ABB MEASUREMENT & ANALYTICS | DATA SHEET

SensyMaster FMT430, FMT450

Thermal Mass Flowmeter

Measurement made easy

Precise and sensitive direct mass flow measurement of gases

Efficient, high-grade thermal sensor elements

- Single-chip design thermal sensors on ceramic support material for superior long term stability
- Effective sensor element protection frame with flow conditioning properties for best repeatability

High performance ABB common platform based electronics

- Quick commissioning with Easy Set-up
- Easy parametrization by ABB common menu concept
- Modular In- and outputs with plug-in cards
- “Plug-and-play” electronic exchange with SensorApplicationMemory
- Best accuracy with dynamic temperature compensation

ApplicationSelector

- Up to 8 configurable applications for maximum flexibility

Integrated diagnostics and on-board verification

- Lower costs with extended maintenance cycles
- Better plant availability with predictive maintenance
- Safe processes through sensor element verification

Overview – models

Flowmeter sensor

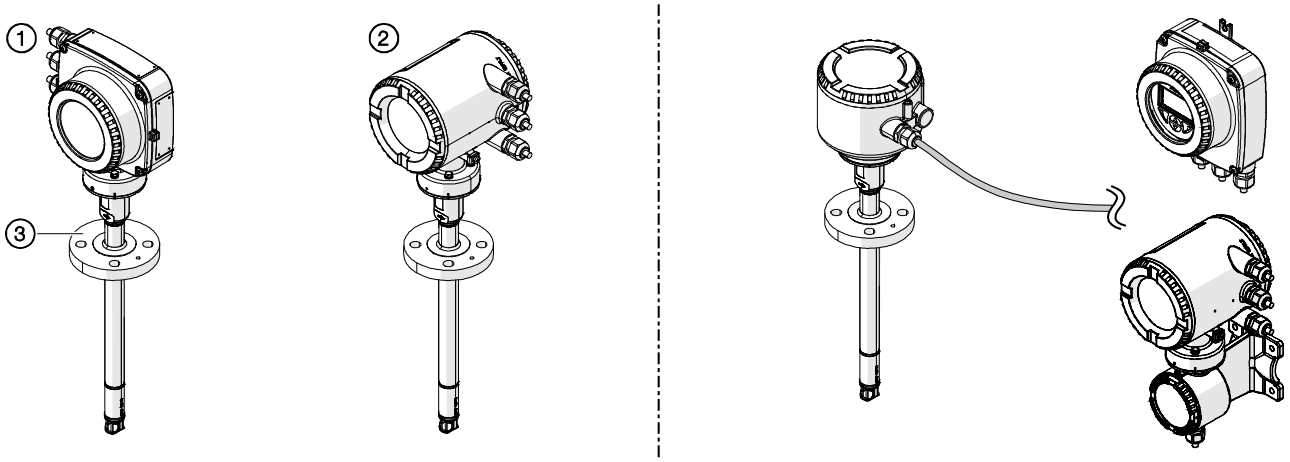


Figure 1: Sensor FMT430, FMT450 (example)

Model	FMT430	FMT450
Design	Integral mount design, remote mount design; Transmitter optionally available in single-compartment housing (1) or dual-compartment housing (2)	
Measuring media	Gas (air ,methane, nitrogen, hydrogen, carbon dioxide, oxygen, natural gas, ammonia, helium, argon, propane, ethane, butane, ethene, biogas) and gas mixtures with known compositions	
Measuring accuracy for gases[1)] Air, nitrogen	± 1.2 % of Qm in the range of 10 ... 100% of the measuring range; ± 0.12 % of the Q_{max}DN possible in the nominal diameter in the range of 0 ... 10 % of the measuring range	± 0.6 % of the measured value, ± 0.05% of the Q_{max}DN possible in the nominal diameter
Other gases (optional process gas calibration)	–	± 1.6 % of the measured value, ± 0.1 % of the Q_{max}DN possible in the nominal diameter
Extended measuring range	No	Yes, optional
Measuring medium temperature T_{medium}	Standard: -20 ... 150 °C (-4 ... 302 °F)	Standard: -20 ... 150 °C (-4 ... 302 °F) optional: -20 ... 300 °C (-4 ... 572 °F)
Ambient temperature $T_{ambient}$	Standard: -20 ... 70 °C (-4 ... 158 °F)	
Sensor connection (3)	Flange DN 25 – PN 40, threaded connection DN 11851, compression fitting	
Wetted materials	Stainless steel, ceramic measuring element (other materials on request)	
IP rating	In accordance with EN 60529: IP 65 / IP 67	
NEMA rating	In accordance with NEMA 4X	

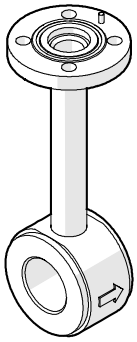
Approvals and certificates	
Explosion protection ATEX / IECEx	In preparation
Explosion protection cFMus	In preparation
Further approvals	Available on our website abb.com/flow or on request

1) The stated measuring accuracy only applies under the reference conditions in the stated measuring range.

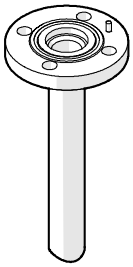
...Overview – models

Process connections

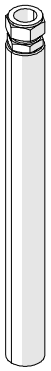
FMT091 – Wafer type design

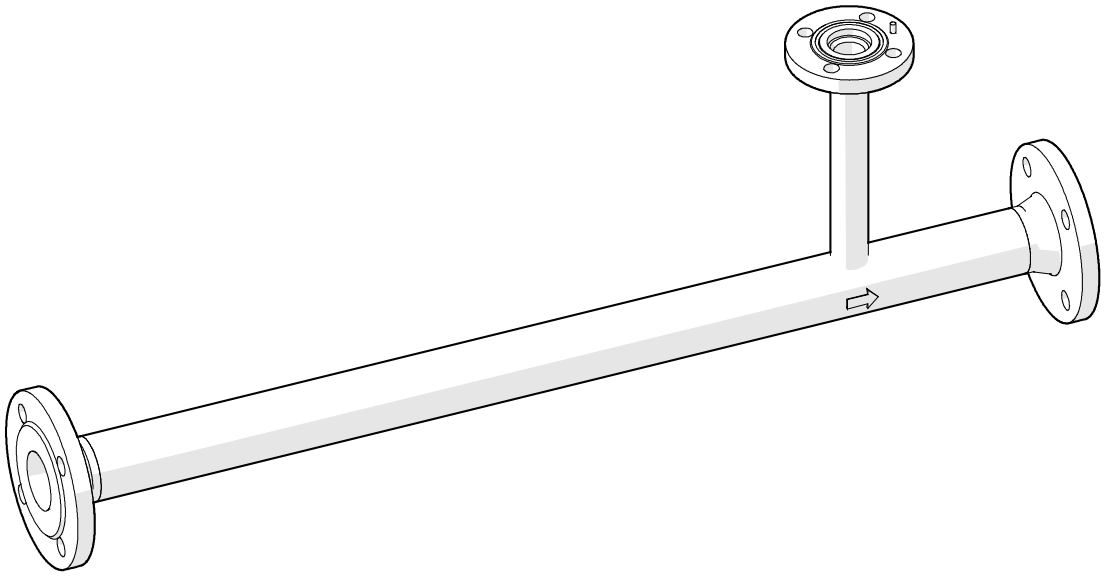


FMT094 – Weld-on adapter



FMT094 – Weld-on adapter with clamp ring threading





FMT092 – Partial measuring section

Figure 2: Pipe components (examples)

Pipe components	
FMT091 – Wafer type design	In accordance with EN 1092-1 DN 40 ... 200, PN 40
	In accordance with ASME B16.5 1 1/2 ... 8”, CL 150 ... 300
FMT092 – Partial measuring section	Flange in accordance with EN 1092-1, DN 40 ... 100 (larger nominal diameters on request), PN 10 ... 40.
	Flange in accordance with ASME B16.5 1 1/2 ... 8”, CL 150 ... 300
	Male thread DN 25 ... 80 R1 in. ... 3 in.
FMT094 – Weld-on adapter	For rectangular ducts or pipe diameters ≥ DN 100 (4 in.), PN 16 ... 40
Wetted materials	
Stainless steel, galvanized steel (other materials on request)	

Transmitter

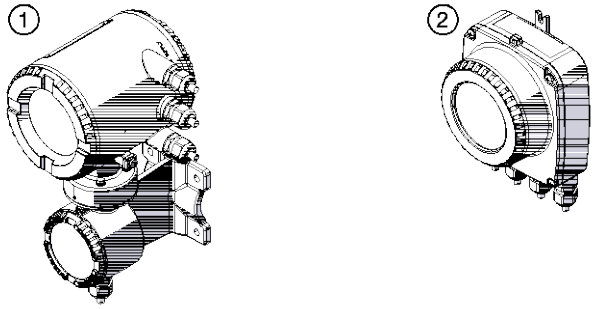


Figure 3: Transmitter in remote mount design

Model	**FMT432**	**FMT452**
Design	Integral mount design (see "Figure 1" on page 3), remote mount design; Transmitter optionally available in single-compartment housing (1) or dual-compartment housing (2)	
IP rating	In accordance with EN 60529: IP 65 / IP 67	
NEMA rating	In accordance with NEMA 4X	
Signal cable length	Maximum 200 m (656 ft), remote mount design only	
Power supply	24 V DC, ± 20 %; 100 ... 240 V AC (-15 % / +10 %, 47 ... 64 Hz)	
Outputs in basic version	Current output: 4 … 20 mA, active or passive Digital output 1: passive, configurable as pulse, frequency or switch output Digital output 2: passive, configurable as pulse, frequency or switch output	
Additional optional outputs	The transmitter has two slots in which plug-in cards can be inserted to provide additional inputs and outputs. The following expansion cards are available: • Current output (maximum two expansion cards simultaneously) • Digital output (maximum one expansion card) • Digital input (maximum two expansion cards) • 24 V DC power supply for active outputs (maximum one expansion card)	
Communication	Standard: HART 7.1, optional: PROFIBUS DP (in preparation) / Modbus (in preparation)	
External output zero return	Yes	
External totalizer reset	Yes	
Counter	Yes	
ApplicationSelector	Yes, up to 2 applications	Yes, up to 8 applications
Preconfigured applications	Yes, up to 2 applications	Yes, up to 4 applications
Free configurable applications	No	Yes, up to 4 applications
Selectable nominal diameters	Yes	Yes
Selectable gas type	No	Yes
Filling function	No	Yes, optional
"VeriMass" diagnosis function	Yes, optional	Yes, optional

Approvals	
Further approvals	At www.abb.com/flow or on request.

...Overview – models

Device description

The SensyMaster FMT430, FMT450 works in accordance with the measuring principle of a hot-film anemometer. This measurement method allows for direct measurement of the gas mass flow.
Taking into account the standard density, the norm volume flow can be displayed without the need for additional pressure and temperature compensation.
The transmitter is equipped with an analog / HART output (0/4 ... 20 mA) and two fast digital outputs that can be configured as pulse, frequency or binary outputs.
Optionally, the transmitter can be extended using plug-in cards with further inputs and outputs.
The SensyMaster FMT430, FMT450 is used in the process industry for the flow measurement of gases and gas mixtures.

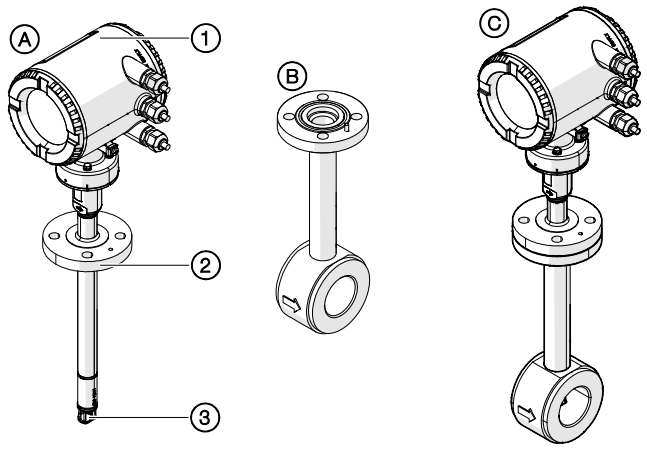


Figure 4: **Sensor (example, wafer type design)**

Pos.	Description
A	Sensor
B	Pipe component
C	Sensor with pipe component
1	Transmitter
2	Sensor connection
3	Thermal measuring element

Table 1 **Legend**

The SensyMaster FMT430, FMT450 is composed of the components sensor and pipe component (process connection).
The pipe component can be delivered in various designs. In addition, a weld-on adapter makes it possible to install the flowmeter sensor in rectangular ducts or pipelines with any diameter.

