual (FM) A5E52748515.

13.4.1.2 Modbus communication

Modbus interface

Modbus interface of SITRANS FC is implemented in accordance with "MODBUS over serial line specification and implementation guide V1.02", for details of instrumentation see website of the Modbus organization (http://www.modbus.org/).

Modbus connections

Tab. 49: Connection terminal assignment for Modbus

Terminal	Description
I/O3 -	Modbus C (Common)
I/O4 +	Modbus B (D1)
I/O4 -	Modbus A (D0)

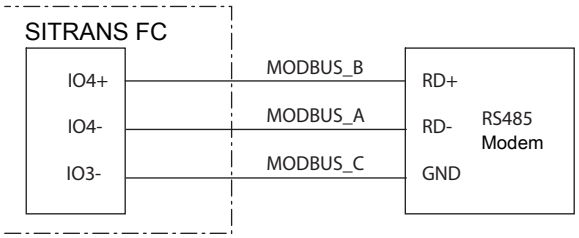


Fig. 83: MODBUS communication

Modbus cable

3-Wire cable (twisted pair (D0, D1) and Common) with shield should be used. Wire gauge should be AWG24 or wider.

SITRANS FC has a RS485 electrical interface, operating in slave mode and communicating with the following default specification:

Default Modbus setting

- Modbus baud rate: 19200 bps
- Modbus transfer mode: RTU
- Modbus parity: Even
- Modbus stop bit: 1 stop bit

For further details, see applicable Function Manual (FM) A5E52748619.

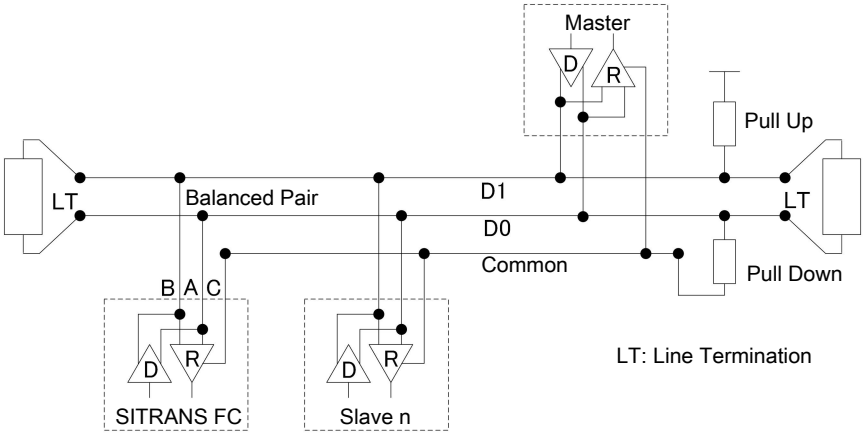


Fig. 84: Modbus connection

13.4.1.3 Output signals

Galvanic isolation

All circuits for inputs, outputs and power supply are galvanically isolated from each other.

Active current output *Iout*

One or two current outputs are available depending on order code position -Z.

Depending on the measured value, the active current output delivers 4 – 20 mA.

It may be used for output of the following measured values:

- Flow rate (mass, volume, net partial component flow of a mixture)
- Density
- Temperature
- Pressure
- Concentration

For HART communication devices, it is supplied on the current output *Iout1*. The current output may be operated in compliance with the NAMUR NE43 standard.

	Value
Nominal output current	4 – 20 mA
Maximum output current range	2.4 – 21.6 mA
Load resistance	≤ 750 Ω
Load resistance for secure HART communication	230 – 600 Ω

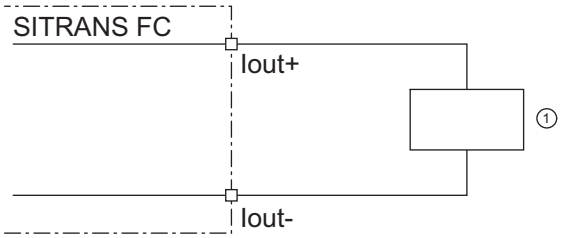


Fig. 85: Active current output connection *Iout* HART

① Receiver

Passive current output *Iout*

	Value
Nominal output current	4 – 20 mA
Maximum output current range	2.4 – 21.6 mA
External power supply	10.5 – 32 V_{DC}
Load resistance for secure HART communication	230 – 600 Ω
Load resistance at current output	≤ 911 Ω

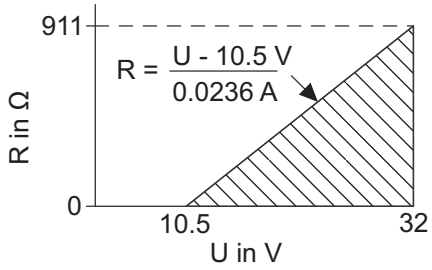


Fig. 86: Maximum load resistance as a function of an external power supply voltage

R	Load resistance
U	External power supply voltage

The diagram shows the maximum load resistance R as a function of voltage U of the connected voltage source. Higher load resistances are allowed with higher power supply values. The usable zone for passive power output operation is indicated by the hatched area.

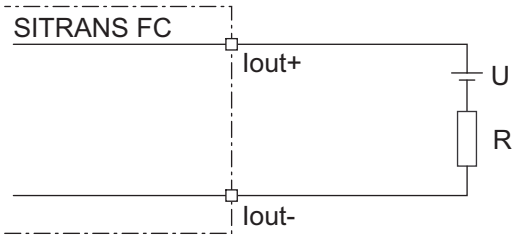


Fig. 87: Passive current output connection *Iout*

Active pulse output *P/Sout*

Connection of an electronic counter

Maximum voltage and correct polarity must be observed for wiring.

Terms	Value
Load resistance	> 1 kΩ
Internal power supply	24 V_{DC} ±20 %
Maximum pulse rate	10000 pulses/s
Frequency range	0 – 12.5 kHz

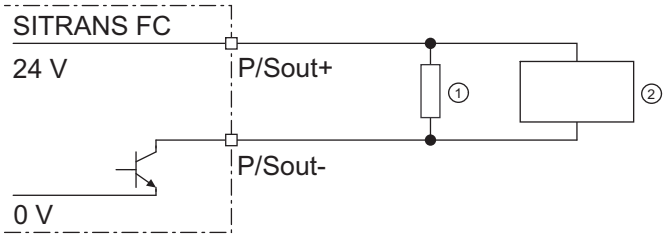


Fig. 88: Active pulse output connection *P/Sout*

① Load resistance
② Electronic counter

Connection of an electromechanical counter

Terms	Value
Maximum current	150 mA
Average current	≤ 30 mA
Internal power supply	24 V_{DC} ±20 %
Maximum pulse rate	2 pulses/s
Pulse width	20, 33, 50, 100 ms

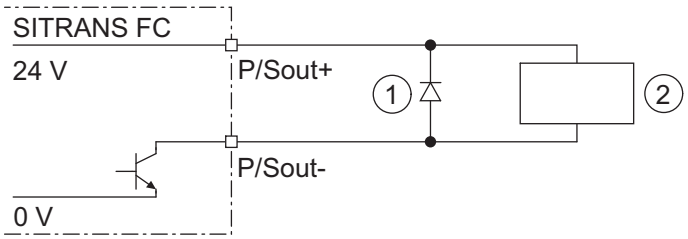


Fig. 89: Active pulse output *P/Sout* connection with electromechanical counter

① Protective diode
② Electromechanical counter

Active pulse output *P/Sout* with internal pull-up resistor

	Value
Internal power supply	24 V_{DC} ±20 %
Internal pull-up resistor	2.2 kΩ
Maximum pulse rate	10000 pulses/s
Frequency range	0 – 12.5 kHz

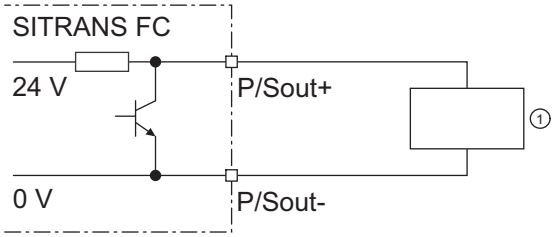


Fig. 90: Active pulse output *P/Sout* with internal pull-up resistor

① Electronic counter

Maximum voltage and correct polarity must be observed for wiring.

	Value
Power supply	9 to 32 V_{DC}
Current draw	15 mA (maximum)

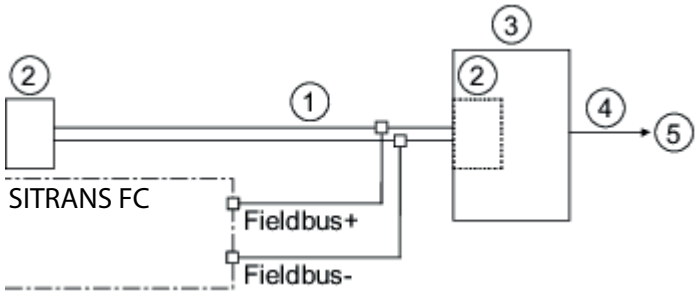


Fig. 91: PROFIBUS PA connection

① PROFIBUS PA
② Termination
③ DP/PA-Coupler
④ PROFIBUS DP
⑤ Host

Passive pulse output (only for calibration)

	Value
Maximum load current	≤ 200 mA
Power supply	≤ 30 V_{DC}
Maximum pulse rate	10000 pulses/s
Frequency range	0 – 12.5 kHz

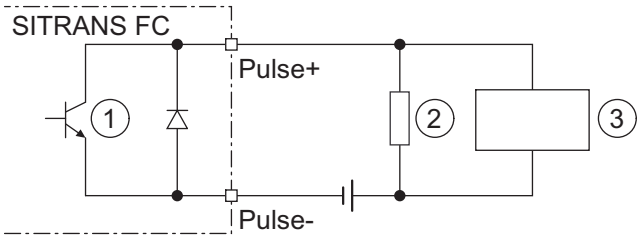


Fig. 92: Passive pulse output connection with electronic counter

① Passive pulse
② Load resistance
③ Electronic counter

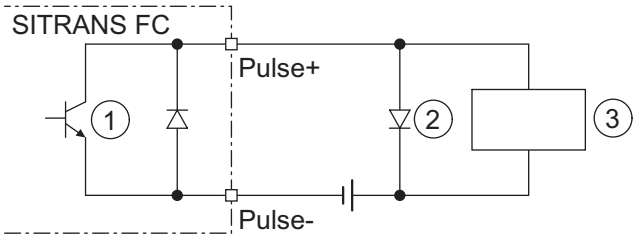


Fig. 93: Passive pulse output connection with electromechanical counter

① Passive pulse
② Protective diode
③ Electromechanical counter

Active status output *P/Sout*

Since this is a transistor contact, maximum allowed current as well as polarity and level of output voltage must be observed during wiring.

	Value
Load resistance	> 1 kΩ
Internal power supply	24 V_{DC} ±20 %

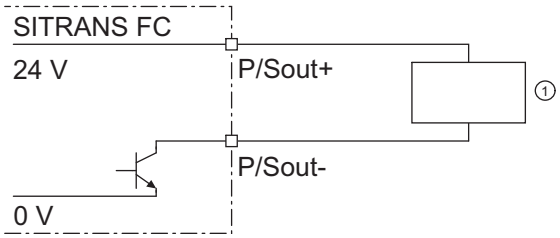


Fig. 94: Active status output connection *P/Sout*

① External device with load resistance

Active status output *P/Sout* with internal pull-up resistor

	Value
Internal pull-up resistor	2.2 kΩ
Internal power supply	24 V_{DC} ±20 %

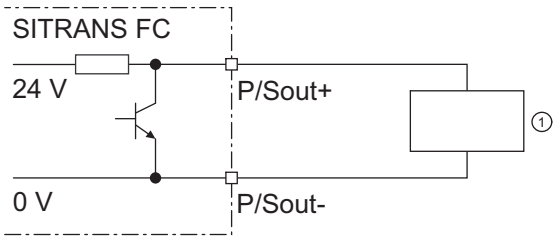


Fig. 95: Active status output *P/Sout* with internal pull-up resistor

① External device

Passive status output *P/Sout* or *Sout*

	Value
Output current	≤ 200 mA
Power supply	≤ 30 V_{DC}

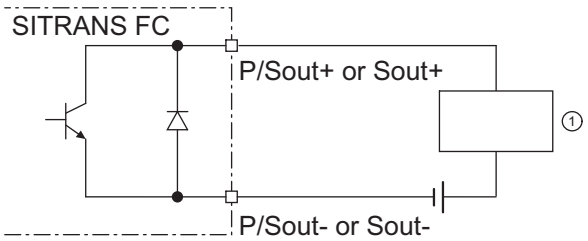


Fig. 96: Passive status output connection *P/Sout* or *Sout*

① External device

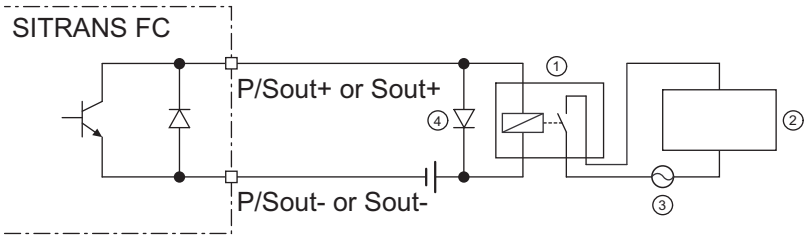


Fig. 97: Passive status output connection *P/Sout* or *Sout* for solenoid valve circuit

① Relay
② Solenoid valve
③ Magnetic valve power supply
④ Protective diode

A relay must be connected in series to switch alternating voltage.

Passive pulse or status output *P/Sout* (NAMUR)

Output signals according to EN 60947-5-6 (previously NAMUR, worksheet NA001):

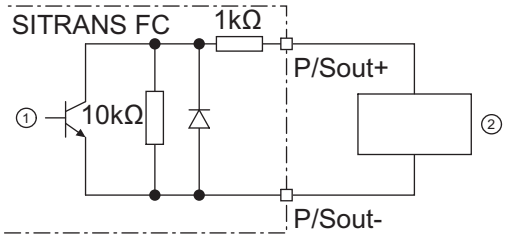


Fig. 98: Passive pulse or status output with switching amplifier connected in series

① Passive pulse or status output
② Switching amplifier

13.4.1.4 Input signals

Active current input *lin*

An individual analog power input is available for external analog devices.

The active current input *lin* is provided for connecting a two-wire transmitter with an output signal of 4 – 20 mA.

	Value
Nominal input current range	4 – 20 mA
Maximum input current range	2.4 – 21.6 mA
Internal power supply	24 V_{DC} ±20 %
Internal load resistance SITRANS FC	≤ 160 Ω

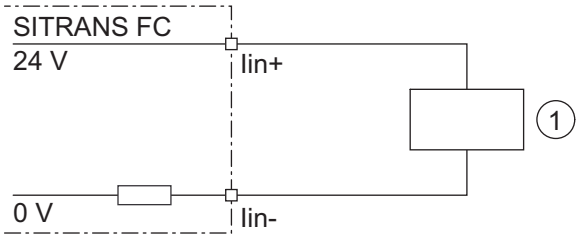


Fig. 99: Connection of external device with passive current output

① External passive current output device

Passive current input *lin*

The passive current input *lin* is provided for connecting a four-wire transmitter with an output signal of 4 – 20 mA.