Measuring principle

Thermal flow metering procedures use different ways to evaluate the flow dependent cooling of a heated resistor as measuring signal.
In a hotfilm anemometer with constant temperature difference control, the heated platinum resistor is maintained at a constant overtemperature in relation to an unheated platinum sensor inside the gas flow.
The heating power required for maintaining the overtemperature depends directly on the flow rate and the material properties of the gas. With a known (and constant) gas composition the mass-flow can be determined by electronically evaluating the heater current / mass-flow curve without additional pressure and temperature compensation.
Together with the standard density of the gas this results directly in the standard volume flow.
Considering the high measuring range dynamics up to 1:100, an accuracy smaller than 1 % of the measuring value is achieved.

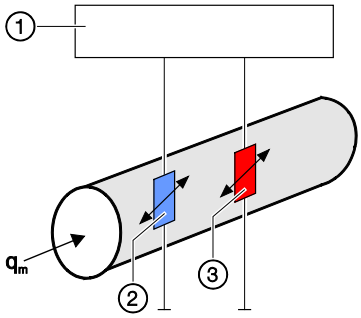


Figure 5: **Measuring principle (simplified)**

Pos.	Description
1	Transmitter
2	Measurement resistor gas temperature
3	Heat resistor

Table 2 **Legend**

The transmitter has three signals available. In addition to the heating power, the temperatures of the measuring medium and the heater resistance are included herein, which can be used to compensate the temperature dependency of gas parameters.
By storing the gas data in the transmitter the optimal tailoring can be calculated and performed at any operating point.

Advantages of the SensyMaster measuring principle

- Through the provision of several primary and secondary signals, they can be displayed in parallel via the HART interface. This saves a gas temperature measurement.
- Regulating the measuring element and adjusting the signal processing becomes possible through the implementation of fully digital signal processing. Thus, an optimum measuring dynamic can always be achieved even under changing operating conditions.
- The SensyMaster measuring principle can offer an even larger measuring range.

Typical applications

- Gas volume measurement in chemical and process technology (air ,methane, nitrogen, hydrogen, carbon dioxide, oxygen, natural gas, ammonia, helium, argon, propane, ethane, butane, ethene, biogas)
- Pressurized air balancing
- Gas burner controls
- Digester gas and activation air measurements in sewage plants
- Gas measurement in air separators
- Hydrogen measurements in the process

ApplicationSelector – Integrated data bank for gases

The thermal mass flowmeters SensyMaster FMT430, FMT450 have an integrated gas data base for air, methane, nitrogen, carbon dioxide, oxygen and other gases.
Two (FMTx30) or eight (FMTx50) different application can be defined in total. Two or four applications can also be preconfigured in the factory on request.
The operator can define their own applications (only with FMTx50)

- For each application the gas type can be chosen from a table, additionally gas mixtures of up to ten different gases can also be configured.
- For each application the pipeline diameter can be configured.
- For each application the parameters for the flow rate and temperature measurement can be configured.

Diagnosis and self-monitoring

The thermal mass flowmeter SensyMaster FMT430, FMT450 also includes the internal monitoring of the transmitter and the sensor.
Amongst other things, the following functions and components are monitored:

- Monitoring of the power supply
- Limit value monitoring of the process values, temperature monitoring of the measuring medium
- Monitoring of the measuring element for line break and short-circuit
- Monitoring of the SensorMemory

Sensor verification “VeriMass” (optional)

SensorCheck

VeriMass includes the SensorCheck, which verifies the integrity of the measuring elements and can notify of possible deposits on the measuring elements.
The SensorCheck relies on the comparison of fingerprints. The finger print includes values that are based on the temperature and heat conductivity of the measuring element. For instance, a fingerprint created during installation can be compared with a fingerprint created at a later point in time.

The sensor check must be started in the transmitter and always performed at zero flow under the same conditions. The comparison of values delivers information on possible damage or contamination of the measuring elements.

...Overview – models

FillMass batch function

Only for FMT450

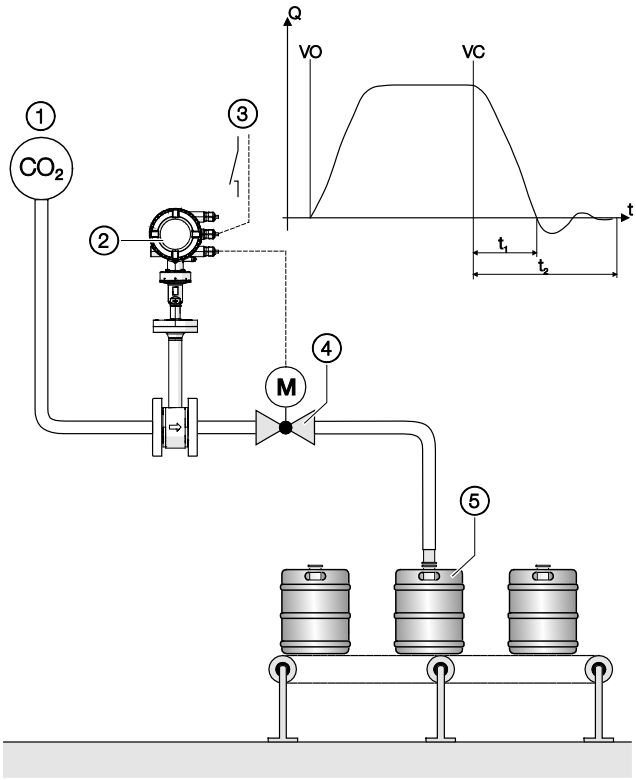


Figure 6: Filling function FillMass (example CO_2filling)

The integrated FillMass fill function allows filling processes to be recorded in > 3 seconds.
For this purpose, the filling quantity is given via an adjustable totalizer.
The fill function is controlled via the HART interface or via the digital input.
The valve is triggered via one of the digital outputs and closed again once the preset filling quantity is reached.
The transmitter measures the overrun quantity and calculates the overrun correction from this.
Additionally, the low flow cut-off can be activated if required.

Pos.	Description
1	Gas line (CO_2)
2	Sensor
3	Fill start / stop (via digital input)
4	Fill valve
5	Fill container
VO	Valve open (filling started)
VC	Valve closed (fill quantity reached)
t_1	Valve closing time
t_2	Overrun time

Table 3 Legend

Flowmeter sensor

Installation conditions

Installation location and assembly

Note the following points when selecting the installation location and when mounting the sensor:

- The ambient conditions (IP rating, ambient temperature range T_{amb}) of the device must be adhered to at the installation location.
- Sensors and transmitters must not be exposed to direct sunlight.If necessary, provide a suitable means of sun protection on site. The limit values for the ambient temperature T_{amb} must be observed.
- On flange devices, ensure that the counterflanges of the piping are aligned plane parallel. Only install flange devices with suitable gaskets.
- Prevent the sensor from coming into contact with other objects.
- The device is designed for industrial applications.
  No special EMC protective measures are required if the electromagnetic fields and interference at the installation location of the device comply with "Best Practice" guidelines (in accordance with the standards referred to in the declaration of conformity).
  Maintain a suitable distance from electromagnetic fields and interference that extend beyond the usual dimensions.

Gaskets

Users are responsible for selecting and mounting suitable gaskets (material, shape).
Note the following points when selecting and mounting gaskets:

- Only gaskets made from a material that is compatible with the measuring medium and measuring medium temperature may be used
- Gaskets must not extend into the flow area, since possible turbulence may influence the accuracy of the device.

Inlet and outlet sections

The figures below show the recommended inlet and outlet sections for various installations.

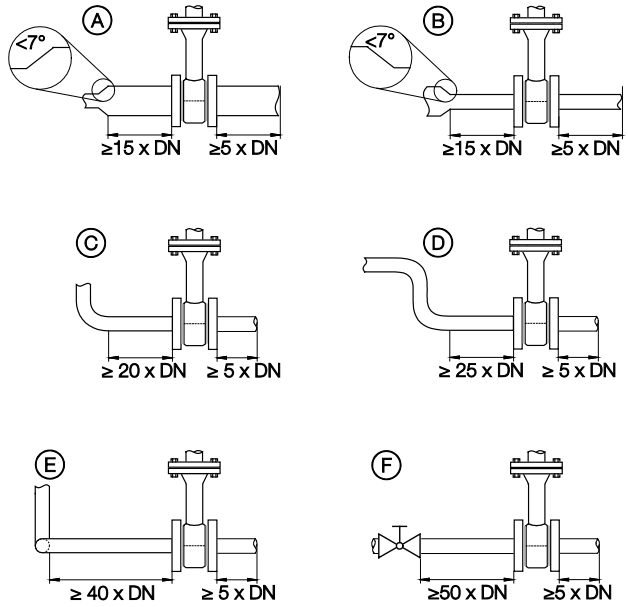


Figure 7: Inlet and outlet sections

Installation		Inlet section	Outlet section
A	Pipe extension	min. 15 x DN	min. 5 x DN
B	Pipe reduction	min. 15 x DN	
C	90° Pipe elbow	min. 20 x DN	
D	2 x 90° Pipe elbow in one level	min. 25 x DN	
E	2 x 90° Pipe elbow in two levels	min. 40 x DN	
F	Turn-off device	min. 50 x DN	

Table 4 Legend

...Flowmeter sensor

To achieve the specified measuring accuracy, the indicated inlet and outlet sections are required.
In case of combinations of several inlet-side errors, e.g. valve and reduction, a longer inlet section must always be taken into account.
In case of confined spaces at the installation place, the outlet section can be reduced to 3 x DN. However, reducing the specified inlet section will reduce the achievable level of accuracy.
A high repeatability of the measured value is maintained.
In case of insufficient inlet and outlet sections, a special calibration may be possible. To do this, a detailed alignment is necessary for individual cases.
The specified inlet and outlet sections must be doubled for gases with a very low density (hydrogen, helium).

Sensor insulation

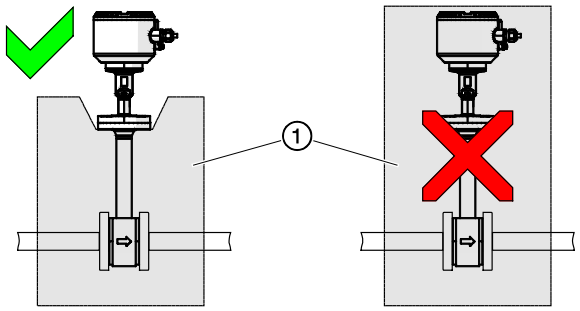


Figure 8: Insulation of the sensor

The sensor may be insulated as shown in Figure 8.

Installation at high ambient temperatures

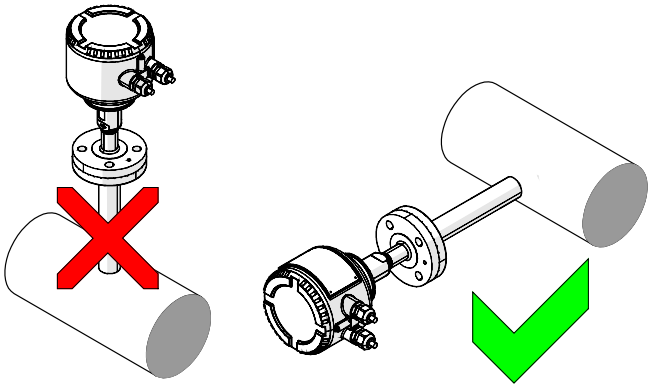


Figure 9: Mounting position at high ambient temperatures

Under high but permissible ambient temperatures, avoid additional thermal stress from heat convection or radiation, since these sources of heat may exceed the permissible ambient temperature on the equipment surface.
If the device needs to be installed directly on a hot, horizontal piping, we recommend installing it on the side. In such cases, you should avoid installing it in the 12 o'clock position, otherwise the warm air that rises up will cause additional heating of the electronics.