	Value
Nominal input current range	4 – 20 mA
Maximum input current range	2.4 – 21.6 mA
Internal load resistance SITRANS FC	≤ 160 Ω

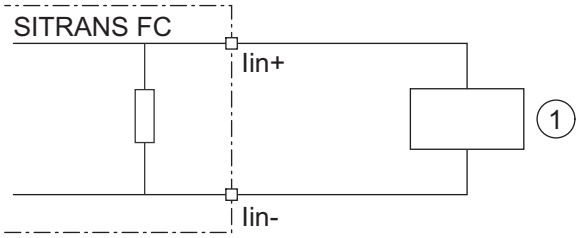


Fig. 100: Connection of external device with active current output

① External active current output device

Status input *Sin*

Do not connect a signal source with electric voltage.

The status input is provided for use of voltage-free contacts with the following specification:

Switching status	Resistance
Closed	< 200 Ω
Open	> 100 kΩ

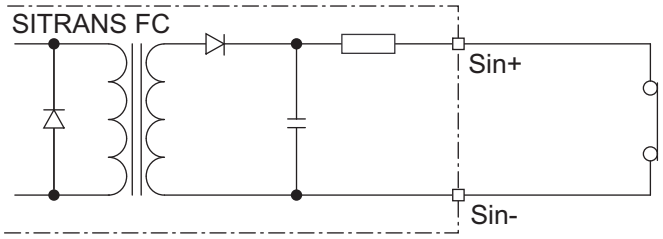
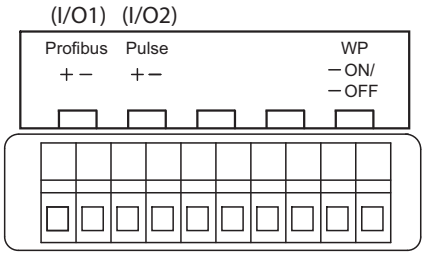


Fig. 101: Status input connection

13.4.2 PROFIBUS PA connection terminals

For the PROFIBUS PA version there is only one configuration of the connection terminal. Following is the configuration of the connection terminal (value E10+F41 and E10+F42 on order code position -Z, see Inputs and Outputs in chapter Setting methods for details):

PROFIBUS PA

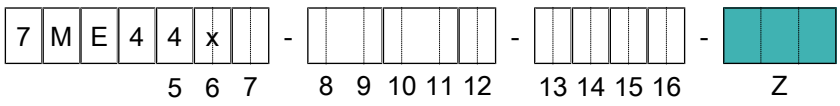


I/O1:	Profibus	PROFIBUS PA communication
I/O2:	Pulse	Pulse / Frequency output
WP:		Write-protect bridge

13.4.3 Assignment of PROFIBUS PA

The table below shows possible connection terminal assignments for I/O outputs depending on order code Position -Z.

The following figure shows the relevant position of the order code:



Tab. 50: Connection terminal assignment for PROFIBUS PA

Order code position -Z	Connection terminal assignment				
	I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-	WP
E10+F41	PROFIBUS PA	Pulse Passive	–	–	Write-protect
E10+F42	PROFIBUS PA (IS)	Pulse Passive (IS)	–	–	Write-protect

PROFIBUS PA:	PA communication
Pulse Passive:	Pulse / Frequency output (only for calibration)

Intrinsically safe (IS) outputs are only available in combination with selecting Ex approval of the device, see Operating Instructions A5E52595189, chapter Ex approval.

13.4.4 PROFIBUS PA communication

PROFIBUS PA interface

PROFIBUS PA interface of SITRANS FC is based on PROFIBUS PA protocol (Profile Revision R3.02 Compliant) and standard IEC61158, for details of instrumentation see website of the PROFIBUS/PROFINET organization (https://www.profibus.com/).

13.4.4.1 Output signals PROFIBUS PA

Digital communication signal based on PROFIBUS PA protocol.

PROFIBUS PA output signals

Maximum voltage and correct polarity must be observed for wiring.

	Value
Power supply	9 – 32 V_{DC}
Current draw	15 mA (maximum)

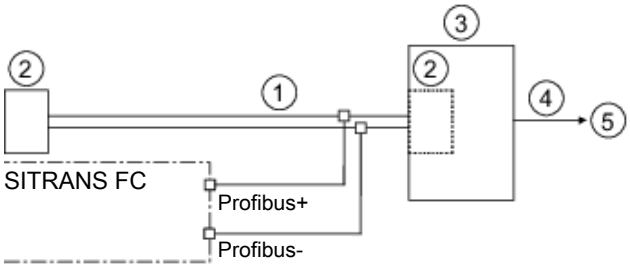


Fig. 102: PROFIBUS PA connection

① PROFIBUS PA
② Terminator
③ DP/PA-Coupler
④ PROFIBUS DP
⑤ Host

PROFIBUS PA cable

Tab. 51: PROFIBUS PA cable and transmissible length

Type of cable	**Cable specifications**	**Max. length of cable** (reference value)
Type A: Individually-shielded twisted pair cable	#18AWG (0.82 mm²)	1,900 m

Default PROFIBUS PA setting

For further details, see applicable Function Manual (FM) A5E52748624.

Passive pulse output (only for calibration)

	Value
Maximum load current	≤ 200 mA
Power supply	≤ 30 V_{DC}
Maximum pulse rate	10000 pulses/s
Frequency range	0 – 12.5 kHz

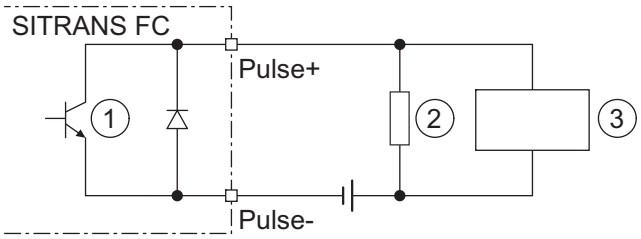


Fig. 103: Passive pulse output connection with electronic counter

① Passive pulse
② Load resistance
③ Electronic counter

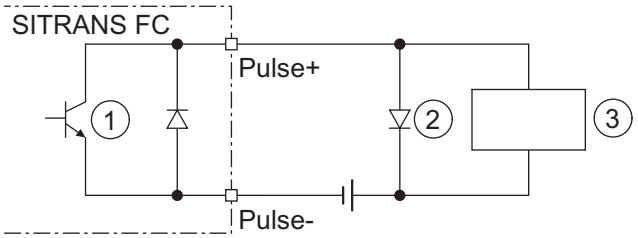


Fig. 104: Passive pulse output connection with electromechanical counter

① Passive pulse
② Protective diode
③ Electromechanical counter

13.4.5 Power supply

Power supply

Alternating-current voltage (rms):

- Power supply[1)]: 24 V_{AC} +20 % -15 % or 100 – 240 V_{AC} +10 % -20 %
- Power frequency: 47 – 63 Hz

Direct-current voltage:

- Power supply[1)]: 24 V_{DC} +20 % -15 % or 100 – 120 V_{DC} +8,3 % -10 %

[1)] for option S2x (DNV GL approval) supply voltage is limited to 24 V; in addition NE21 testing indicates a tolerable area of 24 V_{DC} ±20 % under NE21 test conditions.

Power consumption

P ≤ 10 W (including sensor)

Power supply failure

In the event of a power failure, the flow meter data are backed up on a non-volatile internal memory. In case of devices with display, the characteristic sensor values, such as no-
minal diameter, serial number, calibration constants, zero point, etc. and the error history are also stored on a microSD card.

13.4.6 Connecting power supply and external devices

⚠ WARNING

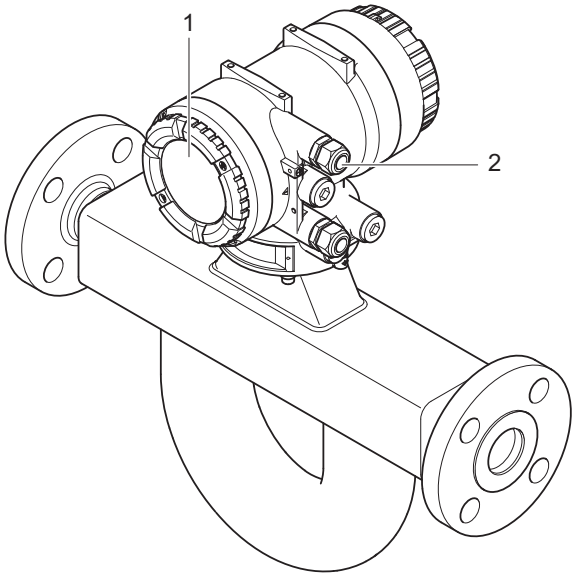
Risk of sparking and damage to the flow meter due to incorrect sealing

- ▸ In case of metric cable entry ensure appropriate IP rating and suitability of O-ring of used accessory (e.g. cable glands).
- ▸ In case of NPT cable entry ensure appropriate sealing measures (e.g. use of sealing tape).

NOTICE

Risk of damage to the flow meter due to incorrect power supply

- The specified power supply must be observed (see Operating Instructions).
- The power-supply cable must be designed for the power supply used with a minimum diameter of 0.5 mm.



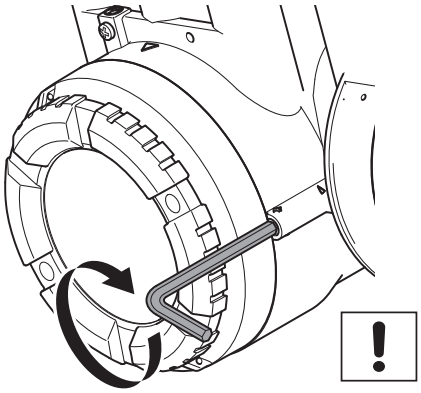
1 Transmitter back cover
2 Power supply cable gland

⚠ WARNING

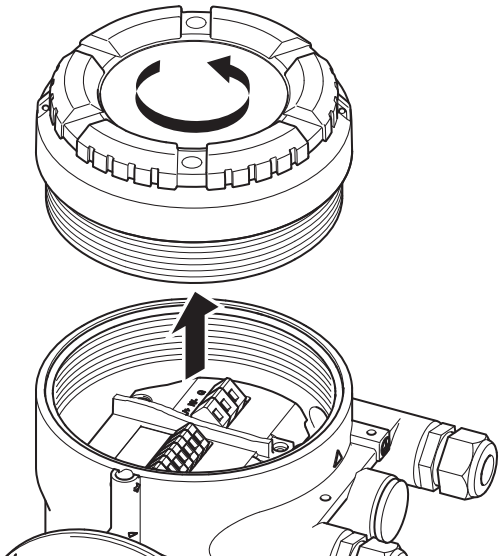
Risk of injury due to electrical shock

- The transmitter must be assigned an external, fixed-mount power switch or automatic circuit breaker in order to disconnect the transmitter from the power grid (compliant with IEC60947-1 and IEC60947-3). Power switch or automatic circuit breaker must disconnect all lines under current, but cannot disconnect the grounding conductor under any circumstances.
- The power switch of automatic circuit breaker must be installed near the transmitter and easily accessible. The "OFF" switch position must be clearly recognizable.

1. Switch off power supply.
2. Using an Allen wrench (Size: 3.0), tighten the locking screw on the back cover in clockwise direction.

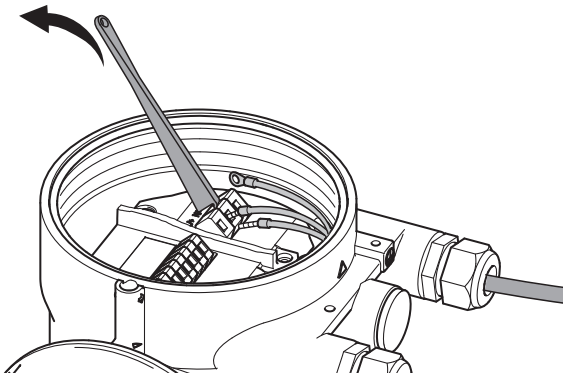


3. Unscrew back cover from transmitter housing in counter-clockwise direction.



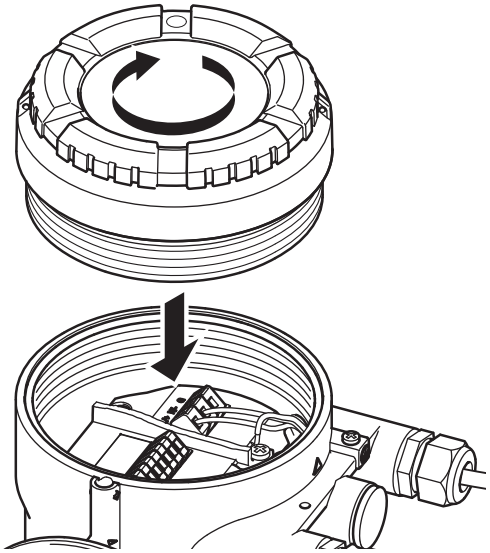
4. Attach cable glands.
5. Connect wires to connection terminals.

NOTICE	Connect the grounding conductor to the grounding screw (see chapter Connection terminals, figure 30, point 2).

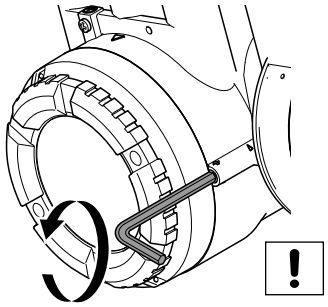


6. Fit grounding conductor with a terminal lug and affix to grounding conductor.
7. Screw cable gland on tightly.

8. Screw back cover onto transmitter housing in clockwise direction.



9. Using an Allen wrench (Size: 3.0), loosen the locking screw in counter-clockwise direction.



13.5 Wiring check list

The following checks must be performed once the flow meter is connected electrically:

⚠ WARNING

Risk of injury from electrical shock due to insufficiently closed housing

- Before switching on the power supply, check that the housing covers of the transmitter have been properly installed.

⚠ WARNING

Risk of sparking and damage to the flow meter due to missing locking screw

- After wiring work, check that the housing cover has been installed and the locking screws have been tightened.

NOTICE

Risk of damage to the flow meter due to insufficiently secured cable inlets

- Install cables tension-free.
- Fit any unused cable entries with blind plugs.
- Completely install cable glands and screw together tightly.

NOTICE

Be aware that improper treatment of cable entry and/or cable terminal may lead to disturbance of other sensitive electrical equipment due to increased electromagnetic emissions.

Check	Performed?
Are cables intact?	
Are power-supply and signal cables connected correctly?	
Do the cables have a lower point where liquid can drip immediately before they enter the cable glands?	
Are the cables installed tension-free?	
Is the power supply within the range specified on the nameplate?	
Are any unused cable entries fitted with blind plug?	
Are cable glands installed completely, tightly secured and watertight?	
Are housing covers installed and locking screws tightened?	

14 Commissioning

1. Activate external power switch.
2. Perform check of piping installation.
3. Check flow meter for device errors, warnings or alarms, see chapter on *Troubleshooting [▷ 156]*.
4. Configure the transmitter, and perform autozero, see chapter on *Default settings [▷ 146]*.

⇨ Flow meter is ready for operation.

15 System configuration and operation

15.1 Operating options

The SITRANS FC can be operated in different ways:

- IR (Infra-Red) switches on the display
- Digital communication (e.g. HART or Modbus)

The section below describes how to operate the system using the IR switches on the display.

The display is a device option and therefore not always available.

For more information on how to operate the transmitter and its functions, and on digital communication, see applicable Function Manual.

NOTICE

Be aware that all covers are closed before operating in order to prevent disturbance of other sensitive electrical equipment due to increased electromagnetic emissions.

15.2 Display

All of the functions described here are also available via digital communication. Numerical values that are entered via the display are limited to 6 digits.

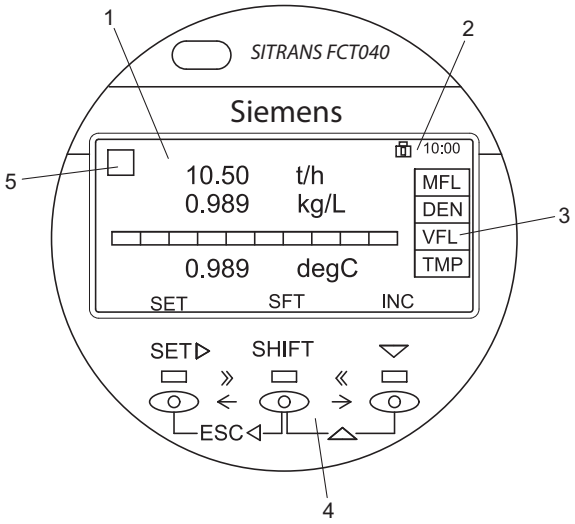


Fig. 105: Display layout

1	Measured quantities and units	4	IR switches
2	Status icon and time	5	Alarm symbol
3	Measured quantity abbreviation		

The controls on the display are IR switches. They respond as soon as an object, such as a finger, is in close proximity. It is not necessary to apply pressure to the display surface.

NOTICE

Impairment of the display

If the device is operated for a longer period and is subjected to high temperatures or high humidity in the process, the display may be impaired.

- Replace display unit as described in *Rotating and replacing the display [109]*

Observe the following instructions to ensure that the IR switches are functional:

- Keep the display glass clean.
- Avoid exposure to direct sunlight.
- To increase the reflectivity of fingers (e.g. if they are very dirty) place some white tape on the fingertip.

IR switch functions

IR switch	Display	Function
SET ▶	**SET**	▪ Apply setting ▪ Enter data ▪ Apply parameter
SHIFT	**SHT**	▪ Move cursor right or to the next position ▪ Change function and display of **SET** and ▼
▼	**INC**	▪ Increment parameter or value ▪ Change position of the decimal point ▪ Select next menu item

The IR switch function changes as follows when used with the **SHIFT** key:

Key combinations	Display	Function
SHIFT + **SET** ▶	**ESC**	▪ Cancel and switch to parent menu
SHIFT + ▼	**DEC**	▪ Decrement parameter or number ▪ Select previous menu item

Status icons

Status icon	Description	Status icon	Description
	System alarm tripped		Process alarm tripped
	Settings alarm tripped		Warning tripped
	Write protection disabled		Write protection enabled
	Device error (no write access)		Device busy (no write access)
	microSD card ready		Access to microSD card
	Error accessing microSD card		Process variable has bad status

Status icon	Description	Status icon	Description
	Upload parameter enabled		Download parameter enabled

Status icons HART

	Total health result: good (only indicated when display total health result is active)		Total health result: warning (only indicated when display total health result is active)
	Total health result: bad state (only indicated when display total health result is active)		Tube Health Check with result: OK
	Tube Health Check with result: warning		Tube Health Check with result: error
	Stop batch		Resume batch
	Batch running		SIL mode

Status icons Modbus, PROFIBUS PA

	Total health result: good (only indicated when display total health result is active)		Total health result: warning (only indicated when display total health result is active)
	Total health result: bad state (only indicated when display total health result is active)		Tube Health Check with result: OK
	Tube Health Check with result: warning		Tube Health Check with result: error

For status icon placement on the display see figure at Display, No. 1, 2 or 5.

Measured quantities and identifications

List of measured quantity abbreviations and identification on the display

Tab. 52: Regular display

Abbreviation	Measured quantity or identification
MFL	Mass flow
DNS	Density
TMP	Temperature
VFL	Volume flow
RFD	Reference density
RLD	Relative density
CVF	Corrected volume flow
PRS	Pressure
TT1 – TT6	Totalizer 1 – 6
TAG	Customer-Device identification
LTG	Customer-Device identification, long version
VEL	Velocity
CNC	Concentration
NM1, NM2	Net mass flow rate 1, 2

Abbreviation	Measured quantity or identification
NV1, NV2	Net volume flow rate 1, 2
NCV	Corrected net volume flow rate
DRC	Drive current
VSC	Viscosity
HT1	24hours totalizer 1
HT2	24hours totalizer 2
HT3	24hours totalizer 3
GVF	Gas void fraction

The following values are only available for the trend display to record data on the microSD card. Additional information about data recording can be found in the applicable Function Manual.

Only use the microSD card included with the SITRANS FC. Functionality of the device cannot be guaranteed if other cards are used.

Tab. 53: Trend display

Abbreviation	Measured quantity or identification
MFL	Mass flow
DNS	Density
TMP	Temperature
VFL	Volume flow
PRS	Pressure
CNC	Concentration
NM1	Net mass flow rate 1
NV1	Net volume flow rate 1
PHS	Phase shift
FRQ	Resonance frequency
DRG	Drive gain
DRC	Driving current
MBT	Transmitter temperature
VSC	Viscosity

15.3 Default settings

15.3.1 Setting display language

1. Press **[SET]** switch for 2 seconds to enter [Operation level].
2. Press **[▼]** switch 1 time to enter [Operator].
3. Press **[SET]** switch to enter [Device setup].
4. Press **[▼]** switch until the menu [Lang] is selected.
5. Press **[SET]** switch to enter the [Lang] menu.
6. Press **[▼]** switch repeatedly until the desired language appears.
7. Press **[SET]** switch to select the desired language.
8. Press **[SET]** switch to confirm the language selected.
   ⇨ Display switches to the next higher menu level.

15.3.2 Setting date

1. Press **[SET]** switch for 2 seconds to enter [Operation level].
2. Press **[▼]** switch until the [Maintenance] menu is selected.
3. Press **[SET]** switch to enter the [Device setup] menu.
4. Press **[▼]** switch until the [Detailed setup] menu is selected.
5. Press **[SET]** switch to enter the [Detailed setup] menu.
6. Press **[▼]** switch until the [Date/Time] menu is selected.
7. Press **[SET]** switch to enter the [Date/Time] menu.
   ⇨ Menu [Date] is preselected.
8. Press **[▼]** switch until the menu [Set date] is selected.
9. Press **[SET]** switch to enter the menu [Set date].
   ⇨ Date on display is flashing.
10. Press **[▼]** switch until the desired year is displayed.
11. Press **[SHIFT]** switch to switch to the display of the month.
12. Press **[▼]** switch until the desired month is displayed.
13. Press **[SHIFT]** switch to switch to the display of the day.
14. Press **[▼]** switch until the desired day is displayed.
15. Press **[SET]** switch to apply the date set.
16. Press **[SET]** switch to confirm the date set.
    ⇨ Display switches to the next higher menu level.

15.3.3 Setting time

1. Press **[SET]** switch for 2 seconds to enter [Operation level].
2. Press **[▼]** switch until the [Maintenance] menu is selected.
3. Press **[SET]** switch to enter [Device setup].
4. Press **[▼]** switch until the [Detailed setup] menu is selected.
5. Press **[SET]** switch to enter [Detailed setup].
6. Press **[▼]** switch until the [Date/Time] menu is selected.
7. Press **[SET]** switch to enter [Date/Time].
8. Press **[▼]** switch until the [Set time] menu is selected.
9. Press **[SET]** switch to enter [Set time].
   ⇨ Time on display is flashing.
10. Press **[▼]** switch until the desired number for the hour is displayed.
11. Press **[SHIFT]** switch to set the minutes.
12. Repeat the two previous steps for minutes and seconds.
13. Press **[SET]** switch to apply the time set.
14. Press **[SET]** switch to confirm the time set.
    ⇨ Display switches to the next higher menu level.

15.3.4 Setting zero point

In order to avoid systematic flow rate measurement deviations, performance of a zero point adjustment is recommended before starting measuring operations. For two- or multiphase fluids, the factory-set zero point value is preferable to a manual zero point adjustment.

1. Flush flow meter with fluid and check valves for tightness.

2. Close valves in front of and after the flow meter and stop the flow.
3. Wait until density, temperature and pressure are stabilized.
4. In case of fluids, compare the density displayed on the SITRANS FC with the fluid density in order to rule out gas accumulations in the measuring tube.
5. In applications with increased process pressure, ensure that the process pressure and its unit of measurement are set correctly.
6. Perform autozero.

15.3.5 Performing autozero

To ensure ideal measuring results, performance of a second autozero process is recommended after several days of operation and stabilization of the installation conditions.

1. Press **[SET]** switch for 2 seconds to enter [Operation level].
2. Press **[▼]** switch until the [Maintenance] menu is selected.
3. Press **[SET]** switch to enter [Device setup].
4. Press **[▼]** switch until the [Diag/Service] menu is selected.
5. Press **[SET]** switch to enter [Diag/Service].
6. Press **[▼]** switch until the [AZ] menu is selected.
7. Press **[SET]** switch to enter [AZ].
   ⇨ Menu [Exe] is preselected.
8. Press **[SET]** switch to enter [Exe].
   ⇨ Parameter [Not exe] appears.
9. Press **[▼]** switch until [Exe] is selected.
10. Press **[SET]** switch.
    ⇨ Parameter [Exe] flashes.
11. Press **[SET]** switch to start autozero.
    ⇨ Progress bar appears to indicate status of autozero, after completion display switches to next higher menu level.

15.4 Advanced settings

⚠ DANGER

Explosion hazard

- When the housing is opened in hazardous areas, the applicable Explosion Proof Type Manual must be observed, see chapter Operation, maintenance and repair.

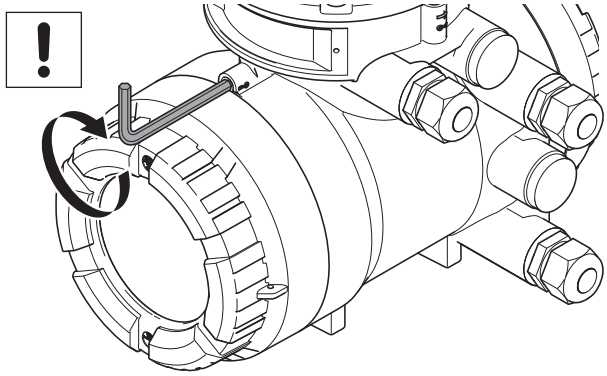
15.4.1 Setting hardware write-protection

The flow meter can be protected from unauthorized access. If the software write-protection via password is not adequate, an additional hardware write-protection can be set on the main board of the transmitter. With the write-protection active, the transmitter display can still be operated, any changes to settings or parameters are not saved and therefore not effective.

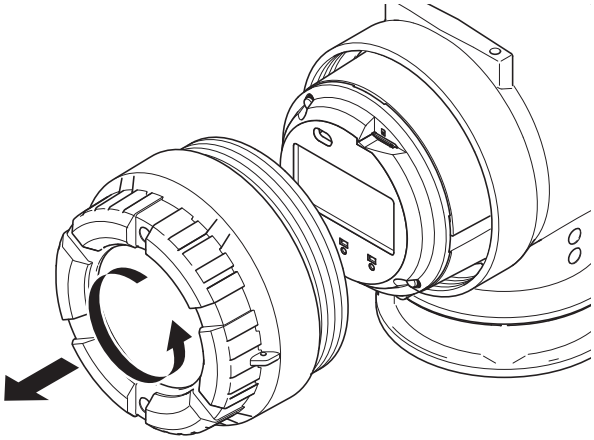
Write-protection can also be activated without removing the display. To do this, remove the jumper from the write-protection terminal (see Connection terminals).

It is not possible to release the hardware write-protection via HART, Modbus or other communication software.

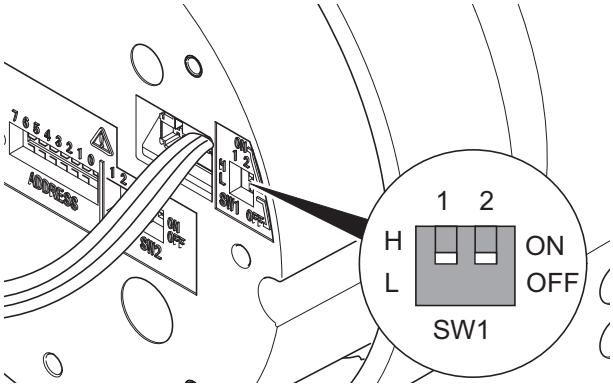
1. Switch off power supply.
2. Loosen the locking screw by turning it clockwise with an Allen wrench (size: 3.0).



3. Unscrew display cover from transmitter housing.



4. On the main board, set DIP switch 2 to the *ON* position using a sharp-pointed object.



5. Screw display cover back onto transmitter housing.
6. Tighten the locking screw by turning it counterclockwise with an Allen wrench (size: 3.0).

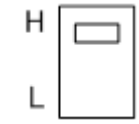
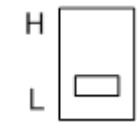
⇨ Symbol appears in the top right corner of the display.

Setting the Burnout mode

The flow meter is equipped with a Burnout function. The Burnout mode can be set via DIP SW1-1 behind the display.

Factory setting

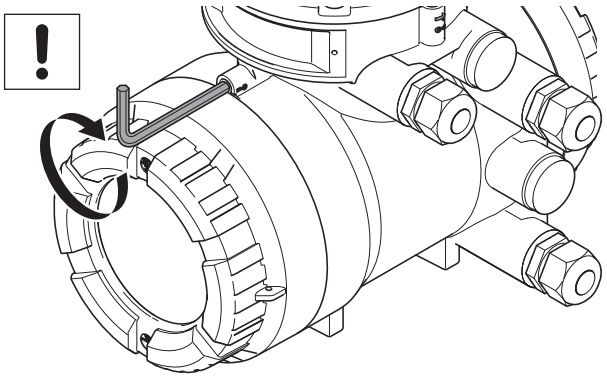
The factory setting of the Burnout mode is *High*.

SW1-1 position	Burnout mode	Output value if Burnout in mA
	High	21.6
	Low	2.4

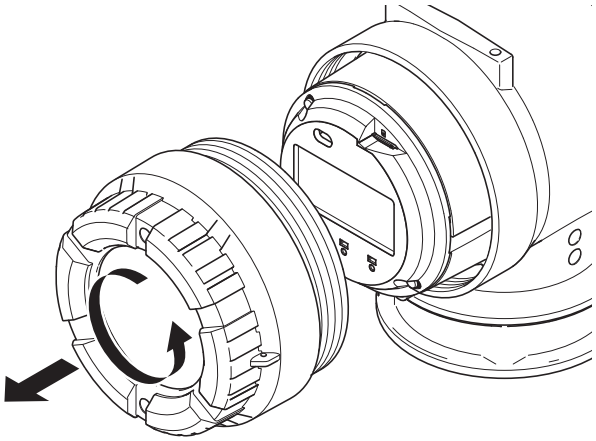
15.4.2 Modbus hardware setting

Switch settings

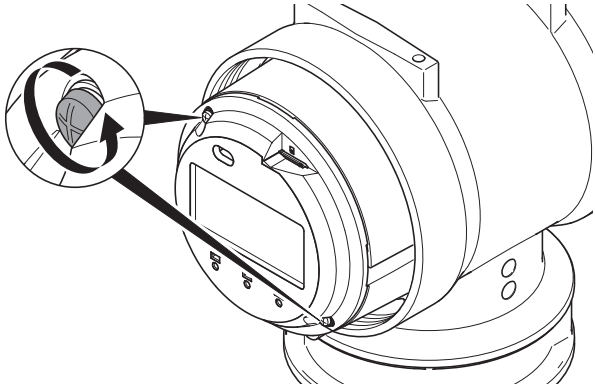
1. Switch off power supply.
2. Loosen the locking screw by turning it clockwise with an Allen wrench (size: 3.0).