Measuring accuracy

Measured error

The stated measured error only applies under the reference conditions in the stated measuring range. Special calibration on request.

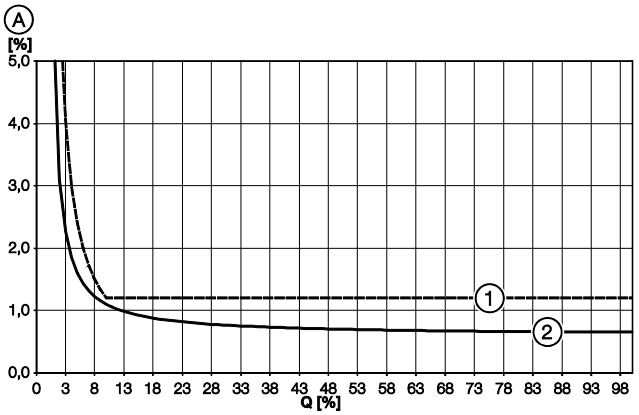


Figure 10: Measured error under reference conditions

Pos.	Description
A	Measured error in %
1	FMT230
2	FMT250

Table 5 Legend

Measuring medium	FMT430	FMT450
Air, nitrogen	± 1.2 % of the measured value in the range of 10 ... 100 % of the measuring range	± 0.6 % of the measured value
	± 0.12 % of the measuring range's final value possible in the nominal diameter in the range of 0 ... 10 % of the measuring range	± 0.05 % of the measuring range's final value possible in the nominal diameter
Other gases	–	Optional process gas calibration: ± 1.6 % of the measured value
		± 0.1 % of the measuring range's final value possible in the nominal diameter

Table 6 Measured error

Reference conditions

Calibration with air	
Calibration gas	Air
Temperature	21 °C, ± 2°C
Pressure	Atmospheric pressure
Relative humidity	40 ... 60 %
Test laboratory	In accordance with ISO / IEC 17025

Calibration with process gas	
Order code	RP, RM
ABB offers the possibility of calibrating thermal mass flowmeters with non-corrosive and non-toxic gases and mixtures of such, subject to availability. The availability of gases should be inquired prior to ordering with ABB.	

The exact reference conditions are noted in the respective calibration certificate.

Reproducibility

< 0.2 % of the measured value, measuring time: 10 s

Response time

T_{63} = 0.5 s

Effect of the temperature of the medium being measured

< 0.025 % of the measured value per Kelvin (depending on the gas type)

Effect of the measuring medium pressure

< 0.1 % of the measured value per 100 kPa (1 bar) (depending on the gas type)

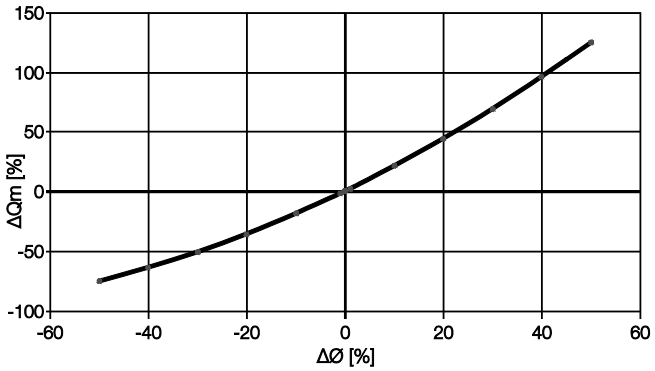
Influence of the relative humidity of the measuring medium

0.2 % of the measured value per 10 % RH in the range of 15 ... 70 % RH

...Flowmeter sensor

Influence of the pipe cross-section

If the inside diameter configured in the device does not correspond with the real diameter of the piping, measuring errors in the flow measurement occur.



Δ Qm [%] = Measuring error mass flowmeter in %

Δ Ø [%] = Deviation piping inside diameter in %

Figure 11: Influence of the pipe cross-section

Environmental conditions

Ambient temperature

Standard: -20 ... 70 °C (-4 ... 158 °F)

Storage temperature range

-25 ... 85 °C (-13 ... 185 °F)

Relative humidity

Maximum 85 % RH, annual average ≤ 65 % RH

IP rating

In accordance with EN 60529: IP 65 / IP 67

NEMA rating

NEMA 4X

Permitted pipe vibration

In accordance with IEC 60068-2-6

Maximum acceleration: 2 g in the frequency range of 10 ... 150 Hz

Process conditions

Measuring medium temperature

Devices with ceramic element and flange connection

Standard: -20 ... 150 °C (-4 ... 302 °F)

Extended (optional, only FMTx50):

-20 ... 300 °C (-4 ... 572 °F)

The approved measuring medium temperature T_{medium} also depends on the selected sensor process connection and the design of the pipe components.

The following temperature specifications apply:

Sensor connection	T_{medium}
Threaded connection DIN 11851	-20 ... 140 °C (-4 ... 284 °F)
Clamp ring fitting	-20 ... 140 °C (-4 ... 284 °F)
Pipe components with ball valve	Maximal 150 °C (302 °F)
Integrated hot tap fitting	See the chapter titled "Integrated hot tap fitting" on page 23

Table 7 Approved measuring medium temperature T_{medium} as a function of the sensor process connection

Operating pressure

Maximum operating pressure

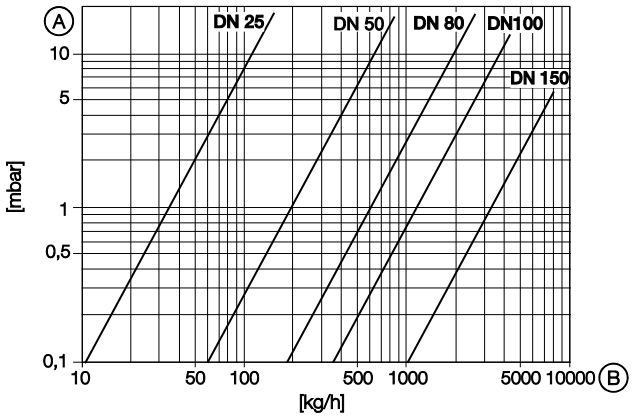
Standard for devices with flange connection, P_{medium}:
4 MPa; 40 bar (580 psi)

The approved operating pressure P_{medium} also depends on the selected sensor process connection and the design of the pipe components.
The following temperature specifications apply:

Sensor connection	P_{medium}
Threaded connection DIN 11851	1,6 MPa; 16 bar (232 psi)
Clamp ring fitting	2 MPa; 20 bar (290 psi)
Integrated hot tap fitting	See the chapter titled "Integrated hot tap fitting" on page 23

Table 8 Approved operating pressure P_{medium} as a function of sensor process connection

Pressure drop



(A) Pressure loss
(B) Mass flow

Figure 12: Pressure loss in logarithmic representation

Sensor installation length

The sensor is available in different installation lengths. See chapter "Flowmeter sensor" on page 24 .

Sensor connection

The following sensor connections are available for connecting the sensor to the pipe components or the process:

Sensor connection
Flange in accordance with EN 1092-1 DN 25, PN 40
Male thread in accordance with DIN 11851, PN 16
Compression fitting NPT 1” Male thread, PN 20

Materials

Materials for the sensor

Wetted components	Material
Sensor	Stainless steel 1.4571 (AISI 316 Ti)
Measuring element	Ceramic
Sensor connection gasket (O-ring)	• Viton (standard) • Kalrez 4079 / Kalrez 1050 (for high temperature design) • Kalrez 1050 (for oxygen) • Kalrez Spectrum 6375 (for ammoniac) • EPDM (DIN 11851)

...Flowmeter sensor

Measuring range table

The recommended value for applications with air or nitrogen (other gases on request) under atmospheric conditions. For hydrogen and helium, the measuring range lower limit is typically approx. 10 % of the upper limit.

Devices with process connections in accordance with EN 1029-1

	Standard measuring range		Extended measuring range (only with FMTx50)	
Nominal diameter	**Q_{max} [kg/h]**	**Q_{max} [Nm^3/h][2)]**	**Q_{max} [kg/h]**	**Q_{max} [Nm^3/h][2)]**
DN 25 (1 in.)	180	140	240	180
DN 40 (1 1/2 in.)	450	350	590	450
DN 50 (2 in.)	800	620	1050	820
DN 65 (2 1/2 in.)	1400	1100	1750	1400
DN 80 (3 in.)	1900	1500	2400	1900
DN 100 (4 in.)	3200	2500	4100	3200
DN 125 (5 in.)	4800	3800	6200	4800
DN 150 (6 in.)	7000	5500	9000	7000
DN 200 (8 in.)	12000	9300	15000	12000
Ø up to 3000 mm (118 in.)[1)]	2500000	2000000	3200000	2500000

Device with process connections in accordance with ASME B16.5

	Standard measuring range		Extended measuring range (only with FMTx50)	
Nominal diameter	**Q_{max} [lbs/h]**	**Q_{max} [scfm][3)]**	**Q_{max} [lbs/h]**	**Q_{max} [scfm][3)]**
1 in.	350	75	450	100
1 1/2 in.	880	190	1100	250
2 in.	1600	350	2000	450
3 in.	3700	820	4900	1100
4 in.	6400	1400	8400	1850
6 in.	14500	3200	19000	4200
8 in.	25500	5600	33100	7300
Ø up to 3000 mm (118 in.)[1)]	5500000	1200000	7100000	1600000

1) Rectangular ducts and larger diameters on request

2) Applies for oxygen or nitrogen at 0 °C (32 °F) / 1013.25 hPa (14.696 psia)

3) Applies for oxygen or nitrogen at 15 °C (59 °F) / 1013.25 hPa (14.696 psia)

NOTE

For further information regarding dependencies and restrictions and help regarding product selection please use the selection and design tool for flow rate (ABB Product Selection Assistant) on www.abb.com/flow.

Transmitter

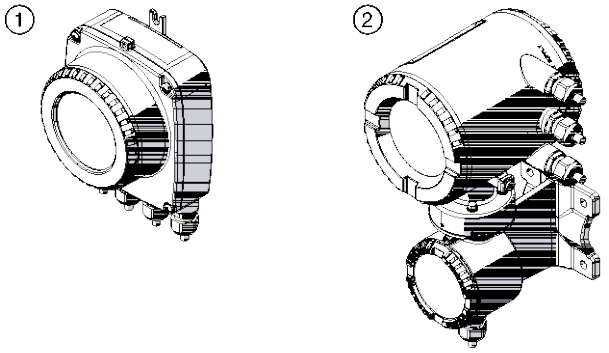


Figure 13: Transmitter in field mount housing (remote mount design)

Pos.	Description
1	Single-compartment housing
2	Dual-compartment housing

Table 9 Legend

Features

- 4 ... 20 mA current / HART 7 output.
- Current output in the event of an alarm can be configured to 21 ... 23 mA (NAMUR NE43).
- Programmable digital output. Can be configured as a frequency, pulse or binary output.
- Two slots for optional plug-in cards for retrofitting additional current / digital outputs or digital inputs.
- Parameterization by means of HART communication.
- Damping: 0.2 ... 100 s configurable (1 τ).
- Low flow cut-off: 0 ... 10 % for current and pulse output.
- Measuring medium parameters can be changed at any time (pressure and temperature influence, units, etc.).
- Simulation of current and binary output (manual process execution).

LCD indicator (option)

- Indicator of all measured values of the SensyMaster (e.g. mass flow, standard volume flow, temperature).
- Application-specific visualizations which the user can select. Four operator pages can be configured to display multiple values in parallel.
- Plain text fault diagnostics.
- Menu-guided parameterization with four buttons.
- "Easy Set-up" function for fast commissioning.
- Operation through the front glass via capacitive buttons.