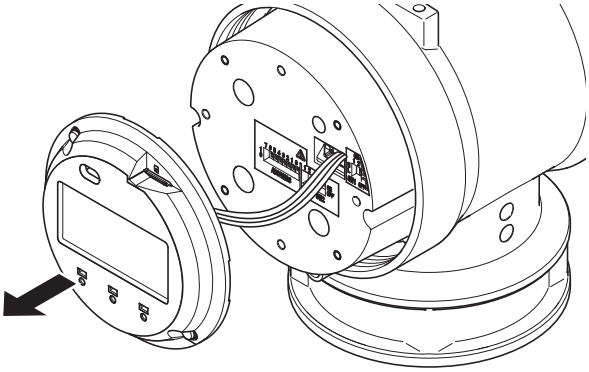
3. Unscrew display cover from transmitter housing.



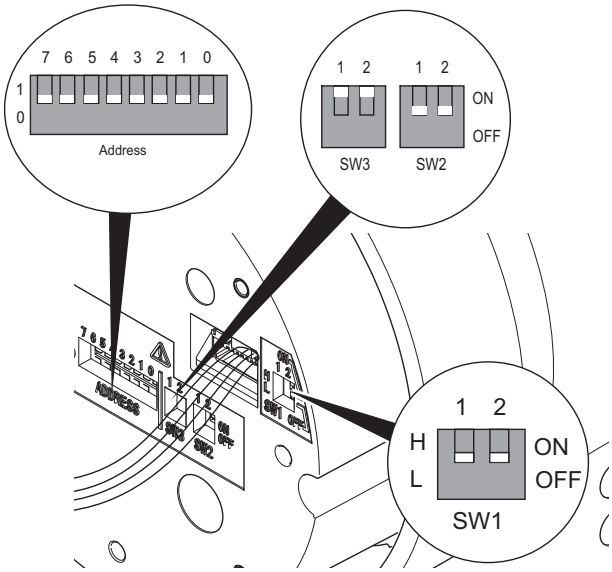
4. Remove 2 screws from the display.



5. Remove the display from housing by slowly pulling forward.
   ⇨ The switch can be seen.



6. Set the desired address.



7. Push display into housing.
8. Fasten the display with 2 screws.
9. Screw display cover back onto transmitter housing.
10. Tighten the locking screw by turning it counterclockwise with an Allen wrench (size: 3.0).

Default settings

Switches		
Address	SW 3	SW 2
0	ON	OFF

Address switch

SW (ADDRESS: 7)

Device address	Position	Description
Hardware	1	Address SW" settings between position 0 and 6 are the device address.
Software	0	Parameter value setting is the device address. Factory setting

SW (ADDRESS: 0-6)

Hardware address can be set from 1 to 127.

e.g.: If only address switch "6" is set to 1, the resulting address is 64.

(**1** * 2^6 + **0** * 2^5 + **0** * 2^4 + **0** * 2^3 + **0** * 2^2 + **0** * 2^1 + **0** * 2^0)

Address has to be set always between 1 and 127. If address switch is set to 0, address is automatically converted to 1.

When hardware switch is active, then address value based on the hardware address is stored in the device.

SW2

Line termination of two ends on the bus are required to communicate Modbus. One termination mode can be selected by SW2, see below table for setting.

Termination mode	Configuration
Bus end	Available when both SW2-1 and SW2-2 are "ON" (Resistance is 150 Ω)
Not bus end	Available when both SW2-1 and SW2-2 are "OFF"

Both SW2-1 and SW2-2 have to be set at the same position.

SW3

When bus is idle state, it becomes unstable in potential without pull up to D1 and pull down to D0. SW3 can be set, see below table for setting.

Pull up and Pull down mode	Configuration of Pull up and Pull down
Used	Available when both SW3-1 and SW3-2 are "ON" (Resistance is 600 Ω)
Not used	Available when both SW3-1 and SW3-2 are "OFF"

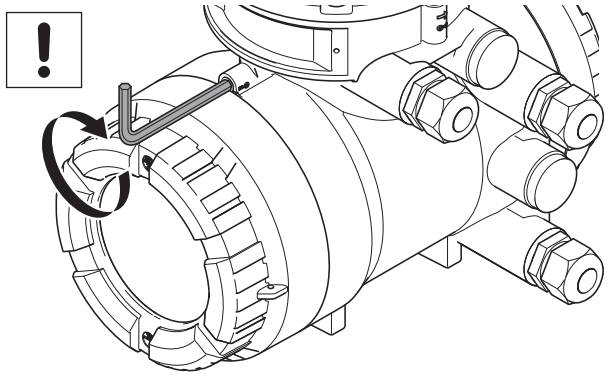
Both SW3-1 and SW3-2 have to be set at the same position.

15.4.3 PROFIBUS PA hardware setting

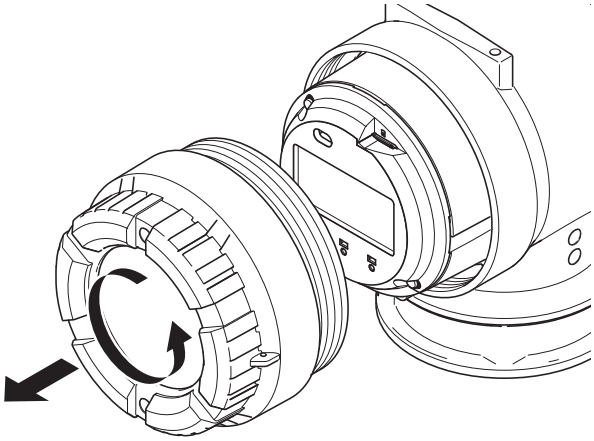
15.4.3.1 Access to Hardware DIP switches

Open the front cover

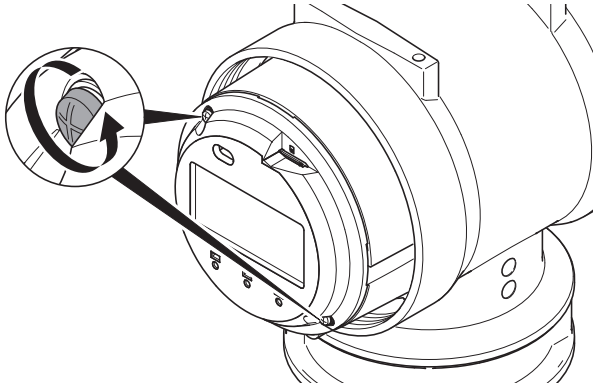
1. Switch off power supply.
2. Loosen the locking screw by turning it clockwise with an Allen wrench (size: 3.0).



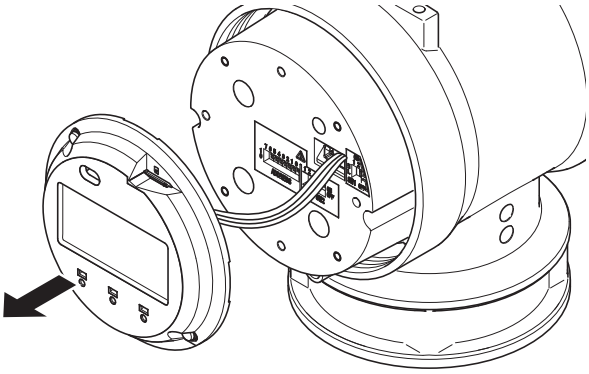
3. Unscrew display cover from transmitter housing.



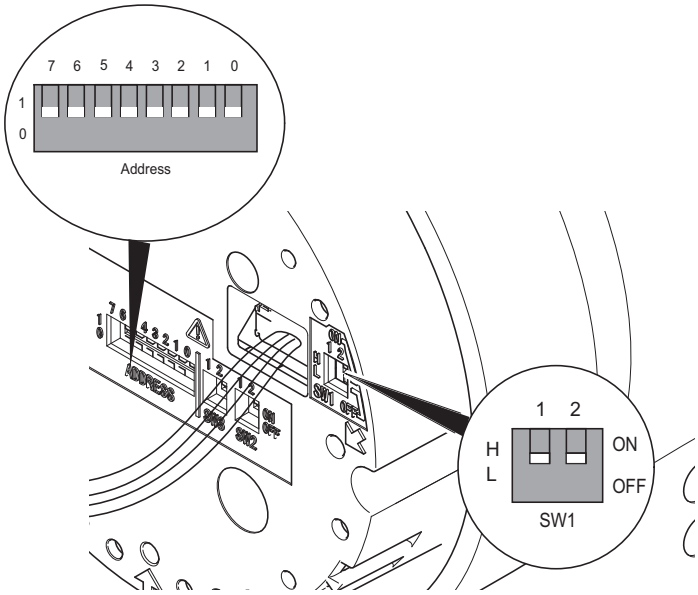
4. Remove 2 screws from the display.



5. Remove the display from housing by slowly pulling forward.
   ⇨ The switch can be seen.



6. Set the desired address and switch position.



7. Push display into housing.
8. Fasten the display with 2 screws.
9. Screw display cover back onto transmitter housing.
10. Tighten the locking screw by turning it counterclockwise with an Allen wrench (size: 3.0).

15.4.3.2 Setting hardware write-protection

The flow meter is equipped with a write protection function. It can be set via DIP SW1-2 behind the display. Use a sharp-pointed object to set the switch.

The flow meter can be protected from unauthorized access. If the software write-protection via WRITE LOCKING is not adequate, an additional hardware write-protection can be set on the main board of the transmitter. With the write-protection active, the transmitter display can still be operated, any changes to settings or parameters are not saved and therefore not effective.

Write-protection can also be activated without removing the display. To do this, remove the jumper from the write-protection terminal (see Inputs and Outputs in chapter Setting methods).

It is not possible to release the hardware write-protection via PROFIBUS PA communication software.

Factory setting

The factory setting of the Write protection mode is *Low*.

SW1 position	SW1-1	SW1-2
	Not applicable	Write protect state
H L	–	Protected
H L	–	Not protected

Symbol appears in the top right corner of the display, when SW1-2 is set to *High*.

15.4.3.3 Setting the bus address

This section describes the procedure to set bus address in the transmitter. Every device in PROFIBUS PA must be assigned a unique address in the range of 0(0x00) to 126(0x7e). If it is not specified at the time of order, 126(0x7e) is the factory default. Do not change to 0, 1 or 2 as these are used by master devices. There are two ways to set bus address: by using communication tools or by hardware switch in device.

Hardware Address Switch (ADDRESS: 7)

Device address	Mark	Description
Hardware	1	"Hardware Address Switch" settings between 0 and 6 are device addresses.
Software	0	Parameter setting is device address. Factory setting.

Hardware Address Switch (ADDRESS: 0 – 6)

Numbers of these address switches show the square of each number.

Example: If only the address SW-6 is 1, address shows 64.

$$1 * 2^6 + 0 * 2^5 + 0 * 2^4 + 0 * 2^3 + 0 * 2^2 + 0 * 2^1 + 0 * 2^0$$

Address has to be set always between 0 and 126. If address switch is set to 127, the address is automatically converted to 126. Hardware Address Switch change has to be performed to reflect hardware switch status after powering off a device.

Software address setting

Device address can be set by PROFIBUS PA software tool if hardware address setting is not active. For further details, see applicable Function Manual (FM) A5E52748624.

16 Troubleshooting

All error messages and error codes that may appear in operation are described in the Function Manual. Possible malfunctions that may occur during commissioning are explained below and remedying them is explained. If you cannot remedy the malfunction using these explanations, contact the Siemens service center.

16.1 Malfunction of operation

Tab. 54: Different kinds of malfunction of operation: causes ans remedies

Malfunction	Possible causes	Remedy
Display on transmitter not functioning	Power supply disconnected	▪ Ensure that the unit is connected to the power supply, see *[137]*
	Settings cannot be made via IR switches	▪ Check cable connections between display and main board and connect properly, if necessary.
Settings cannot be made via IR switches	Incorrect settings in write-protect menu item	▪ Switch off write-protect menu item via digital communication or hardware switch.
Field communicator is not detected	HART DD not installed on field communicator	▪ Install HART DD file on field communicator.
	Field communicator not connected	▪ Connect field communicator with SITRANS FC, see Function Manual.
PROFIBUS PA Host does not detect SITRANS FC	PROFIBUS PA EDD not installed on the Host	▪ Install PROFIBUS PA EDD[1)] on the Host
	PROFIBUS PA GSD file is not installed on the Host	▪ Install PROFIBUS PA GSD[2)] file on the Host
	PROFIBUS DP/PA coupler is not connected to the Host	▪ Connect PROFIBUS DP/PA coupler with Host
	PROFIBUS PA modem is not connected to the DP/PA coupler	▪ Connect PROFIBUS PA modem with DP/PA coupler
	SITRANS FC is not connected to the PROFIBUS PA modem	▪ Connect PROFIBUS PA modem with SITRANS FC

[1)] meaning of "EDD": Electronic device description. The EDD describes the digital communication characteristics of intelligent field instrumentation and equipment parameters (device status, diagnostic data and configuration details).

[2)] meaning of "GSD": The GSD file and Ident number are necessary for PROFIBUS communication. Before starting communication, the device must be specified by the GSD file in the host system and the Ident number of the device.

You can download the GSD file from http://www.profibus.com/products/gsd-files/.

16.2 Zero point unstable

Tab. 55: Different kinds of malfunction for zero point unstable: causes ans remedies

Malfunction	Possible causes	Remedy
Zero point unstable	Measuring tube not completely filled with fluid	– Check that the measuring tube in the sensor is completely filled with fluid. Correct installation, see Installation instructions.
	Bubbles or solids in the fluid	– Check pipe and sensor installation, see Sensor installation. – Correct installation, see Installation instructions.
	No electrical grounding	– Ground transmitter and sensor, see *[▷ 119]*, and *[▷ 137]*. – Check correct connection of connecting cable shield on transmitter.
	Flow meter installed in proximity to facilities with strong electro-magnetic field	– Ground transmitter and sensor, see *[▷ 119]*, and *[▷ 137]*. – Install flow meter as far away as possible from these electric devices.
	Mechanical strain from traction or pressure	– Eliminate cause for mechanical tension.
	Terminal board or connection terminals of transmitter or sensor soiled or damp	– Clean terminal board and connection terminals. – Clean transmitter and/or sensor. – Dry transmitter and/or sensor. – Seal transmitter and/or sensor tightly.
	Influence of external vibration	– Install mechanical dampers. – Increase parameter *mass flow damping* (see applicable Function Manual).

16.3 Display deviating

Tab. 56: Different kinds of malfunction for display deviating: causes ans remedies

Malfunction	Possible causes	Remedy
Flow rate displayed deviates from actual flow rate	Zero point set incorrectly	– Set zero point, see *[▷ 147]*
	Highest and lowest value for mass flow set incorrectly	– Match settings of flow meter and reading system. – Check LRV and URV process parameters, see Function Manual.
	Measuring tubes not completely filled with fluid	– Correct installation, see *[▷ 103]*
	Bubbles in fluid	– Check pipe and installation, see *[▷ 103]*. – Correct installation, see *[▷ 103]*
	Connecting cable incorrectly connected for remote type	– Check cable connections and correct, if necessary, see *[▷ 121]*.