Optional plug-in cards

The transmitter has two slots (OC1, OC2) in which plug-in cards can be inserted to provide additional inputs and outputs.
The slots are located on the transmitter motherboard and can be accessed after removing the front housing cover.

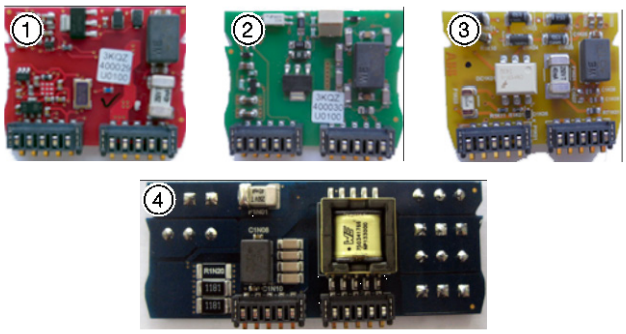


Figure 14: Optional plug-in cards

Plug-in card		Number[1)]
1	Passive current output, 4 ... 20 mA (red) Order no. 3KQZ400029U0100	2
2	Passive digital output (green) Order no. 3KQZ400030U0100	1
3	Passive digital input (yellow) 3KQZ400032U0100	2
4	24 V DC power supply (blue) 3KQZ400031U0100	1

Table 10 Available plug-in cards

1) The "Number" column indicates the maximum number of plug-in cards of the same type that can be used.

NOTICE

For an overview of possible plug-in card combinations, please refer to chapter "Ordering Information" on page 34 .

...Transmitter

IP rating

In accordance with EN 60529: IP 65 / IP 67

NEMA rating

NEMA 4X

Vibration

In accordance with EN 60068-2

In the 10 ... 58 Hz range, max. deflection 0.15 mm (0.006 in.)[1)]

In the range of 58…150 Hz, max. acceleration 2 g[1)]

1) Peak load

Temperature data

	Standard
Ambient temperature	-20 … 70 °C (-4 … 158 °F)
Storage temperature	-20 ... 70 °C (-4 ... 158 °F)

NOTE

When operating below -20 °C (-4 °F), the LCD display can no longer be read and the electronics should be operated with as few vibrations as possible.
Full functionality is assured at temperatures above -20 °C (-4 °F).

Housing design

Integral mount design	
Housing	Cast aluminum, painted
Paint	≥ 80 µm thick, RAL 9002 (gray white)
Cable gland	Polyamide
	Stainless steel[1)]

Remote mount design	
Housing	Cast aluminum, painted
Paint	≥ 80 µm thick, RAL 9002 (gray white)
Cable gland	Polyamide M20 x 1.5 or 1/2 in. NPT
	Stainless steel M20 x 1.5 or 1/2 in. NPT
Weight dual-compartment housing	4.5 kg (9.92 lb)
Weight single-compartment housing	2.1 kg (4.6 lb)

Signal cables

The signal cable used for the connection of the transmitter and sensor must fulfill at least the following technical specifications.

Cable specification	
Impedance	100 ... 200 Ω
Withstand voltage	120 V
Outer diameter	6 ... 12 mm (0.24 ... 0.47 in.)
Cable design	Two wire pairs as a star-quad cable
Conductor cross-section	Length-dependent
Shield	Copper braid with approximately 85 % coverage
Temperature range	Depends on application.

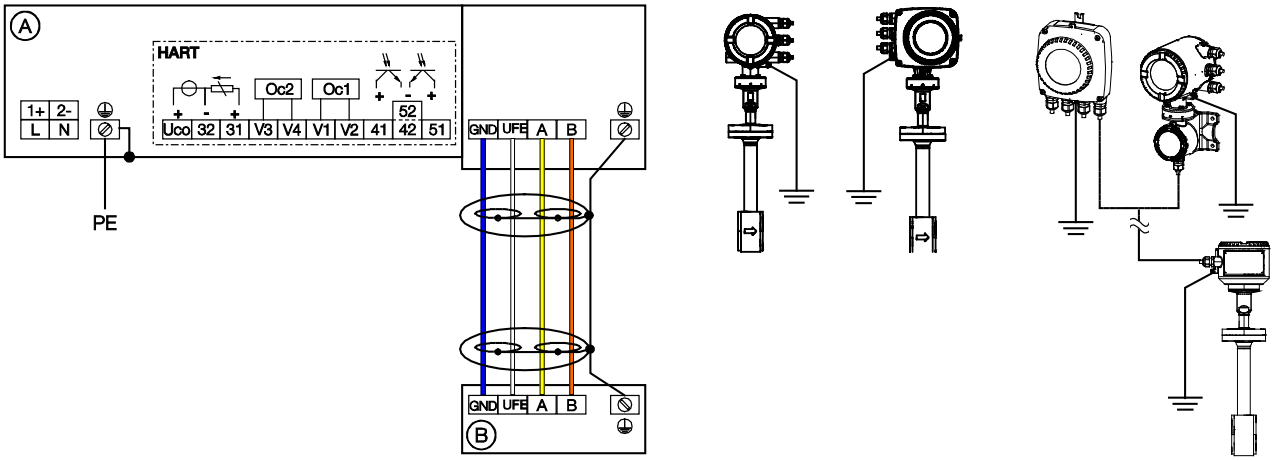
Maximum signal cable length	
0.25 mm^2 (AWG 24)	50 m (164 ft)
0.34 mm^2 (AWG 22)	100 m (328 ft)
0.5 mm^2 (AWG 20)	150 m (492 ft)
0.75 mm^2 (AWG 19)	200 m (656 ft)

Recommended cables

It is recommended to use an ABB signal cable with the order number 3KQZ407123U0100 for standard applications.
The ABB signal cable fulfills the above-mentioned cable specification and can be utilized unrestrictedly up to an ambient temperature of $T_{amb.}$ = 80 °C (176 °F).

Electrical connections

Electrical connection (HART protocol)



Ⓐ Transmitter

Ⓑ Sensor

Figure 15: Connection diagram

Connections for the power supply

AC voltage	
Terminal	**Function / comments**
L	Phase
N	Neutral conductor
PE / ⏚	Protective earth (PE)
⏚	Potential equalization

DC voltage	
Terminal	**Function / comments**
1+	+
2-	-
PE / ⏚	Protective earth (PE)
⏚	Potential equalization

Connecting the signal cable

Only for remote mount design.

The sensor housing and transmitter housing must be connected to potential equalization.

Terminal	**Function / comments**
U_{FE}	Sensor power supply
GND	Ground
A	Data line
B	Data line
⏚	Functional earth / Shielding

Connections for inputs and outputs

Terminal	**Function / comments**
Uco / 32	**Active 4 ... 20 mA current output / HART**
	or
31 / 32	**Passive 4 ... 20 mA current output / HART**
41 / 42	**Passive digital output DO1**
51 / 52	**Passive digital output DO2**
V1 / V2	**Plug-in card, slot Oc1**
V3 / V4	**Plug-in card, slot Oc2**
	For details, see chapter "Optional plug-in cards" on page 15.

...Transmitter

Electrical data for inputs and outputs

Power supply

AC voltage	
Terminals	L / N
Operating voltage	100 ... 240 V AC, (-15 % / +10 %), 47 … 64 Hz
Power consumption	S_{max}: < 20 VA
Power-up current	18.4 A, t < 3 ms

DC voltage	
Terminals	1+ / 2-
Operating voltage	24 V DC ± 20 %
Ripple	< 5 %
Power Consumption	P_{max}: < 20 W
Power-up current	21 A, t < 10 ms

HART communication

A HART DTM in accordance with FDT1.2 standards is available. HART protocol based Integrations in other Tools or systems (e.g., Emerson AMS/Siemens PCS7) are available on request. The DTM, the DD and EDD is available for download from www.abb.com/flow.

HART output	
Terminals	Active: Uco / 32 Passive: 31 / 32
Protocol	HART 7.1
Transmission	FSK modulation on current output 4 … 20 mA in accordance with Bell 202 standard
Baud rate	1200 baud
Signal amplitude	Maximum 1.2 mAss
Current output load	Minimum 250 Ω
Cable	0,25 mm² (AWG 24), twisted
Maximum cable length	1200 m (3937 ft)

Current output Uco / 32, 31 / 32

Can be configured for outputting mass flow and volume flow.

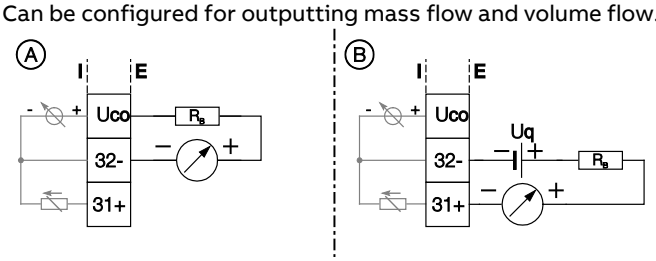
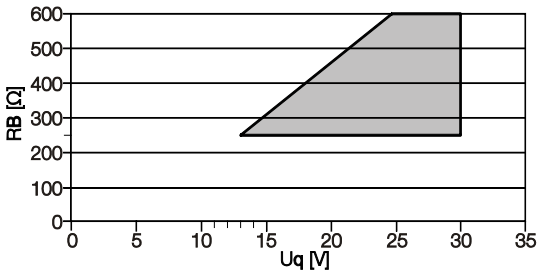


Figure 16: (I = internal, E = external, R_B = load, U_q = Source voltage)

(A) Active current output Uco / 32
(B) Passive current output 31 / 32



Permissible source voltage U_q for passive outputs in relation to load resistance where I_{max} = 22 mA. = Permissible range

Figure 17: Source voltage for passive outputs

	Active	**Passive**
Terminals	Uco / 32	31 / 32
Output signal	4 … 20 mA or 4 … 12 ... 20 mA, switchable	4 … 20 mA
Load R_B	250 Ω ≤ R_B ≤ 300 Ω	250 Ω ≤ R_B ≤ 600 Ω
Source voltage U_q [1)]	•	13 V ≤ U_q ≤ 30 V
Measuring error	< 0.1 % of measured value	
Isolation	The current ouput and the digital outputs are electrically isolated from each other.	

Table 11: Electrical data current output Uco / 32, 31 / 32

1) The source voltage U_q depends on the load R_B and must be within the permissible range.

Digital output 41 / 42, 51 / 52

These can be configured as pulse outputs, frequency outputs or binary outputs.

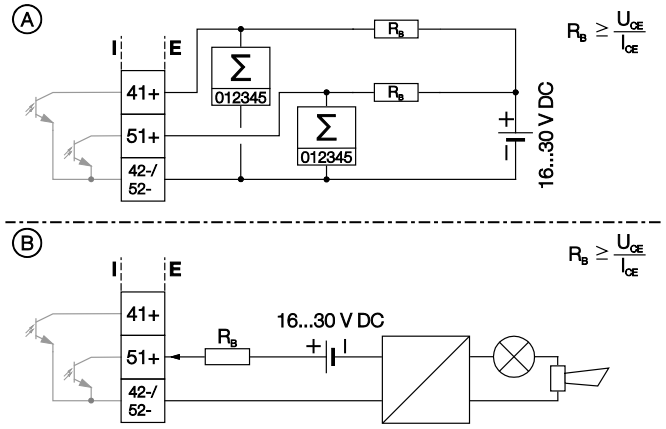


Figure 18: **(I = internal, E = external, R_B = load)**

(A) Passive digital output 41 / 42, 51 / 52 as pulse or frequency output

(B) Passive digital output 51 / 52 as binary output

Pulse / frequency output (passive)	
Terminals	41 / 42, 51 / 52
Output "closed"	0 V ≤ U_{CEL} ≤ 3 V
	For f < 2.5 kHz: 2 mA < I_{CEL} < 10 mA
	For f > 2.5 kHz: 10 mA < I_{CEL} < 30 mA
Output "open"	16 V ≤ U_{CEH} ≤ 30 V DC
	0 mA ≤ I_{CEH} ≤ 0.2 mA
f_{max}	10.5 kHz,
Pulse width	0.1 … 2000 ms
Binary output (passive)	
Terminals	41 / 42, 51 / 52
Output "closed"	0 V ≤ U_{CEL} ≤ 3 V
	2 mA ≤ I_{CEL} ≤ 30 mA
Output "open"	16 V ≤ U_{CEH} ≤ 30 V DC
	0 mA ≤ I_{CEH} ≤ 0,2 mA
Switching function	Configurable

Table 12: **Electrical data digital output 41 / 42, 51 / 52**

NOTICE

- The Terminals 42 / 52 have a common ground. The Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other. An electrically isolated digital output can be realized using a plug-in card.
- For mechanical counters, we recommend setting the pulse width to ≥ 30 ms and a maximum frequency of f_{max} ≤ 3 kHz.