Malfunction	Possible causes	Remedy
Density displayed deviating from actual density	Density unit, highest and lowest value for density set incorrectly	– Match settings of flow meter and reading system. – Check LRV and URV process parameters, see Function Manual.
	Fixed density	– Check whether the Val sel parameter is set correctly. If a fixed value is selected, ensure that the parameter Fix val is set correctly, see Function Manual. – Set parameter Val sel to Meas val, see Function Manual.
	Analog output trim was performed incorrectly	– Correctly perform trimming, see applicable Function Manual.
	No electrical grounding	– Ground transmitter and sensor, see *[▷ 119]*. – Check correct connection of connecting cable shield on transmitter.
	Bubbles in fluid	– Check pipe and installation, see *[▷ 103]*.
	Connecting cable incorrectly connected for remote type	– Check cable connections and correct, if necessary, see *[▷ 121]*.
	Faulty temperature measurement	– Check temperature measurement circuits TP1 – TP3 of connecting cable.
	Corrosion and erosion	– If corrosion or erosion due to corrosive fluids is suspected, contact Siemens and have density and mass flow recalibrated, if necessary.
	Contaminated measuring tubes	– Clean measuring tubes.
Temperature displayed deviating from actual temperature	Temperature unit, highest and lowest value for temperature set incorrectly	– Match settings of flow meter and reading system. – Check LRV and URV process parameters, see Function Manual.
	Non-adjustable temperature	– Check whether the Func sel parameter is set correctly. If a fixed value is selected, ensure that the Fix val is set correctly, see Function Manual. – Set parameter Func sel to Inter val.
	Analog output trim was performed incorrectly	– Correctly perform trimming (see applicable Function Manual).
	Connecting cable incorrectly connected for remote type	– Check cable connections and correct, if necessary, see *[▷ 121]*.
	Incorrect temperature measurement with remote type	– Check temperature measurement circuit by measuring resistance between TP1/ TP2 and TP1/TP3. Each value must be between 50 – 200 Ω. – Check temperature measurement circuit TP2/TP3 and make sure that resistance is < 10 Ω. – Connect Pt100 simulator and check temperature measurement.

Malfunction	Possible causes	Remedy
Output signal deviating from measured quantity	Incorrect parameter	– Check parameter LRV and URV of the corresponding output signal, and correct, if necessary.
	Incorrect measured quantity	– Check measured quantity output and, if necessary, correct; check parameter Sel, see Function Manual.

17 Maintenance and repair

Applicable country-specific regulations for opening and repairing electrical devices must be observed.

⚠ DANGER

Risk of injury and damage to the flow meter due to ignition after sparking, if there is mechanical impact

- Avoid strong mechanical impacts on the flow meter during maintenance work.

⚠ WARNING

Risk of injury due to electrical shock, as well as damage to the flow meter, due to insufficiently trained personnel

- Only have skilled personnel maintain and repair the flow meter.

⚠ WARNING

Risk of injury due to electrical shock, as well as damage to the flow meter

- Do not perform maintenance outdoors during rain.

⚠ WARNING

Risk of injury from slipping or falling flow meter

- Observe notes about the transport of the flow meter in chapter *Transport [▶ 20]*; these also apply accordingly during maintenance work.

⚠ WARNING

Risk of injury due to electrical shock, as well as damage to the flow meter, due to maintenance work in areas at risk of explosion

- When maintaining the flow meter in areas at risk of explosion, compliance with the applicable Explosion Proof Type Manual is mandatory.

⚠ WARNING

Risk of injury from electrical shock due to insufficiently closed housing

- After completion of the maintenance work, check that the housing covers of the transmitter have been properly installed.

⚠ WARNING

Risk of open/ close the transmitter cover

- Please be sure to handle the transmitter cover carefully so that there are no damages and foreign matter adhesion at its thread and O-ring when it is opened or closed. Keep checking their condition and clean the threads in case of adhering the foreign matter. Replace the cover in case the threads receive damages. Replace the O-ring if there is any scarring or transformation and apply silicone based grease at the O-ring in case of the shortage and exhaustion of grease.

⚠ WARNING

Risk of opening the gas-filling-plug of the sensor

- When opening the gas-filling-plug of the sensor, ensure that the sensor housing is pressure-less and free of hazardous fluids.

NOTICE

Risk of damage to the flow meter due to electrostatic discharge (ESD)

- When performing maintenance work on the flow meter, appropriate ESD protective measures must be taken.

NOTICE

Be aware that all covers are closed before operating in order to prevent disturbance of other sensitive electrical equipment due to increased electromagnetic emissions.

The need for maintaining the SITRANS FC depends on process and environmental conditions. Maintenance-free operation is possible for many processes. Contact the responsible Siemens sales organization for details.

17.1 Exterior cleaning

⚠ WARNING

Risk of injury due to electrical shock, as well as damage to the flow meter, due to unskilled cleaning

- For CIP or SIP cleaning, limit the steam temperature to max. 230°C.
- Observe the maximum permissible ambient temperature for the transmitter during cleaning (especially for the compact type).

1. Regularly remove soiling on display glass pane or nameplate by using a soft, dry cloth.
2. Use only cleaning agents that do not corrode the surface of the flow meter.

17.2 Recalibration and calibration service

For recalibration, flow meters should be sent to the manufacturer Siemens. For additional information regarding service products and their availability, go to the Siemens homepage or contact a local Siemens sales partner.

17.3 Impairment of the display

NOTICE

Impairment of the display

If the device is operated for a longer period and is subjected to high temperatures or high humidity in the process, the display may be impaired.

- Replace display unit as described in Rotating and replacing the display

17.4 List of replacement parts

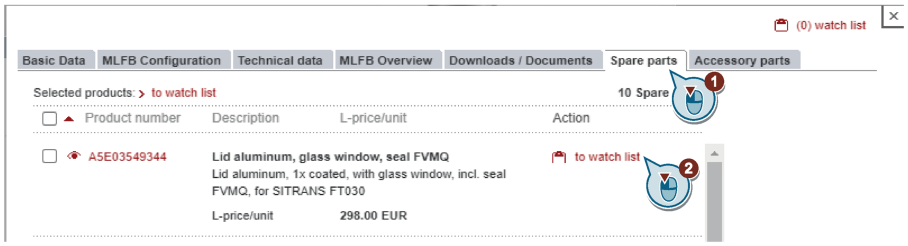
Replacement parts may be reordered using the *Customer Maintenance Part List (CMPL)*, which is available on the included microSD.

17.5 Ordering of spare parts

✓ You have a Siemens Industry Mall account.

1. Open the PIA Life Cycle Portal (https://www.pia-portal.automation.siemens.com)
2. Select the desired language.
3. To find spare parts for your device, do one of the three following:
4. Enter the complete order number of your device (e.g. 7ME4633-4KA51-8DC3-Z A05+B11+E06+F11) into the "Product number" field and click "Go".
5. Enter the serial number of your device (e.g.N1KXXXXXXX) in the "Serial number" field and click "Go".
6. If you do not know the product or serial number, search for your device under "Product family".

7. Navigate to the "Spare parts" tab.
   ⇨ You see the list of spare parts available for your device.



8. Select a spare part and add it to your watch list.
   ⇨ The watch list opens.
9. Click "Add to cart of Industry Mall".

⇨ The Siemens Industry Mall opens and you can order your spare part.

18 Sensor replacement

18.1 Dismantling of the defective sensor

The defective SITRANS FC sensor has to be dismantled. The dismantling flow depends on the flow meter type (compact or remote).

The rules according to the Explosion Proof Type Reference Manual apply, especially the chapter “Operation, maintenance and repair”:

- ATEX A5E52487402
- IECEx A5E52595170
- FM/CSA A5E52487431
- NEPSI A5E52595174
- Korea Ex A5E52778071

18.1.1 Connecting interfaces

Remote type

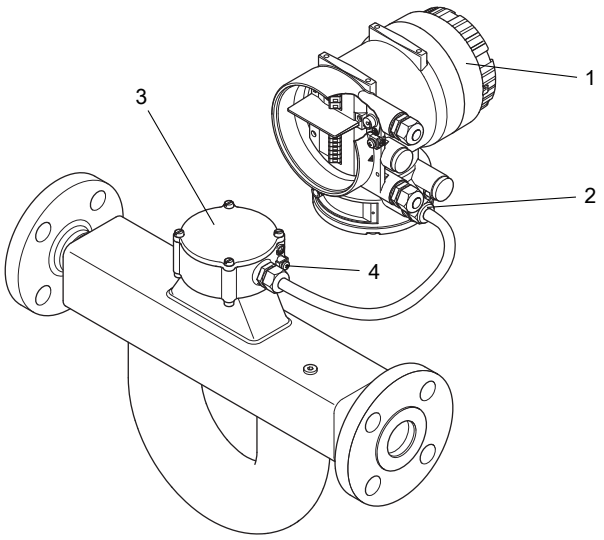


Fig. 106: Connecting interfaces on sensor remote type

1	Display (if available)
2	Communication cable entry
3	Terminal cover
4	Grounding terminal for external potential equalization (sensor)

Compact type

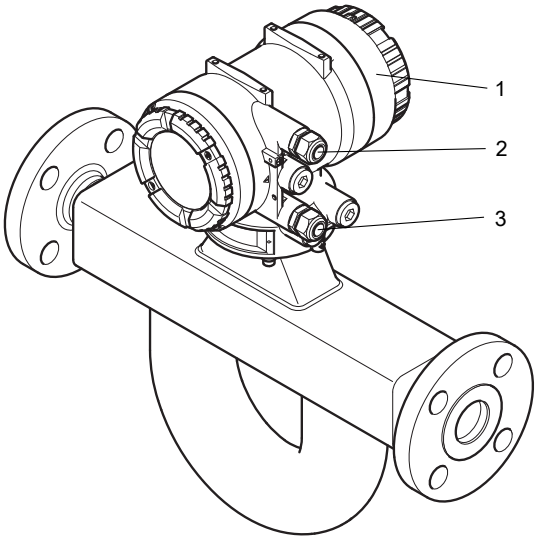


Fig. 107: Connecting interfaces on sensor compact type

1 Display (if available)
2 Power supply cable entry
3 Communication cable entry

Transmitter housing back cover

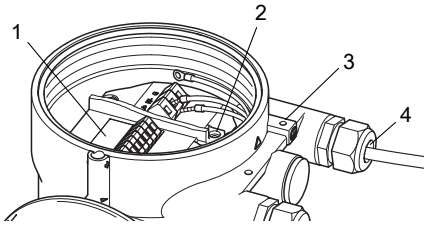


Fig. 108: Connecting interfaces on transmitter housing back cover

1 Terminal box power and I/O
2 Grounding screw for connecting grounding conductor
3 Grounding terminal for external potential equalization (transmitter)
4 Power supply cable entry

18.1.2 Disconnect remote type sensor

⚠ WARNING

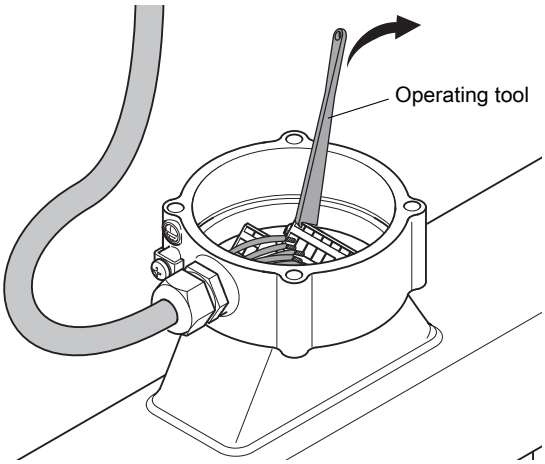
Life-threatening injuries from electric shock

- Switch off power supply and communication.
- Secure against inadvertent switch-on.

Disconnecting power, communication and grounding

After power down and breaking all power cable connections from L/+ N/- and grounding for the power circuit (except potential equalization connection of external grounding terminal) the sensor has to be disconnected by the following procedure:

1. Open the terminal cover.



2. Disconnect all cables with the operating tool.
3. Remove the cable gland and cable.
4. Disconnect the sensor potential equalization.

18.1.3 Disconnect compact type sensor

⚠ WARNING

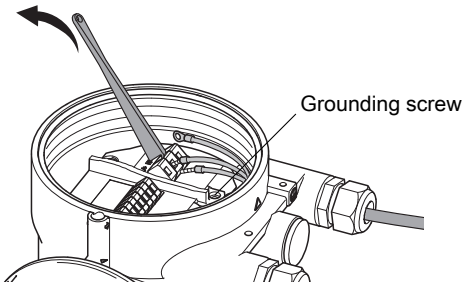
Life-threatening injuries from electric shock

- Switch off power supply and communication.
- Secure against inadvertent switch-on.

Disconnecting power, communication and grounding

After power down and breaking all power cable connections from L/+ N/- and grounding for the power circuit (except potential equalization connection of external grounding terminal) the sensor has to be disconnected by the following procedure:

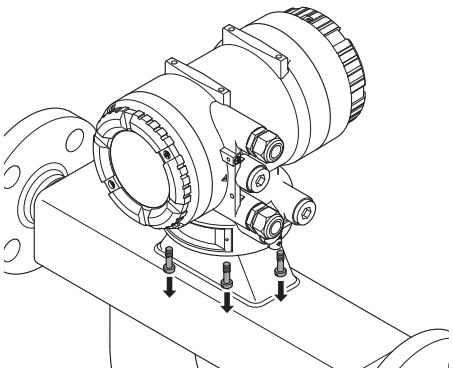
1. Remove locking screw of the “Terminal box power and I/O connection” and remove the back cover.
2. Disconnect the communication and I/O cables (avoid short circuit!).
3. Remove the cable gland and cable.
4. Disconnect the power cables from L/+ and N/- “Power supply connection terminals”.



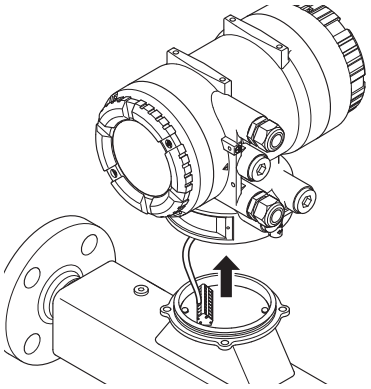
5. Remove “Grounding screw for connecting grounding conductor”.
6. Remove potential equalization from “Grounding terminal for potential equalization” (if used).

Remove transmitter and disconnect from defective sensor

1. After disconnection the transmitter is removed by unscrewing the four clamping bolts.



2. Lift the transmitter housing:



3. Turn the transmitter housing around for disconnection.
4. Disconnect all wires from the sensor with the operating tool.

18.1.4 Remove defective sensor

After disconnection the sensor has to be dismantled according to chapter *14.1 Decontamination and return shipment [189]* .

18.2 Installation of the Spare sensor

For the installation of the Spare sensor, please refer to chapter *Sensor installation [103]*.

18.3 Parameter setting

18.3.1 Relevant settings and parameter storage

Relevant settings

For the exchange of the sensor two kinds of parameters are relevant to ensure a proper operation of the flowmeter:

- **sensor related parameters** (liquid or gas select, mass flow- or volume flow unit, temperature unit...)
- **sensor specific parameters** (SK20, KD, fl20)

The sensor exchange has no impact on system related setting (e.g. device ID, device tag).

Delivered parameters

The Spare sensor is delivered with parameters according to the ordered order code and as documented on the calibration certificate.

Storage location of parameters

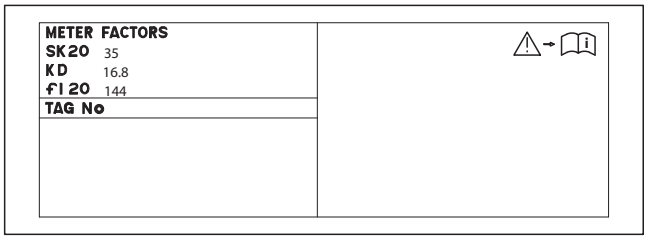
Both parameter types, sensor related parameters and sensor specific parameters, are stored on the microSD card in the file “Factory.PAR”.

In addition, the sensor specific parameters can be found on:

- the calibration certificate of the sensor:

Results:	Flow Calibration	Density Calibration
	Sensor Coefficient SK20: 103,0	Density Coefficient KD: 2,7933 kg/l
	Auto Zero Value: - 0,0 kg/h	Frequency FL20: 383,305 Hz

- the additional nameplate of the sensor:



Communication possibilities

There are two possibilities to configure the transmitter with all relevant settings to ensure a possibilities proper operation:

- Parameter setting via communication tool like 475 Configurator or DTM
- Parameter setting via transmitter display, if available

18.3.2 Parameter setting procedure

The coupling of the existing transmitter with the spare sensor can be executed with the following procedure:

1. Set the process parameter units to standard units.
   Please refer to chapter Set up process variable units.
2. Copy and rename the file “Factory.PAR”, available on the delivered microSD card, to the microSD card of the existing transmitter.

The use of the microSD card is possible only for transmitters with display (indicated on order code position 16 = 3)

3. Run the function “Download sensor constants from microSD card“. Please refer to chapter *Set up sensor relevant and sensor specific parameters [▷ 175]*.

18.4 Wiring

For the wiring of Spare sensor and existing transmitter, please refer to chapter *Wiring [▷ 118]*.

18.5 Commissioning

1. Activate external power switch.
2. Perform check of piping installation.
3. Check flow meter for device errors, warnings or alarms,
   see chapter Troubleshooting.
4. Configure the transmitter, and perform autozero,
   see chapter System configuration and operation.

⇨ Flow meter is ready for operation.

19 Transmitter replacement

19.1 Dismantling of the defective transmitter

The defective SITRANS FC transmitter has to be dismantled. The dismantling flow depends on the flow meter type (compact or remote).

The rules according to the Explosion Proof Type Reference Manual apply, especially the chapter “Operation, maintenance and repair”:

- ATEX A5E52487402
- IECEx A5E52595170
- FM/CSA A5E52487431
- NEPSI A5E52595174
- Korea Ex A5E52778071

19.1.1 Connecting interfaces

Transmitter

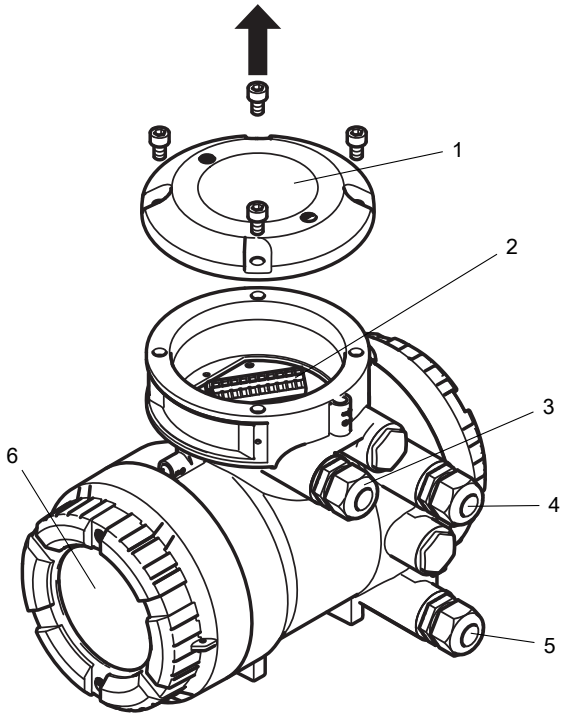


Fig. 109: Connecting interfaces on transmitter

1	Terminal box cover (remote type only)
2	Terminal box sensor connection
3	Sensor communication cable entry (remote type only)
4	Communication cable entry
5	Power supply cable entry
6	Display, if available

Transmitter housing back cover

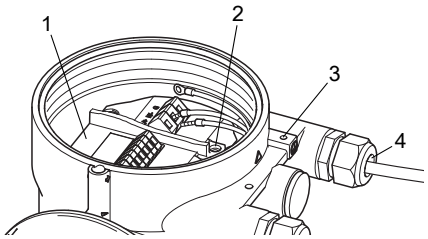


Fig. 110: Connecting interfaces on transmitter housing back cover

1 Terminal box power and I/O
2 Grounding screw for connecting grounding conductor
3 Power supply cable entry
4 Grounding terminal for external potential equalization

19.1.2 Disconnect remote type transmitter

⚠ WARNING

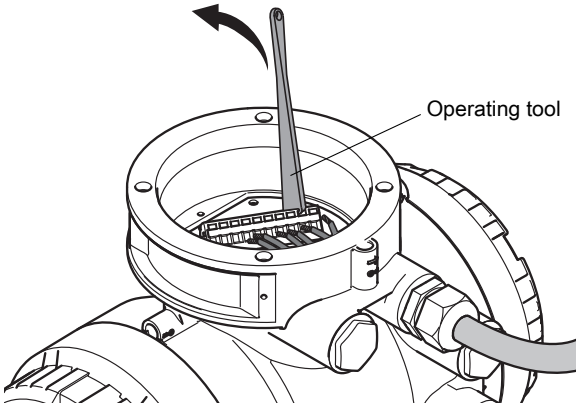
Life-threatening injuries from electric shock

- Switch off power supply and communication.
- Secure against inadvertent switch-on.

Disconnecting power, communication and grounding

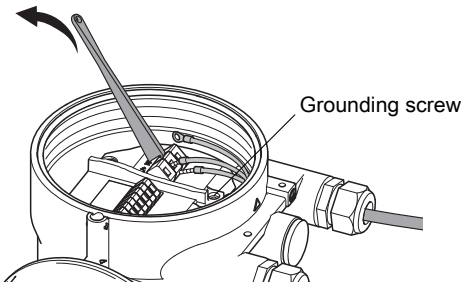
After power down and breaking all power cable connections from L/+ N/- and grounding for the power circuit (except potential equalization connection of external grounding terminal) the transmitter has to be disconnected by the following procedure:

1. Open the terminal box sensor connection.
2. Disconnect all cables with the operating tool.



3. Remove the cable gland and cable.
4. Remove locking screw of the “Terminal box power and I/O connection” and re-move the back cover.
5. Disconnect the communication and I/O cables (Avoid short circuit!).
6. Remove the cable gland and cable.

7. Disconnect the power cables from L/+ and N/- “power supply connection terminals”.



8. Remove “Grounding screw for connecting grounding conductor”.
9. Remove potential equalization from “Grounding terminal for potential equalization”.

19.1.3 Remove defective transmitter

After disconnection the transmitter has to be removed by unscrewing the four clamping bolts.

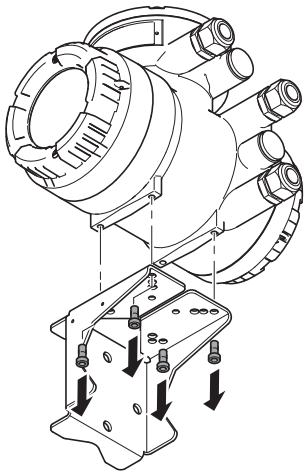


Fig. 111: Removal of defective transmitter from the mounting bracket

The mounting bracket (U-bracket) remains for the installation of the spare transmitter.

19.1.4 Disconnect compact type transmitter

⚠ WARNING

Life-threatening injuries from electric shock

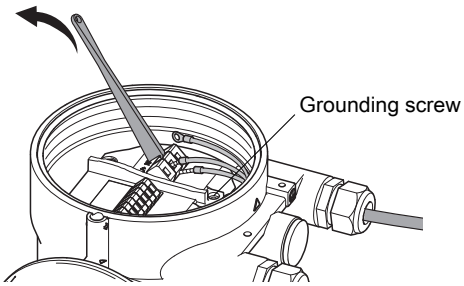
- Switch off power supply and communication.
- Secure against inadvertent switch-on.

Disconnecting power, communication and grounding

After power down and breaking all power cable connections from L/+ N/- and grounding for the power circuit (except potential equalization connection of external grounding terminal) the transmitter has to be disconnected by the following procedure:

1. Remove locking screw of the “Terminal box power and I/O connection” and remove the back cover.
2. Disconnect the communication and I/O cables (avoid short circuit!).
3. Remove the cable gland and cable.

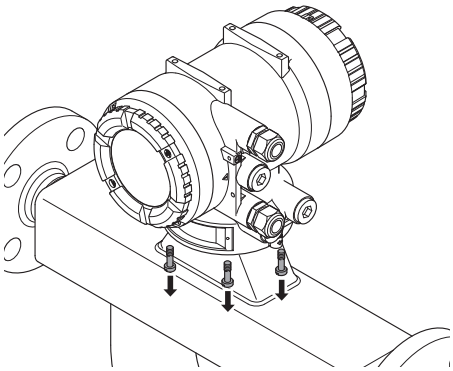
4. Disconnect the power cables from L/+ and N/- “Power supply connection terminals”.



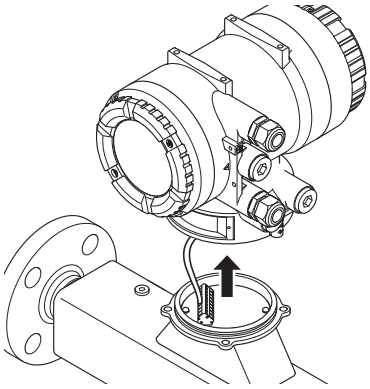
5. Remove “Grounding screw for connecting grounding conductor”.
6. Remove potential equalization from “Grounding terminal for potential equalization” (if used).

Remove defective transmitter and disconnect from sensor

1. After disconnection the transmitter is removed by unscrewing the four clamping bolts.

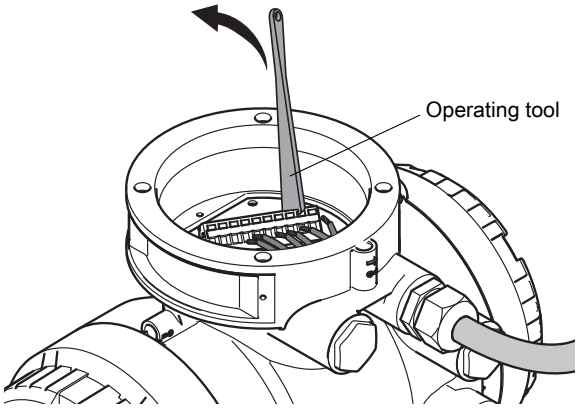


2. Lift the transmitter housing:



3. Turn the transmitter housing around for disconnection.

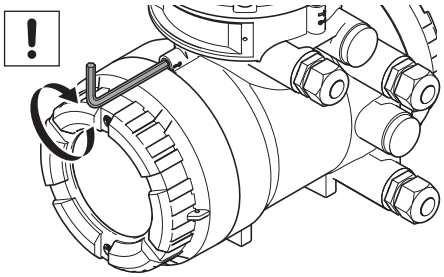
4. Disconnect all wires from the transmitter with the operating tool.



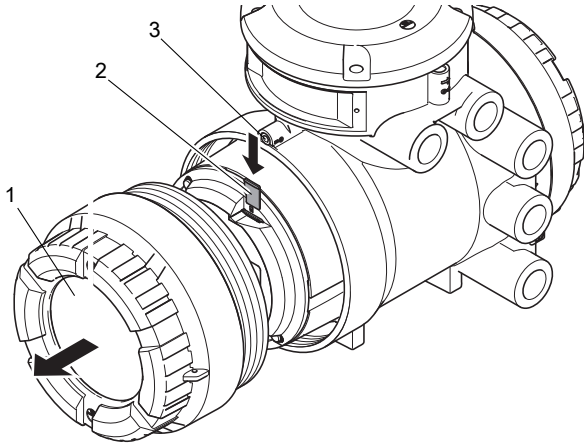
19.1.5 Remove microSD card (transmitter with display only)

In case of defective transmitter with display the microSD card can be used to set up the Spare transmitter by following the procedure after removal of transmitter:

1. Remove locking screw of the front cover



2. Unscrew the front cover and remove the microSD card



1 Front cover
2 microSD card
3 Locking screw

19.2 Installation of the Spare transmitter

For the installation of the Spare transmitter, please refer to chapter *Transmitter installation [▷ 109]*.

19.3 Parameter setting

19.3.1 Relevant settings and parameter storage

Relevant settings

The SITRANS FC transmitter has four kinds of relevant parameters which must be adjusted to ensure a proper operation of the flowmeter:

- **System relevant parameters** - a device can be identified in one of the three following ways:
  - *device identifier* (ID) – fixed value by manufacturer
  - device (HART) *tag*
  - *address* (HART, Modbus, PROFIBUS PA)
- **sensor related parameters** (liquid or gas select, mass flow- or volume flow unit, temperature unit…)
- **sensor specific parameters** (SK20, KD, fl20)
- **customer specific parameters** (lowcut and URV)

Storage location of parameters

System relevant parameters are stored on the microSD card of the Spare transmitter in the file “Factory.PAR”.

Sensor relevant parameters and **sensor specific parameters** are available on the microSD card of the defective transmitter in the file “Factory.PAR”.

Delivered parameter setting

The default setting of sensor specific and sensor related parameters in the spare transmitter is based on SITRANS FCS600 DN25 made of stainless steel for standard process fluid temperature range.

Order Code: 7ME4469-xxxxx-xxxx-Z

19.3.2 Setting methods

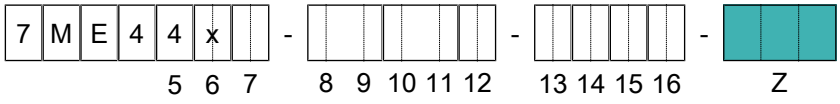
Configuring the Spare transmitter with the sensor settings always needs a backup file of the defective transmitter.

- If the microSD card from the defective transmitter is available, insert it into the Spare transmitter.

The factory backup file of the defective transmitter is stored on the microSD in the directory “SIEMENS” attached to the defect SITRANS FC at delivery time. Please make sure to use a differing file name in case of coping to microSD of the Spare transmitter

The method to set up the Spare transmitter properly depends on the following order code positions of the defective SITRANS FC in comparison to the Spare Transmitter:

Inputs and Outputs



1. Position *-Z*: Communication type and I/O Configuration

EXAMPLE: *E06+F13* = HART with I/O1 – 4 defined (defined acc. to OI)

Display

1. Position *16*: Display

Order code Position 16 – possible values	Mapping
1	Without display
3	With display

Only SITRANS FCT020 transmitters can be delivered without a display (value 1 in order code position 16). Transmitter without a display don´t have a microSD card.

EXAMPLE: Defective transmitter order code is “7ME4412-5CE31-2CA1-Z” and means for position *-Z* HART communication with I/O assignments for I/O 1 – 4 (*E06+F22*) and with a display (3), position *16*.

Setting method has to follow table below:

Tab. 57: Method overview to set the spare transmitter in dependency of defective transmitter’s order code

Defective transmitter order code:	**Setting method for sensor parameters**	
	Setup with backup file	
Pos. -Z values:	**By display**[1)]	**By Pactware**
E06, E07 + Fxx (HART)	*Possible*	*Recommended from Rev.3*
E14 + Fxx (Modbus)	*Possible*	*Recommended*
E10 + Fxx (PROFIBUS PA)	*Possible*	*Recommended*

[1)] Before using the display the factory backup file of the microSD has to be copied to the microSD of the Spare Transmitter.

The ”*Recommended*” setting method should be used.