Current output V1 / V2, V3 / V4 (plug-in card)

Up to **two additional** current outputs can be implemented via the "Passive current output (red)" plug-in card.

The plug-in card can be used in slot OC1 **or** in OC2.

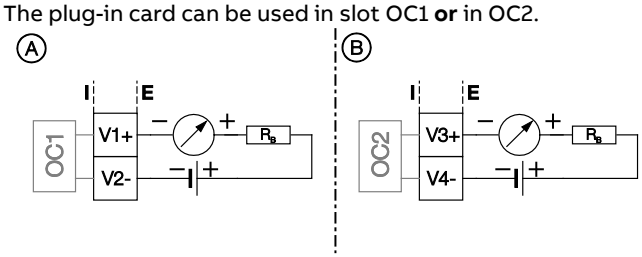
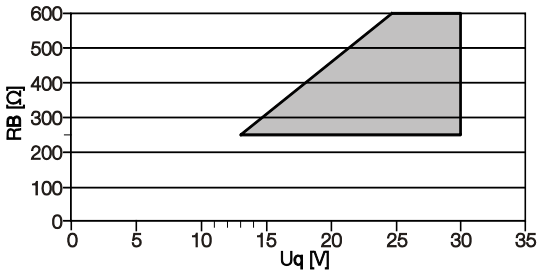


Figure 19: **(I = internal, E = external, R_B = load)**

(A) Passive current output V1 / V2

(B) Passive current output V3 / V4



Permissible source voltage U_q for passive outputs in relation to load resistance where I_{max} = 22 mA. = Permissible range

FIg. 20: **Source voltage for passive outputs**

Passive current output	
Terminals	V1 / V2, V3 / V4
Output signal	4 … 20 mA
Load R_B	250 Ω ≤ R_B ≤ 600 Ω
Source voltage	13 V ≤ U_q ≤ 30 V
Measuring error	< 0.1 % of measured value

Table 13: **Electrical data current output V1 / V2, V3 / V4**

1) The source voltage U_q depends on the load R_B and must be within the permissible range.

...Transmitter

Digital output V1 / V2, V3 / V4 (plug-in card)

An additional binary output can be implemented via the "Passive digital output (green)" plug-in card.
The plug-in card can be used in slot OC1 or in OC2.

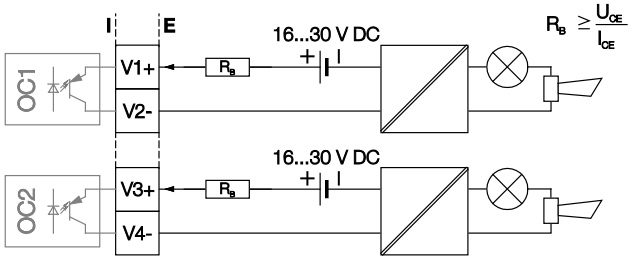


Figure 21: Plug-in card as binary output (I = internal, E = external, R_B = load)

Binary output (passive)	
Terminals	V1 / V2, V3 / V4
Output "closed"	0 V ≤ U_{CEL} ≤ 3 V 2 mA < I_{CEL} < 30 mA
Output "open"	16 V ≤ U_{CEH} ≤ 30 V DC 0 mA ≤ I_{CEH} ≤ 0.2 mA
Switching function	Configurable

Table 14: Electrical data digital output V1 / V2, V3 / V4

Digital input V1 / V2, V3 / V4 (plug-in card)

Two digital inputs can be implemented via the "Passive digital input (yellow)" plug-in card.
The plug-in card can be used in slot OC1 **and / or** in OC2.

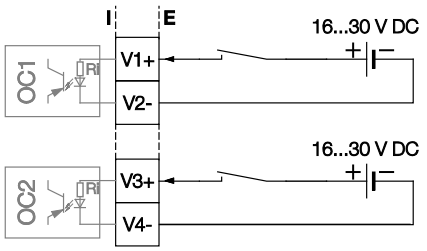


Figure 22: Plug-in card as digital input (I = internal, E = external)

Digital input	
Terminals	V1 / V2, V3 / V4
Input "On"	16 V ≤ U_{KL} ≤ 30 V
Input "Off"	0 V ≤ U_{KL} ≤ 3 V
Internal resistance	R_i = 6.5 kΩ
Function	Configurable

Table 15: Electrical data digital input V1 / V2, V3 / V4

24 V DC power supply V1 / V2 (plug-in card)

The power supply plug-in card allows a passive output on the transmitter to be used as an active output. See chapter "Connection examples" on page 21 .
The plug-in card can only be used in slot OC1.

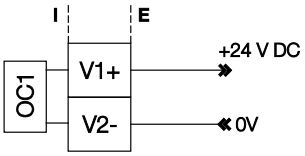


Figure 23: (I = Internal, E = External)

24 V DC power supply	
Terminals	V1 / V2
Function	For active connection of passive outputs
Output voltage	24 V DC at 0 mA, 17 V DC at 25 mA
Load rating Imax	25 mA, permanently short circuit-proof

Table 16 Electrical data plug-in card 24 V DC power supply V1 / V2

NOTICE

When using the device in potentially explosive atmospheres, the power supply plug-in card must only be used to power one passive output. It must not be connected to multiple passive outputs!

Connection examples

Input and output functions are configured via the device software in accordance with the desired application.

Active digital output 41 / 42, 51 / 52, V3 / V4

When the "24 V DC power supply (blue)" plug-in card is used, the digital outputs on the basic device and on the plug-in cards can also be wired as active digital outputs.

NOTICE

Each "power supply (blue)" plug-in card must only power one output.
It must not be connected to two outputs (e.g. digital output 41 / 42 and 51 / 52)!

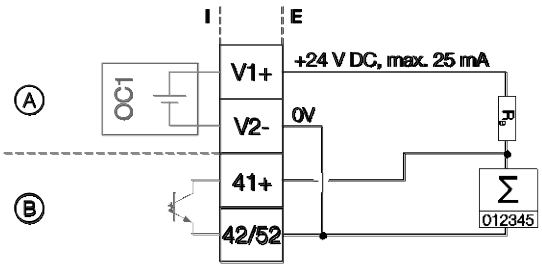


Figure 24: Active digital output 41 / 42 (example)

Ⓐ Plug-in card "Power supply (blue)" in slot 1
Ⓑ Digital output 41 / 42

The connection example shows usage for digital output 41 / 42; the same applies to usage for digital output 51 / 52.

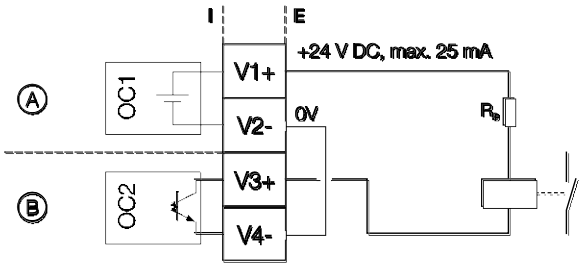


Figure 25: Active digital output V3 / V4 (example)

Ⓐ Plug-in card "Power supply (blue)" in slot 1
Ⓑ Plug-in card "Digital output (green)" in slot 2

Active current output V3 / V4

When the "24 V DC power supply (blue)" plug-in card is used, the current output on the plug-in card can also be wired as the active current output.

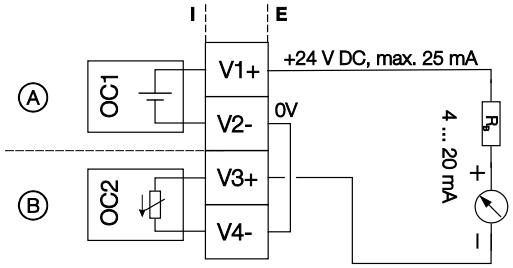


Figure 26: Active current output V3 / V4 (example)

Ⓐ Plug-in card "Power supply (blue)" in slot 1
Ⓑ Plug-in card "Passive current output (red)" in slot 2

Active digital input V3 / V4

When the "24 V DC power supply (blue)" plug-in card is used, the digital input on the plug-in card can also be wired as the active digital input.

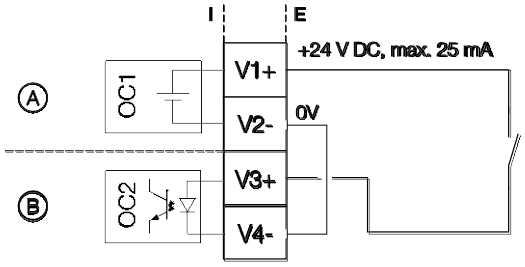


Figure 27: Active digital input V3 / V4 (example)

Ⓐ Plug-in card "Power supply (blue)" in slot 1
Ⓑ Plug-in card "Passive digital input (yellow)" in slot 2

Pipe components

The pipe components are available with the following process connections:

Type	Process connection
FMT091	**Wafer type design** • DN 25 ... 200, PN 40 in accordance with EN 1092-1 • 1 ... 8 in., CL 150 / CL 300 in accordance with ASME B 16.5
FMT092	**Partial measuring section** (optional with flow straightener) • DN 25 ... 100, PN 40 flange in accordance with EN 1092-1 • 1 ... 8 in., CL 150 / CL 300 flange in accordance with ASME B 16.5 • DN 25 ... 80, PN 10 flange in accordance with EN 1092-1 B1 • DN 25 ... 80, PN 10, male thread R1 in. ... 3 in.
FMT094	**Weld-on adapter** With or without ball valve for rectangular channels or pipe diameter DN 100 ... 3000

The pipe components are available optionally with ball valve or integrated hot tap fitting.
The installation length of the sensor must be taken into account when selecting the pipe component!

Materials

Wetted materials for the pipe components

Type	Material
FMT091 Wafer type design	Stainless steel 1.4571 (AISI 316 Ti)
FMT092 Partial measuring section	Stainless steel 1.4571 (AISI 316 Ti) or stainless steel 1.4301 (AISI 304)
Partial measuring section with male thread	Steel, galvanized
FMT094 Weld-on adapter	Stainless steel 1.4571 (AISI 316 Ti) optional: carbon steel 1.0037 (S 235)

Material loads for process connections

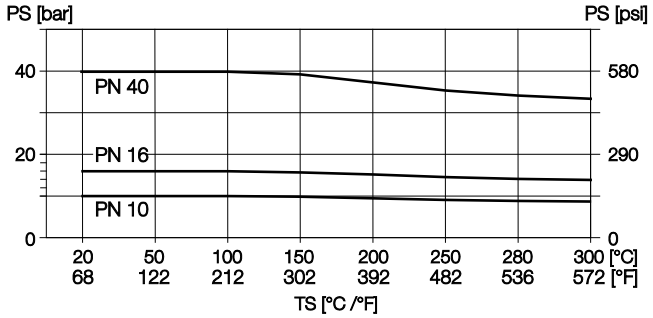


Figure 1: DIN flange process connection

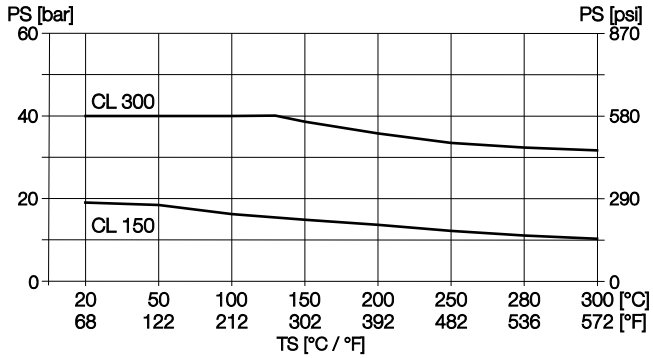


Figure 2: ASME flange process connection

The maximum approved operating pressure for CL 300 is limited to 40 bar (580 psi).

Integrated hot tap fitting

The integrated hot tap fitting is used instead of the previously described pipe components and weld-on adapters if taking out the sensor should be practically possible without gas escaping during running operation.

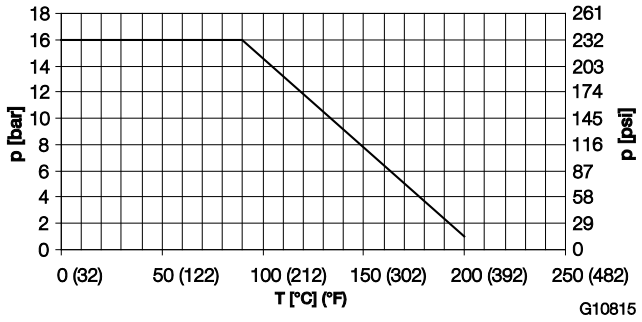


Figure 3: Maximum pressure / temperature values for integrated hot tap fitting

The hot tap fitting is recommended in case of measurements in main lines (e. g. compressed air supply) or at measuring points that must be purged before removing the sensor.
In general, a hot tap fitting should be used in case of measurements that make shutting-off device parts necessary to remove the sensor.

Handling

The sensor is screwed onto the hot tap fitting via the DN 25 flange and the protective caps are mounted.
By rotating the union nut, the sensor is moved from the removable position to the measuring position. The lower edge of the union nut indicates the current position of the measuring element.
When you reach the measuring position 50 – OPEN – MESSEN (the lower limit stop of the union nut), the measuring element will be in the middle of the piping and measured values will be provided.

NOTE

Connection flanges PN 16 with four screw holes must be used in the integrated hot tap fitting in wafer type design DN 65.
Wafer type designs 2...8 in. only for connection flange ASME B16.5, Cl 150.

Dimensions

Flowmeter sensor

Integral mount design

All specified dimensions and weights are in mm (in.) or kg (lb).

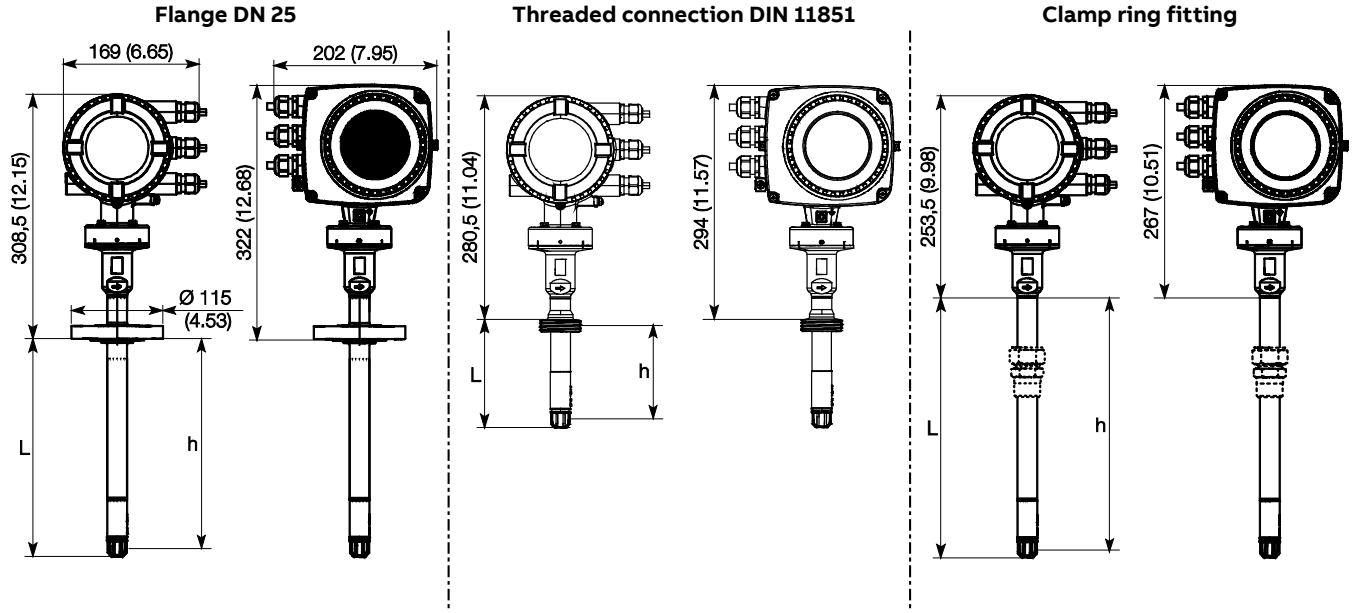


Figure 28: Sensor

Sensor connection	For nominal piping diameter	L mm (in.)	h (installation length) mm (in.)	Approx. weight Kg (lb)
Flange DN 25	DN 25 ... 350 (1 ... 14 in.)	271 (10.64)	263 (10.35)	6.5 (14.3)
	> DN 350 ... 700 (> 14 ... 28 in.)	433 (17.05)	425 (16.73)	7 (15.4)
	> DN 700 (> 28 in.)	783 (30.83)	775 (30.51)	7.5 (16.5)
Clamp ring fitting	DN 100 ... 350 (4 ... 14 in.)	326 (12.83)	318 (12.52)	5.5 (12.1)
	> DN 350 ... 700 (> 14 ... 28 in.)	488 (19.21)	480 (18.90)	6 (13.2)
	> DN 700 (> 28 in.)	838 (32.99)	830 (32.68)	7 (15.4)
Threaded connection DIN 11851	DN 25 ... 80 (1 ... 3 in.)	136 (5.53)	120 (4.72)	4.7 (10.4)

NOTE

The specified nominal piping diameters apply for the use of the sensor with pipe components without ball valves or hot tap fittings.

Remote mount design

All specified dimensions and weights are in mm (in.) or kg (lb).

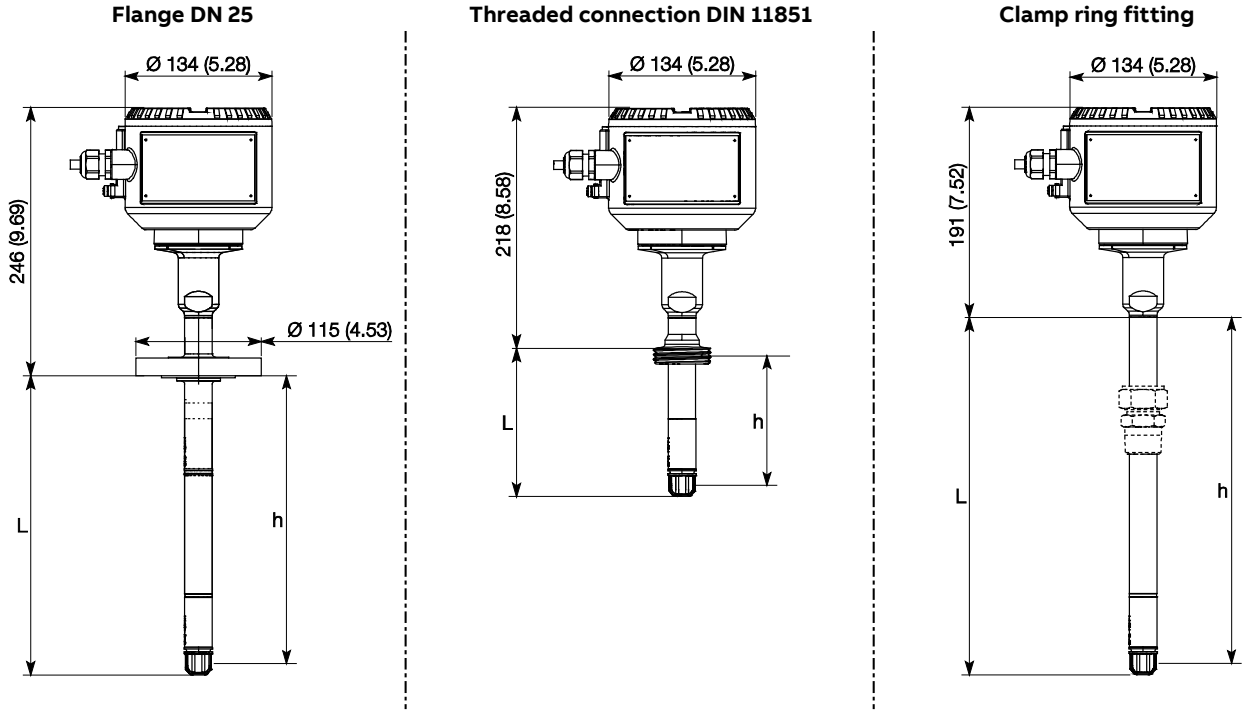


Figure 29: Sensor

Sensor connection	For nominal piping diameter	L mm (in.)	h (installation length) mm (in.)	Approx. weight Kg (lb)
Flansch DN 25	DN 25 ... 350 (1 ... 14 in.)	271 (10.64)	263 (10.35)	5 (11)
	> DN 350 ... 700 (> 14 ... 28 in.)	433 (17.05)	425 (16.73)	5,5 (12)
	> DN 700 (> 28 in.)	783 (30.83)	775 (30.51)	6 (13)
Klemmringverschraubung	DN 100 ... 350 (4 ... 14 in.)	326 (12.83)	318 (12.52)	4 (8,8)
	> DN 350 ... 700 (> 14 ... 28 in.)	488 (19.21)	480 (18.90)	4,5 (9.9)
	> DN 700 (> 28 in.)	838 (32.99)	830 (32.68)	5,5 (12)
Gewindeanschluss DIN 11851	DN 25 ... 80 (1 ... 3 in.)	136 (5.53)	120 (4.72)	3,2 (7)

NOTE

The specified nominal piping diameters apply for the use of the sensor with pipe components without ball valves or hot tap fittings.