19.3.3 Set up process variable units

For Spare transmitter: Set the Spare transmitter measurement units to the values from the file “Customer_Settings_YourDeviceSerialNumber.csv” found on the microSD of Spare transmitter.

For Spare sensor: Set the existing transmitter measurement units to the values from the file “Customer_Settings_YourDeviceSerialNumber.csv” found on the microSD of Spare sensor.

EXAMPLE, see *table below*:

MASS_FLOW	**MASS flow unit**	**R/W3**	5	0:g/s 1:g/min 2:g/h 3:kg/s 4:kg/min 5:kg/h 6:kg/d 7:t/min 8:t/h 9:t/d 10:lb/s 11:lb/min 12:lb/h 13:lb/d 14:User unit

For this device, configured for mass flow measurement, all relevant parameters like Qnom, Qmax are saved in kg/h in the factory-backup file.

To change the mass flow unit over the display, please execute the following sequence:

1. Set user level “Specialist”
2. Go to menu item “[Easy setup wizard] ► [Std dev var] ► [Mass] ► [Unit]”
3. Choose unit corresponding to the saved value in the Customer_Settings file, for example “[kg/h]”
4. Set chosen Unit “[kg/h]”
5. Check process unit of the exchange transmitter

This parameter is also available in additional menus. The values can be set in each of these menus:

- Basic setup
- Detailed setup

Execute this procedure for all other relevant process parameter units in your device corresponding described in the Function Manual:

- HART A5E52748515
- Profibus PA A5E52748624
- Modbus A5E52748619.

⚠ WARNING **If the units for the measurement parameters aren’t adjusted the measurement will be faulty and the transmitter may show configuration error.**

ⓘ Please note your user settings of the units down before you change it. After the pairing process you should set the units back to your origin settings!

19.3.4 Set up sensor relevant and sensor specific parameters

For Spare transmitter: Set the Spare transmitter sensor parameters to the values from microSD card of the defective transmitter by display.

For Spare sensor: Set the sensor parameters in the existing transmitter to the values from microSD card of the Spare sensor by display.

1. Set user level “Specialist”
2. Go to menu item “[Diag/Service] ► [Param bkup/restore] ► [Restore]”
3. Choose sub menu item “[Bkup name]”. Put in the backup name of the defective transmitter user configuration file; for example “UsrPlant”

4. Go to menu item “[Diag/Service] ► [Param bkup/restore] ► [Restore]”
5. Execute “[DL snsr cnst SD]”
6. Check all sensor relevant settings of the exchange transmitter

19.3.5 Set up customer specific parameters

The default setting for customer specific parameters is as follows:

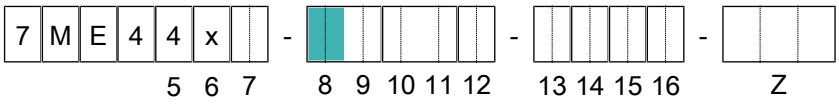
Tab. 58: Assignment: default setting for customer specific parameters

Parameter name:	**Default Setting:**		**Parameter adjustment:**
	Value	*Unit*	
[Mass flow lowcut]	0.0105	*kg/h*	Recommended if meter size is >06
[Net mass flow 1 lowcut] [1)]			
[Net mass flow 2 lowcut] [1)]			
[Mass flow URV]	21.000	*kg/h*	Recommended if meter size is >06
[Net mass flow 1URV] [1)]			
[Net mass flow 2URV] [1)]			
[Volume flow URV]	21.000	*L/h*	
[Liquid gas select]	Liquid	*None*	Needed if sensor is a gas device
[Max permissible pressure]	10.000	*Bar*	Automated with restoration flow

[1)] Relevant only if options Gxx are available for the Spare transmitter

Depending on the order code of the defective transmitter these parameters should be adjusted:

Meter size



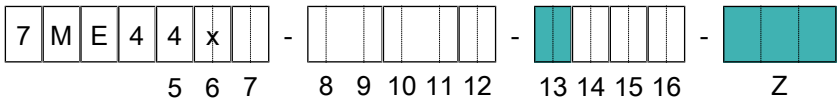
The following parameter values are recommended to set, if needed:

Tab. 59: Overview: setting values for parameters [… lowcut] and [… URV]

	Recommend RMTI parameter setting values:			
Parameter name:	**[… lowcut][1)]**		**[… URV][1)]**	
Meter size:	**Setting value:**		**Setting value:**	
	Value	***Unit***	***Value***	***Unit***
DN15	1.5000	*kg/h*	3000.0	*kg/h*
DN25	5.0000		10000.0	
DN40	16.0000		32000.0	
DN65	50.0000		100000.0	

[1)] “…” Mass flow low cut and URV values compared to parameter values in *table 16*.

Mass flow and density accuracy



The parameter [Liquid gas select] has to be set to “Gas” if the mass flow and density accuracy value on position 13 is 9 and position -Z is N1A or N2A.

19.3.6 Set up system related parameters

It is necessary for usage in the plant that the system related parameters like TAGs and communication Address fit to the system settings. Therefore these settings have to be adapted in the Universal Spare Transmitter. The Address and TAGs for the exchange device should be the same as for the defective device in the plant.

Adapt TAG and Address [HART] by display:

1. Set user level “Specialist”
2. Go to menu item “[Detailed setup] ► [Dev info] ► [Order info] ► [Tag]”
3. Choose sub menu item “[Tag]”. Put in Tag of the defective transmitter
   Choose sub menu item “[Long tag]”. Put in Long tag of the defective transmitter[1)]
4. Set “[Tag]” and “[Long tag]”
5. Go to menu item “[Detailed setup] ► [Dev info] ► [HART info] ► [Poll addr]”
6. Set “[Poll addr]”

[1)] The Tag and Long tag are stored in the “Customer_Setting_...csv”-file attached to the microSD card of the defective transmitter.

For hardware settings, please refer to chapter *Advanced settings [▷ 148]*.

19.4 Wiring

For the wiring of Spare transmitter and existing sensor, please refer to chapter *Wiring [▷ 118]*.

19.5 Commissioning

1. Activate external power switch.
2. Perform check of piping installation.
3. Check flow meter for device errors, warnings or alarms,
   see chapter Troubleshooting.
4. Configure the transmitter, and perform autozero,
   see chapter System configuration and operation.

⇨ Flow meter is ready for operation.

20 Advanced functions

20.1 Overview

	Transmitter		Communication type and I/O			
Functional scope	**SITRANS FCT020**	**SITRANS FCT040**	**Available type**			**Mandatory I/O**
			HART	Modbus	PROFIBUS PA	
Order code (pos. 7 and pos. -Z)	2	4, 9	E06, E07 + Fxx	E14 + Fxx	E10 + Fxx	
Standard concentration measurement	–	●	●	●	●	Not applicable
Advanced concentration measurement	–	●	●	●	●	1 status output for one-stage batching 2 status outputs for two-stage batching
Net Oil Computing following API standard	–	●	●	●	●	1 analog input for E06, E07 + Fxx
Tube Health Check	●	●	●	●	●	1 analog input for E06, E07 + Fxx and E14 + Fxx
Batching function	–	●	●	–	–	
Viscosity function	–	●	●	–	●	
Measurement of heat quantity	–	●	●	●	●	

meaning of "–": not available;
meaning of "●": available

	Advanced functions per product			
Functional scope	**SITRANS FC7x0**	**SITRANS FC1x0**	**SITRANS FC6x0**	**SITRANS FC5x0**
Standard concentration measurement	●	●	●	●
Advanced concentration measurement	●	●	●	●

	Advanced functions per product			
Functional scope	**SITRANS FC7x0**	**SITRANS FC1x0**	**SITRANS FC6x0**	**SITRANS FC5x0**
Net Oil Computing following API standard	●	●	●	●
Tube Health Check	●	●	●	●
Batching function	●	●	●	●
Viscosity function	●	●	●	●
Measurement of heat quantity	●	●	●	●

meaning of "–": not available;
meaning of "●": available

20.2 Concentration and petroleum measurement

Standard concentration measurement

The standard concentration measurement (option S16) can be used for concentration measurements of emulsions or suspensions when density of the fluid involved depends only on temperature.

The standard concentration measurement can also be used for many low-concentration solutions if there is only minor interaction between the liquids or if the miscibility is negligible. For questions regarding a specific application, contact the responsible Siemens sales organization. The appropriate density coefficients must be determined prior to using this option and input into the transmitter. To do so, the recommendation is to determine the necessary parameters from density data using DTM in the Pactware program or the calculation tool included in the delivery.

Petroleum measurement function NOC (option S14)

"NOC" is an abbreviation for the "Net Oil Computing" function that provides real-time measurements of water cut and includes "API" (American Petroleum Institute) correction according to API MPMS Chapter 11.1.

Oil sometimes contains entrained gas. SITRANS FC measures the density of the emulsion oil and gas which is lower than the oil density. If the measured density is used to calculate volume flow of oil, the result would not be correct. Therefore NOC function (option S14) includes also a Gas Void Fraction function (GVF). GVF may reduce the error in oil volume flow calculation at a minimum recognizing the occurrence of gas in the oil and using the oil density to calculate the volume flow.

Oil properties can be selected using Oil type's pre-settings or using "Alpha 60".

Oil and water types predefined in the functions	
Oil types	**Water types**
▪ Crude ▪ Refined Products: Fuel, Jet Fuel, Transition, Gasoline ▪ Lubricating ▪ Custom Oil	▪ Standard Mean Ocean Water ▪ UNESCO 1980 ▪ Fresh water density by API MPMS 11.4 ▪ Produced water density by API MPMS 20.1 Appendix A.1 ▪ Brine water density by El-Dessouky, Ettouy (2002) ▪ Custom

In addition to water cut, the function can calculate: Net oil mass flow, net water mass flow, net oil volume flow, net water volume flow and net corrected oil volume flow.

Advanced concentration measurement

The advanced concentration measurement (option Gxx) is recommended for more complex applications, such as for liquids that interact.

Following is a table that lists possible pre-configured concentrations. The desired data sets must be requested by the customer to the Siemens sales organization at the time the order is placed. The customer is responsible to ensure chemical compatibility of the material of the wetted parts with the measured chemicals. For strong acids or oxidizers which attack steel pipes, a variant with wetted parts made of Ni alloy C-22/2.4602 is necessary.

Set	Fluid A / B	Concentration range	Unit	Temperature range in °C	Density range in kg/l	Data source for density data
G01	Sugar / Water	0 – 85	°Bx	0 – 80	0.97 – 1.45	PTB... Messages 100 5/90: "The density of watery sucrose solutions after the introduction of the international temperature scale of 1990 (ITS1990)" Table 5
G02 [1)]	NaOH / Water	0 – 54	WT%	0 – 100	0.95 – 1.58	D´Ans-Lax, Handbook for chemists and physicists Vol.1, 3rd edition, 1967
G03	KOH / Water	1 – 55	WT%	54 – 100	1.01 – 1.58	D´Ans-Lax, Handbook for chemists and physicists Vol.1, 3rd edition, 1967
G04	NH_4NO_3 / Water	1 – 50	WT%	0 – 80	0.97 – 1.24	Table of density data on request
G05	NH_4NO_3 / Water	20 – 70	WT%	20 – 100	1.04 – 1.33	Table of density data on request
G06 [1)]	HCl / Water	22 – 34	WT%	20 – 60	1.08 – 1.17	D´Ans-Lax, Handbook for chemists and physicists Vol.1, 3rd edition, 1967
G07	HNO_3 / Water	50 – 67	WT%	10 – 60	1.26 – 1.40	Table of density data on request
G09 [1)]	H_2O_2 / Water	30 – 75	WT%	4.5 – 43.5	1.00 – 1.20	Table of density data on request
G10 [1)]	Ethylene glycol / Water	10 – 50	WT%	-20 – 40	1.005 – 1.085	Table of density data on request
G11	Starch / Water	33 – 42.5	WT%	35 – 45	1.14 – 1.20	Table of density data on request
G12	Methanol / Water	35 – 60	WT%	0 – 40	0.89 – 0.96	Table of density data on request
G20	Alcohol / Water	55 – 100	VOL%	10 – 40	0.76 – 0.94	Table of density data on request
G21	Sugar / Water	40 – 80	°Bx	75 – 100	1.15 – 1.35	Table of density data on request
G30	Alcohol / Water	66 – 100	WT%	15 – 40	0.77 – 0.88	Standard Copersucar 1967
G37	Alcohol / Water	66 – 100	WT%	10 – 40	0.772 – 0.885	Brazilian Standard ABNT

[1)] We recommend using devices with wetted parts made of nickel alloy C22. Contact the Siemens sales organization about availability.

Maximum 4 Gxx option sets can be ordered for one device simultaneously.

20.3 Batching function

Batching and filling processes are typical applications in different industries as food and beverage, cosmetic, pharmaceutical, chemical and oil & gas.

SITRANS FC offers an integrated “Batching function” to automatize the task. A “self-learning” algorithm optimizes the process and allows high accurate results.

The function supports two filling modes:

- one-stage mode with single valve
- two-stage mode to control two valves for accurate filling

Without using an external flow computer, data related to the process can be transmitted via communication protocol. The error management function allows the user to set alarms and warnings accordingly the application needs.

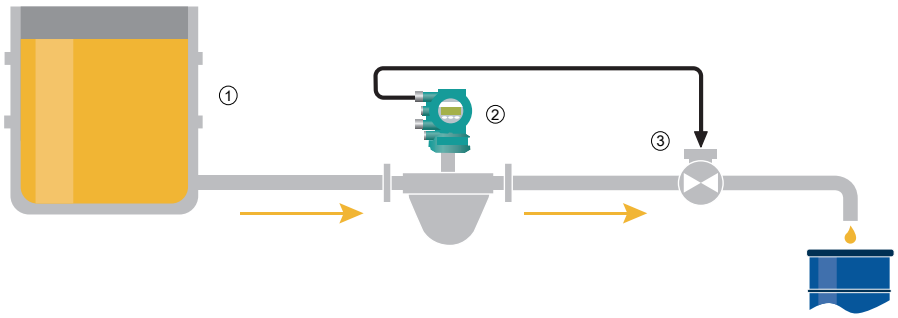


Fig. 112: One-stage mode (The above diagram illustrates the fundamental functionality for one of several combination possibilities)

①	Storage tank	③	Valve
②	SITRANS FC		

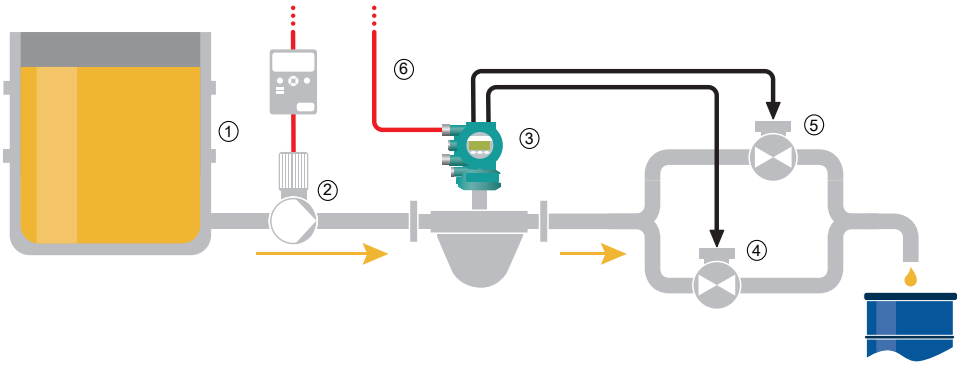


Fig. 113: Two-stage mode (The above diagram illustrates the fundamental functionality for one of several combination possibilities)

①	Storage tank	④	Valve "A"
②	Pump	⑤	Valve "B"
③	SITRANS FC	⑥	HART

20.4 Viscosity function

The Viscosity function allows the user to have an estimation of the viscosity of the fluid.