...Dimensions

Transmitter

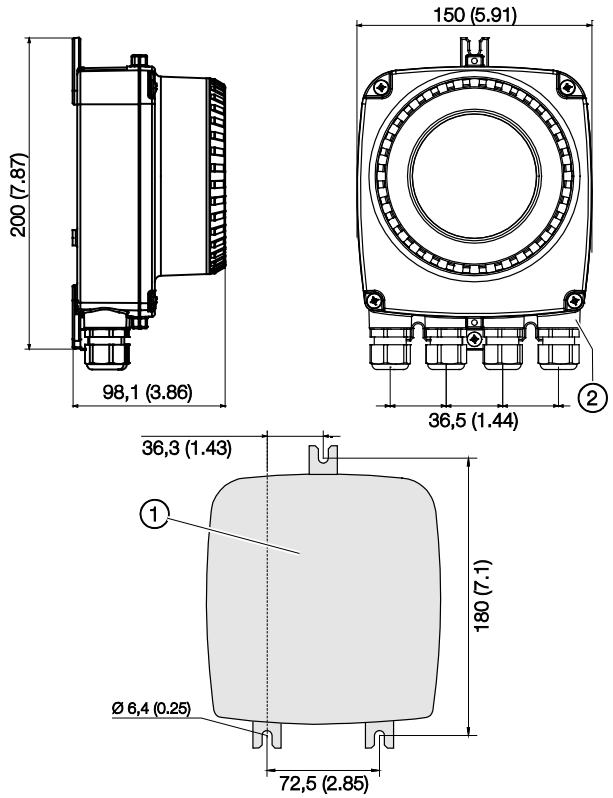


Figure 30: Mounting dimensions single-compartment housing

Pos.	Description
1	Hole pattern for mounting holes
2	Female thread (either 1/2 in. NPT or M20 x 1,5) refer to model coding. With 1/2 in. NPT there will be a plug instead of the PG cable inlet

Table 17 Legend

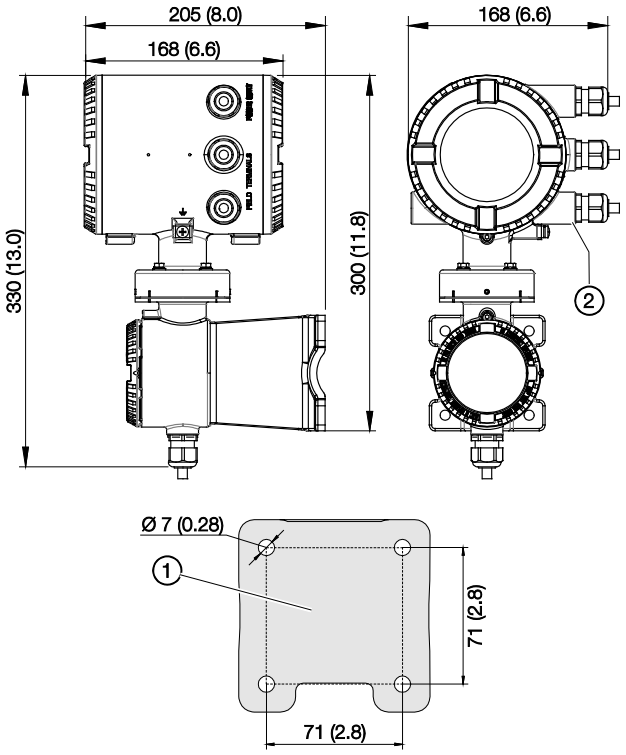


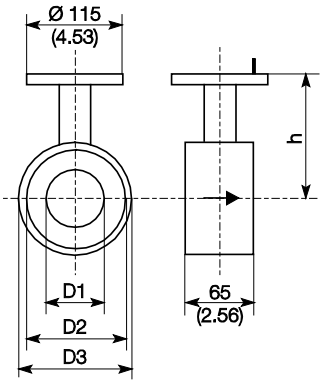
Figure 31: Mounting dimensions of double-compartment housing

Pos.	Description
1	Hole pattern for mounting holes
2	Female thread (either 1/2 in. NPT or M20 x 1,5) refer to model coding. With 1/2 in. NPT there will be a plug instead of the PG cable inlet.

Table 18 Legend

Pipe components

All specified dimensions and weights are in mm (in.) bzw. kg (lb).



FMT091 – Wafer type design

Figure 32: Dimensions Wafer type design

FMT091 – Wafer type design in accordance with EN 1092-1, PN 40 – Sensor connection: flange DN 25

Nominal diameter	h	D1	D2	D3	Weight
DN 40	263 (10.35)	43.1 (1.70)	88 (3.46)	94 (3.70)	4.5 (10)
DN 50		54.5 (2.15)	102 (4.02)	109 (4.29)	5.0 (11)
DN 65		70.3 (2.77)	122 (4.80)	129 (5.08)	–
DN 80		82.5 (3.25)	138 (5.43)	144 (5.67)	7.0 (15.5)
DN 100		107.1 (4.22)	162 (6.38)	170 (6.69)	8.5 (18.7)
DN 125		131.7 (5.19)	188 (7.40)	196 (7.72)	–
DN 150		159.3 (6.27)	218 (8.58)	226 (8.90)	11.5 (25.5)
DN 200		206.5 (8.13)	285 (11.22)	293 (11.54)	–

FMT091 – Wafer type design in accordance with ASME B 16.5, CL 150 – Sensor connection: flange DN 25

Nominal diameter	h	D1	D2	D3	Weight
1 1/2 in.	263 (10.35)	40.9 (1.61)	73 (2.87)	85 (3.35)	–
2 in.		52.6 (2.07)	92 (3.62)	103 (4.06)	–
3 in.		78.0 (3.07)	127 (5.00)	135 (5.31)	–
4 in.		102.4 (4.03)	157 (6.18)	173 (6.81)	–
6 in.		154.2 (6.07)	216 (8.50)	221 (8.70)	–
8 in.		202.7 (7.98)	270 (10.63)	278 (10.94)	–

FMT091 – Wafer type design in accordance with ASME B 16.5, CL 300 – Sensor connection: flange DN 25

Nominal diameter	h	D1	D2	D3	Weight
1 1/2 in.	263 (10.35)	40.9 (1.61)	73 (2.87)	94 (3.70)	–
2 in.		52.6 (2.07)	92 (3.62)	110 (4.33)	–
3 in.		78.0 (3.07)	127 (5.00)	148 (5.83)	–
4 in.		102.4 (4.03)	157 (6.18)	180 (7.09)	–
6 in.		154.2 (6.07)	216 (8.50)	249 (9.80)	–
8 in.		202.7 (7.98)	270 (10.63)	307 (12.09)	–

...Dimensions

All specified dimensions and weights are in mm (in.) bzw. kg (lb).

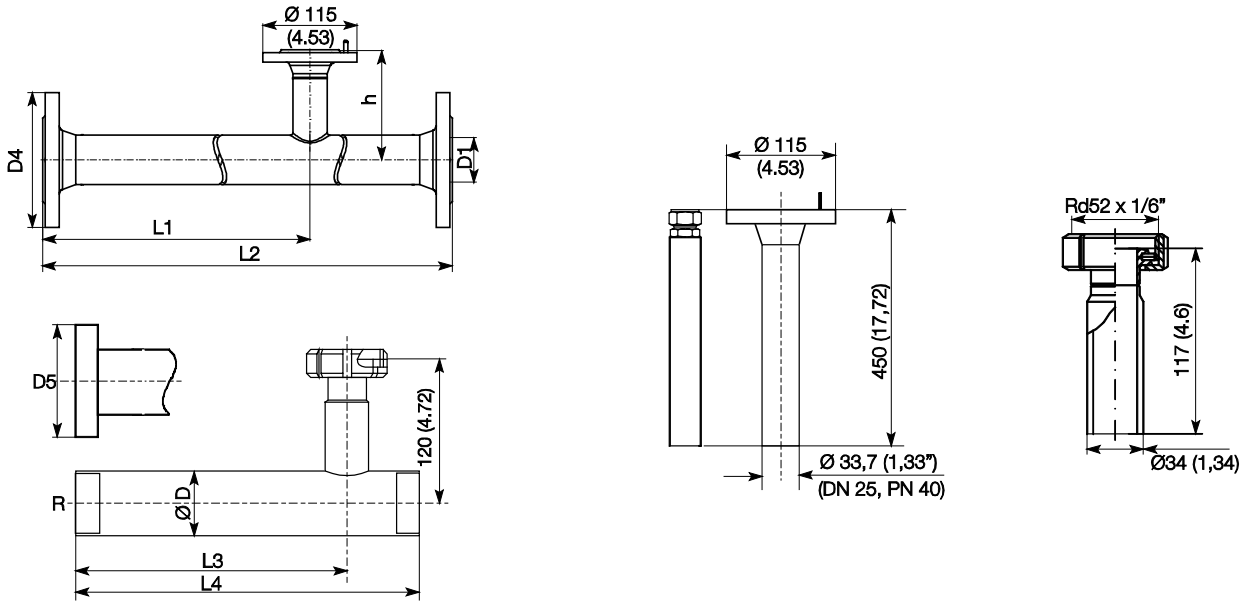


Figure 33: Dimensions pipe components and weld-on adapter

FMT092 – Partial measuring section with flange in accordance with EN 1092-1, Form B1, PN 40 – Sensor connection: flange DN 25						
Nominal diameter	**h**	**D1**	**D4**	**L1**	**L2**	**Weight**
DN 25	263 (10.35)	28,5 (1.12)	115 (4.53)	486 (19.13)	600 (23.62)	5.5 (12.0)
DN 40		43.1 (1.70)	150 (5.91)	731 (28.78)	860 (33.86)	8.0 (17.5)
DN 50		54.5 (2.15)	165 (6.50)	837 (32.95)	1000 (39.37)	11 (24.3)
DN 65		70.3 (2.77)	185 (7.28)	1190 (46.85)	1400 (55.12)	–
DN 80		82.5 (3.25)	200 (7.87)	1450 (57.09)	1700 (66.93)	–
DN 100		107.1 (4.22)	235 (9.25)	1870 (73.62)	2200 (86.61)	–
DN 125[1)]		131.7 (5.19)	270 (10.63)	2300 (90.55)	2700 (106.3)	–
DN 150[1)]		159.3 (6.27)	300 (11.81)	2720 (107.09)	3200 (125.98)	–
DN 200[1)]		206.5 (8.13)	375 (14.76)	3580 (140.94)	4200 (165.35)	–

1) On request

FMT092 – Partial measuring section with flange in accordance with EN 1092-1, Form B1, PN 10 – Sensor connection: threaded connection DIN 11851					
Nominal diameter	**ØD inside**	**D5**	**L3**	**L4**	**Weight**
DN 25	27.3 (1.07)	115 (4.53)	410 (16.14)	550 (21.65)	–
DN 40	41.9 (1.65)	150 (5.91)	615 (24.21)	820 (32.28)	–
DN 50	53.9 (2.12)	165 (6.50)	810 (31.89)	1080 (42.52)	–
DN 80	79.9 (3.15)	200 (7.87)	1200 (47.24)	1600 (62.99)	–

All specified dimensions and weights are in mm (in.) bzw. kg (lb).

FMT092 – Partial measuring section with male thread, PN 10 – sensor connection: threaded connection DIN 11851

Nominal diameter	ØD inside	R male thread	L3	L4	Weight
DN 25	27.3 (1.07)	R1 in. – 33.7 x 1.2	410 (16.14)	550 (21.65)	–
DN 40	41.9 (1.65)	R1 1/2 in. – 48.3 x 3.2	615 (24.21)	820 (32.28)	–
DN 50	53.9 (2.12)	R2 in. – 60.3 x 3.2	810 (31.89)	1080 (42.52)	–
DN 80	79.9 (3.15)	R3 in. – 88.9 x 4.5	1200 (47.24)	1600 (62.99)	–

FMT092 – Partial measuring section with flange in accordance with ASME B 16.5, CL 150 – Sensor connection: flange DN 25

Nominal diameter	h	D1	D4	L1	L2	Weight
1 in.	263 (10.35)	26.6 (1.05)	108 (4.25)	454 (17.87)	560 (22.05)	–
1 1/2 in.		40.9 (1.61)	127 (5.00)	741 (29.17)	864 (34.02)	–
2 in.		52.6 (2.07)	154 (6.06)	846 (33.31)	1003 (39.49)	–
3 in.		78.0 (3.07)	–	–	–	–
4 in.		102.4 (4.03)	–	–	–	–
6 in.[1)]		154.2 (6.07)	–	–	–	–
8 in.[1)]		202.7 (7.98)	–	–	–	–

1) On request

FMT092 – Partial measuring section with flange in accordance with ASME B 16.5, CL 300 – Sensor connection: flange DN 25

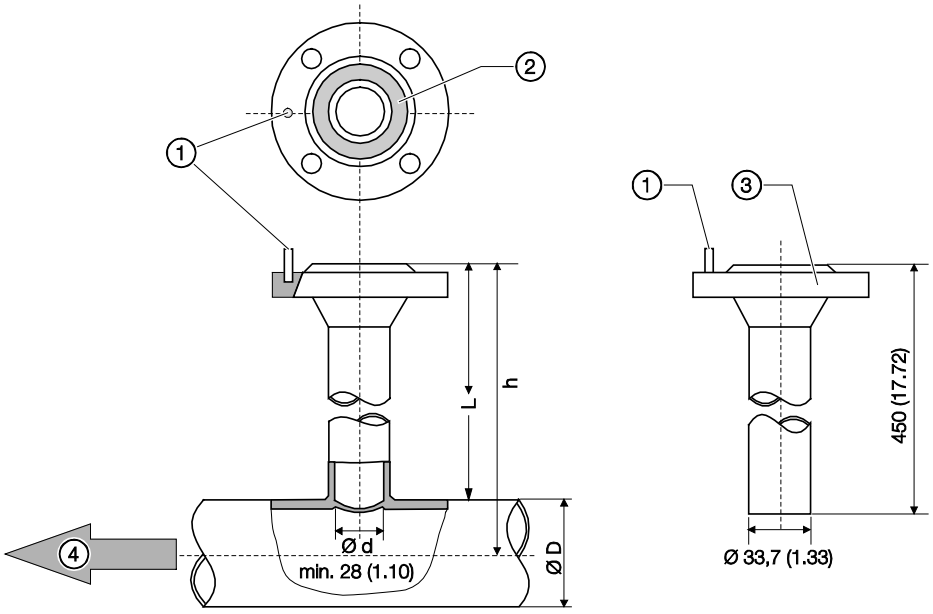
Nominal diameter	h	d1	D4	L4	L3	Weight
1 in.	263 (10.35)	26.6 (1.05)	123.9 (4.88)	454 (17.87)	560 (22.05)	–
1 1/2 in.		40.9 (1.61)	155.4 (6.12)	741 (29.17)	864 (34.02)	–
2 in.		52.6 (2.07)	165.1 (6.50)	846 (33.31)	1003 (39.49)	–
3 in.		78.0 (3.07)	–	–	–	–
4 in.		102.4 (4.03)	–	–	–	–
6 in.[1)]		154.2 (6.07)	–	–	–	–
8 in.[1)]		202.7 (7.98)	–	–	–	–

1) On request

...Dimensions

Weld-on adapter

All dimensions specified in mm (in.).