The function can be used as redundant viscosity control or as reference value to activate other processes like for instance fluid heating systems.

The viscosity estimation is calculated based on a comparison between measured pressure loss Δp and a “calculated” Δp_{cal} between two points of the pipe nearby the flow meter (refer to related instruction manual for the correct installation).

In order to use the function a pressure measurement device (separate order) directly connected to the analog input of the SITRANS FC is necessary. Based on iteration process, SITRANS FC finds the value of viscosity μ that returns a Δp_{cal} closed to the measured Δp.

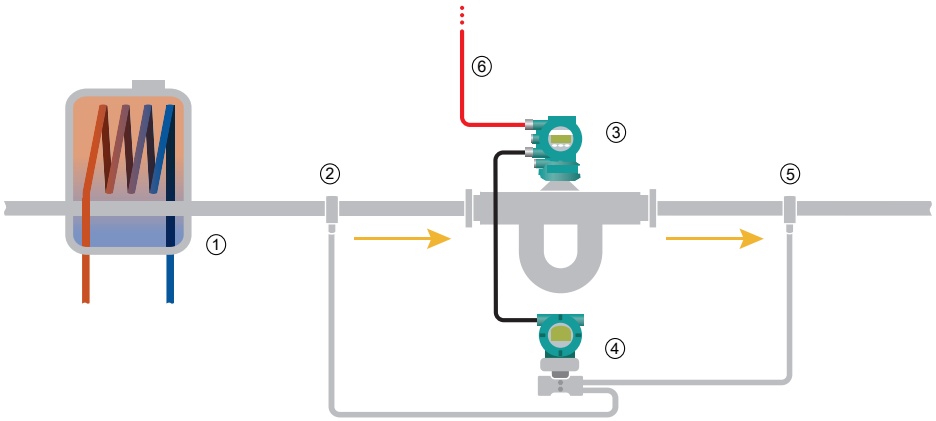


Fig. 114: Positioning of pressure taps

①	Heat exchanger	④	Differential pressure transmitter
②	Pressure tap 1	⑤	Pressure tap 2
③	SITRANS FC	⑥	HART

Application example:

In this application example the Viscosity function returns a reference value used to activate a heating system and the SITRANS FC is using HART communication.

20.5 Tube Health Check

General

The Tube Health Check function is a valuable diagnostic function to evaluate the status of the measuring tubes of SITRANS FC.

Tube integrity

The function is able to measure periodically the change of the stiffness of the measuring tubes and gives the possibility to set up a real predictive maintenance system or to detect corrosion or clogging of the measuring tubes. The measurement values can be stored in the internal microSD card or transmitted via HART, Modbus or PROFIBUS PA protocol and therefore integrated in the customers condition monitoring system.
An alarm or an external event can be activated directly from SITRANS FC in case the measured value exceeds a threshold defined by the user.

20.6 Measurement of heat quantity

The function allows to evaluate the total fuel calorific value of the measured fluid.
The function can work with a constant value of the calorific value of the fluid, but in order to have a precise evaluation we suggest to use an additional device like a gas chromatograph (not included in the supply). The external device that supplies the instantaneous calorific value is connected with the current input of the transmitter. Based on the mass flow, the total calorific energy of the fluid is calculated as below:

Formula for total calorific energy

$$\Sigma E_{cal} = \Sigma (Q_m \times H_i \times \Delta t)$$

E_{cal}	Calorific energy
Q_m	Mass flow rate
H_i	Calorific value variable
Δt	Time interval between two measurements

Other formula based on volume and corrected volume are included in the function and can be set using the display.

21 Approvals and declarations of conformity

CE marking

The SITRANS FC meets the statutory requirements of the applicable EU Directives. By attaching the CE mark, Siemens confirms conformity of the field instrument with the requirements of the applicable EU Directives. The EU Declaration of Conformity is enclosed with the product on a data carrier.

Pressure equipment approvals

The SITRANS FC is in compliance with the statutory requirements of the applicable EU Pressure Equipment Directive (PED) for fluid groups 1 and 2.

The customer is fully responsible of selecting proper materials which withstand corrosive or erosive conditions. In case of heavy corrosion and/or erosion the instrument may not withstand the pressure and an incident may happen with human and/or environmental harm. Siemens will not take any liability regarding damage caused by corrosion or erosion. If corrosion or erosion may happen, the user has to check periodically if the necessary wall thickness is still in place.

RoHS and WEEE Intended Use

SITRANS FC flow meter is intended to be sold and used in large-scale stationary industrial applications, large-scale fixed installation, means of transport vehicles for persons or goods, excluding two-wheel vehicles which are not type approved. The instrument should be disposed in accordance with applicable national legislations or regulations, respectively.

Details about all standards that are fulfilled are show in the tables below.

Not all options are available in all countries. For details please contact your local Siemens Sales Organization.

21.1 Legal equipment standards and norms

Legal equipment standards and norms

Approval type	Approval or certificate
Electromagnetic Compatibility (EMC)	EU directive 2014/30/EU per EN 61326-1 Class A Table 2 and EN 61326-2-3 and EN 61328-2-5 (PROFIBUS PA)
	RCM in Australia/New Zealand: SITRANS FC meets the EMC requirements of the Australian Communications and Media Authority (ACMA).
	KC mark in Korea
Low Voltage	EU directive 2014/35/EU (LVD) per: ▪ EN 61010 1 ▪ EN 61010 2 030
	ANSI/UL 61010-1
	CAN/CSA-C22.2 N0. 61010-1/US)

Approval type	Approval or certificate
Pressure Equipment	EU directive 2014/68/EU per AD 2000 Code (PED)
	ASME B31.3 compliance
	CRN registered in Canada
	ANSI/UL 61010-1 Annex G
	CAN/CSA-C22.2 N0. 61010-1 Annex G
	Licensing rules for special equipment and charging units TSG 07 Pressure pipe supervision inspection rules TSG D7006
RoHS	EU Directives 2011/65/EU, 2015/863/EU per EN IEC 63000
	China RoHS
	Environmental Conditions; compliance to ISA-71.04G standard

21.2 Application and industry related standards

General industrial standards

Approval type	Approval or certificate
NAMUR	▪ EMC according to NE 21 ▪ Homologation according to NE 95 ▪ Mounting length according to NE 132
NACE	Chemical composition of wetted materials 316L/316/1.4404/1.4401/1.4435 and Ni-Alloy C-22/2.4602 is conform to: ▪ ANSI / NACE-MR0175 / ISO15156-2 ▪ ANSI / NACE-MR0175 / ISO15156-3 ▪ NACE MR0103 For details please see Siemens declaration about NACE conformity A5E53186128.
3-A	3-A Sanitary standards in combination with process connection types G2, G6 and J1
EHEDG	EHEDG in combination with process connection type G2, G6 and J1
EC1935-2004 & EC2023-2006	Compliance with the European legislation for the food industry EC1935-2004 & EC2023-2006. For details please see Siemens declaration of conformity.

Marine approvals

Approval type	Approval or certificate
IMO	Material Declaration and Ship recycling compliances to IMO Resolution MEPC.269 (68)
DNV	Marine type approval according to DNV Type approval scheme DNV-CP-0338 and EU RO Mutual Recognition type approval required by article 10.1 of EU regulation 391/2009. For thermal oil applications please consider X-ray inspection (option C33 or C34); see Order code description.
KR	Marine type approval according to KR Rules for Classification of Steel Ships Pt.6, Ch.2, Art.301

Approval type	Approval or certificate
ABS	Product device assessment according to ABS rules for building and classing ▪ Marine Vessels 4-8-3/1.7, 1.9, 1.11.1, 1.17.1 & 13.1, 4-8-4/27.1, 4-9-9/13.1, 13.5 and Table 1 ▪ Offshore units 4-3-1/9, 11, 15 & 17.1, 4-3-3/9.1.1 and 9.1.2
LR	Marine type approval according to Lloyd's Register's Type Approval System (LR), test specification Number 1 - December 2021 including Marine, offshore and industrial applications for use in environmental categories ENV1, ENV2, ENV3 and ENV4.
BV	Marine type approval according to Bureau Veritas (BV) test specification with the main rules NR467 Rules for the classification of steel ships and NR445 Rules for the classification of offshore units.

Metrological Regulations

Approval type	Approval or certificate
ISO	Measurement of fluid flow in closed conduits. Guidance to the selection, installation and use of Coriolis flowmeters (mass flow, density and volume flow measurements) according to Manufacturer Declaration: ISO 10790
Local type approvals	SITRANS FC is registered as a measuring instrument in the following countries: ▪ China Please contact your Siemens representative regarding respective “Pattern Approval Certificate of Measuring Instruments” and for export to these countries.

21.3 Communication interface standards

Communication interface standards

Approval type	Approval or certificate
HART	Registered at FieldComm Group
PROFIBUS PA	Certified at PROFIBUS Nutzerorganisation e.V acc. to PA-Profile 3.02

21.4 Other standards and guidelines

Other standards and guidelines

Approval type	Approval or certificate
IGC	Intergranular Corrosion testing of wetted parts according EN ISO 3651-2 and ASTM. IGC test and certificate available with option P6.
WEEE	EU directive 2012/19/EU (Waste Electrical and Electronic Equipment) is only valid in the European Economic Area.
Dual Seal	Dual Seal approval acc. UL 12.27.01

21.5 Hazardous area

Ex approvals: All data relevant for explosion protection are included in separate Explosion Proof Type Reference Manuals.

Approval type	Approval or certificate
ATEX	EU Directive 2014/34/EU ATEX approval: DEKRA 23ATEX0031 X CE 2813 II2G or II2(1)G or II2D or II2(1)D Applied standards: ▪ EN 60079-0 ▪ EN 60079-1 ▪ EN 60079-7 ▪ EN 60079-11 ▪ EN 60079-31
IECEx	IECEx approval: IECEx DEK 23.0028X Applied standards: ▪ IEC 60079-0 ▪ IEC 60079-1 ▪ IEC 60079-7 ▪ IEC 60079-11 ▪ IEC 60079-31
FM (CA/US)	FM approvals: ▪ US Cert No. FM23US0039X ▪ CA Cert No. FM23CA0029X Applied standards: ▪ Class 3600 ▪ Class 3610 ▪ Class 3615 ▪ Class 3616 ▪ Class 3810 ▪ ANSI/UL 60079-0 ▪ ANSI/UL 60079-11 ▪ ANSI/UL 61010-1 ▪ ANSI/NEMA 250 ▪ ANSI/IEC 60529 ▪ UL 122701 ▪ CSA-C22.2 No. 0.4 ▪ CSA-C22.2 No. 0.5 ▪ CSA-C22.2 No. 25 ▪ CSA-C22.2 No. 30 ▪ CSA-C22.2 No. 94.1 ▪ CSA-C22.2 No. 94.2 ▪ CSA-C22.2 No. 60079-0 ▪ CSA-C22.2 No. 60079-11 ▪ CSA-C22.2 No. 61010-1 ▪ CSA-C22.2 No. 60529

Approval type	Approval or certificate
NEPSI (CN)	Applied standards: ▪ GB/T 3836.1 ▪ GB/T 3836.2 ▪ GB/T 3836.3 ▪ GB/T 3836.4 ▪ GB/T 3836.31
Korea Ex	Applied standards: Notice of Ministry of Labor No 2016-54 harmonized with ▪ IEC 60079-0 ▪ IEC 60079-1 ▪ IEC 60079-7 ▪ IEC 60079-11 ▪ IEC 60079-31

22 Dismantling and disposal

22.1 Decontamination and return shipment

⚠ DANGER

Use of fluids that are a health hazard may result in caustic burns or poisoning

- When removing the flow meter, avoid touching the fluid and breathing gas residues left in the sensor.
- Wear protective clothing and a breathing mask.

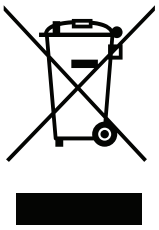
Note the following items before returning the shipment:

- Clean flow meter thoroughly. No harmful chemicals must remain in or on the flow meter. Siemens only accepts completely drained and cleaned flow meters.
- The form "Decontamination Declaration" must be filled in completely and sent to Siemens along with the flow meter.
- Package flow meter in a shockproof manner for transport. Use original packaging, if possible.

22.2 Disposal

Prior to disposal of the flow meter, please take note of the following:

- Comply with the applicable national regulations in the event of disposal or recycling.
- Do not dismantle flow meter until all fluid residues have been removed and dispose the parts individually.



Devices described in this manual should be recycled. They may not be disposed of in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE). Devices can be returned to the supplier within the EC and UK, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country. Further information about devices containing batteries can be found at: Information about battery / product return (WEEE) (https://support.industry.siemens.com/cs/document/109479891/)

Special disposal required

The device includes components that require special disposal.

- Dispose of the device properly and environmentally through a local waste disposal contractor.

23 Specifications

Specifications for sensor and transmitter are listed in the *Operating Instructions* of the corresponding product family.

23.1 Lifetime definition

Lifetime for SITRANS FC: 20 years at ambient temperature ≤ 40 °C.

This value is based on stable environmental condition for safety applications, see Safety Instructions A5E52748634.

24 Product documentation and support

24.1 A.1 Product documentation

Process instrumentation product documentation is available in the following formats:

- Certificates (http://www.siemens.com/processinstrumentation/certificates)
- Downloads (firmware, EDDs, software) (http://www.siemens.com/processinstrumentation/downloads)
- Catalog and catalog sheets (http://www.siemens.com/processinstrumentation/catalogs)
- Manuals (http://www.siemens.com/processinstrumentation/documentation)
  You have the option to show, open, save, or configure the manual.
  - "Display": Open the manual in HTML5 format
  - "Configure": Register and configure the documentation specific to your plant
  - "Download": Open or save the manual in PDF format
  - "Download as html5, only PC": Open or save the manual in the HTML5 view on your PC

You can also find manuals with the Mobile app at Industry Online Support (https://support.industry.siemens.com/cs/ww/en/sc/2067). Download the app to your mobile device and scan the device QR code.

Product documentation by serial number

Using the PIA Life Cycle Portal, you can access the serial number-specific product information including technical specifications, spare parts, calibration data, or factory certificates.

Entering a serial number

1. Open the PIA Life Cycle Portal (https://www.pia-portal.automation.siemens.com).
2. Select the desired language.
3. Enter the serial number of your device. The product documentation relevant for your device is displayed and can be downloaded.

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

Scanning a QR code

1. Scan the QR code on your device with a mobile device.
2. Click "PIA Portal".

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

24.2 A.2 Technical support

Technical support

If this documentation does not completely answer your technical questions, you can enter a Support Request (http://www.siemens.com/automation/support-request).

For help creating a support request, view this video here (www.siemens.com/opensr).

Additional information on our technical support can be found at Technical Support (http://www.siemens.com/automation/csi/service).

Service & support on the Internet

In addition to our technical support, Siemens offers comprehensive online services at Service & Support (http://www.siemens.com/automation/serviceandsupport).

Contact

If you have further questions about the device, contact your local Siemens representative at Personal Contact (http://www.automation.siemens.com/partner).

To find the contact for your product, go to "all products and branches" and select "Products & Services > Industrial automation > Process instrumentation".

Contact address for business unit:

Siemens AG
Digital Industries
Process Automation
Östliche Rheinbrückenstr. 50
76187 Karlsruhe, Germany

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Siemens AG

Digital Industries
Process Automation
Östliche Rheinbrückenstr. 50
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Online Support