1 Centering pin
2 Nut for O-ring
3 Connection flange DN 25 (1”)
4 Flow direction

Figure 34

h – sensor length	Ø D – outer pipe diameter (min. / max.)
263 (10.35)	100 ... 350 (3.94 ... 13.78)
425 (16.73)	> 350 ... 700 (> 13.78 ... 27.56)
775 (30.51)	> 700 ... 1400 (> 27.56 ... 55.12)[1)]

1) The limitation of the maximum pipe diameter only applies for installations with a measuring element in the middle of the pipe. In case of larger or non-round cross-sections, a non-centered position of the measuring element in the piping is considered in the calibration

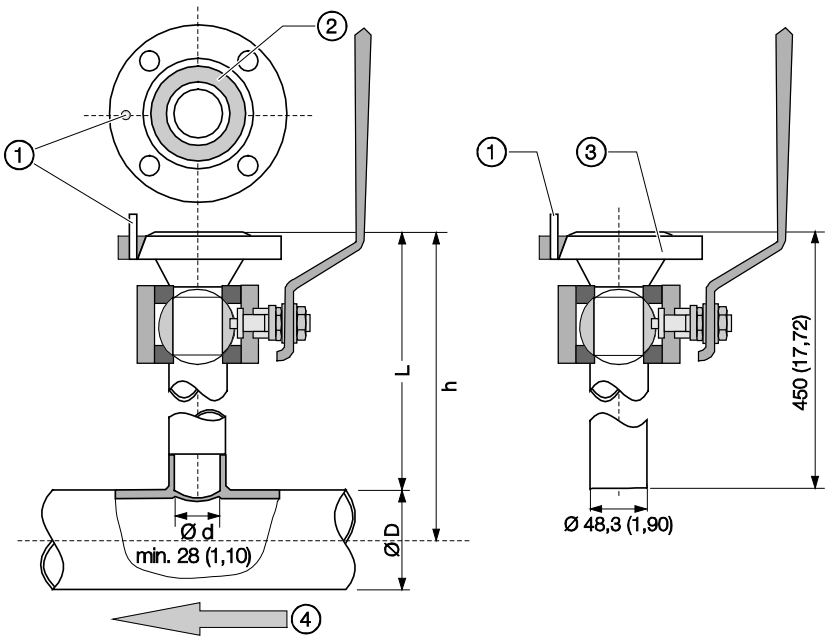
NOTE

When mounting the weld-on adapter, observe the following points:

- The weld-on adapters must be shortened to the dimension L before installation, in accordance with: L = h —(1/2 x Ø D).
- The distance h from the upper edge of the flange to the pipe central axis must be within a tolerance of ± 2 mm (± 0.08 in.).
- Maintain the right angle to the pipe axis (max. tolerance ± 2°).
- The adapter centering pin must be aligned with the pipe axis in the flow direction (outflow side, behind the measuring point).

Weld-on adapter with ball valve

All dimensions specified in mm (in.).



① Centering pin
② Nut for O-ring
③ Connection flange DN 25 (1”)
④ Flow direction

Figure 35

h – sensor length	Ø D – outer pipe diameter (min. / max.)
263 (10.35)	100 ... 150 (3.94 ... 5.91)
425 (16.73)	> 150 ... 500 (> 5.91 ... 19.69)
775 (30.51)	> 500 ... 1150 (> 19.69 ... 45.28)1)

1) The limitation of the maximum pipe diameter only applies for installations with a measuring element in the middle of the pipe. In case of larger or non-round cross-sections, a non-centered position of the measuring element in the piping is considered in the calibration.

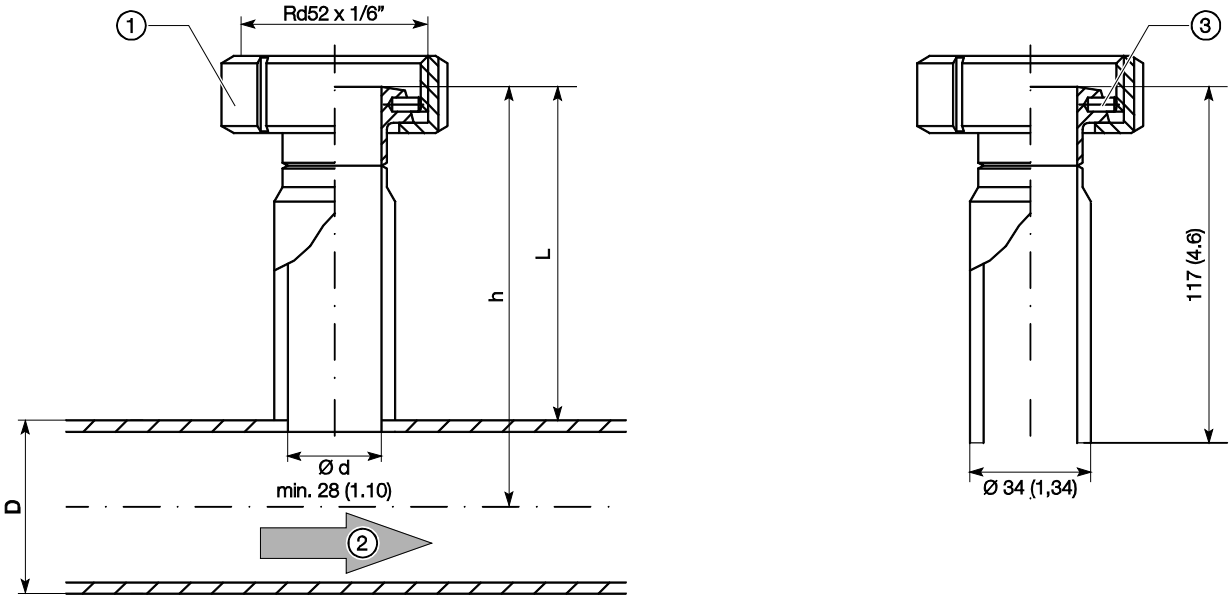
NOTE

When mounting the weld-on adapter, observe the following points:

- The weld-on adapters must be shortened to the dimension L before installation, in accordance with: L = h —(1/2 x Ø D).
- The distance h from the upper edge of the flange to the pipe central axis must be within a tolerance of ± 2 mm (± 0.08 in.).
- Maintain the right angle to the pipe axis (max. tolerance ± 2°).
- The adapter centering pin must be aligned with the pipe axis in the flow direction (outflow side, behind the measuring point).

...Dimensions

Weld-on adapter with threaded connection in accordance with DIN 11851
All dimensions specified in mm (in.).



① Union nut
② Flow direction
③ Centering pin

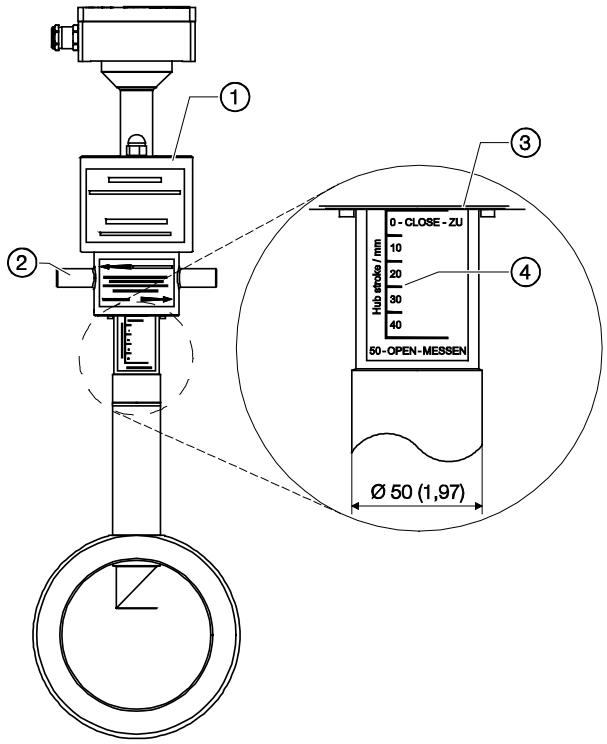
Figure 36

NOTE
When mounting the weld-on adapter, observe the following points:

- Always mount the weld-on adapter together with the union nut on the piping. Mounting it at a later time is not possible.
- The weld-on adapters must be shortened to the dimension L before installation, in accordance with: L = h —(1/2 x Ø D).
- The distance h from the upper edge of the adapter to the pipe central axis must be within a tolerance of ± 2 mm (± 0.08 in.).
- Maintain the right angle to the pipe axis (max. tolerance ± 2°).
- Observe the thickness of pipeline wall and the degree of shrinkage when welding on.
- The adapter centering pin must be aligned with the pipe axis in the flow direction (outflow side, behind the measuring point).
- Once welding is complete, there must be a passage of at least 28 mm (1.10 in.) free for the purpose of mounting the sensor; drill to create if necessary.

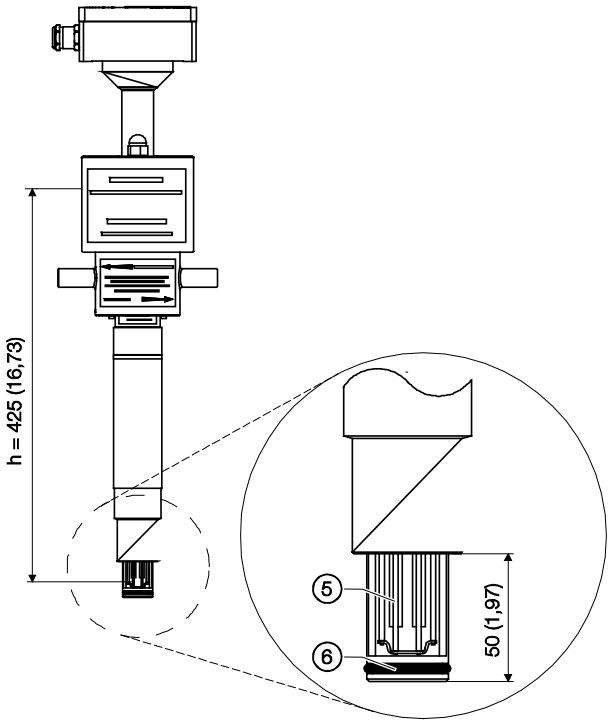
Integrated hot tap fitting

All dimensions specified in mm (in.).



Wafer type design

1. Covering plates for flange DN 25 (1 in.)
2. Union nut
3. Lower edge union nut



Wafer type design

4. Indicator position measuring element, hub 50 mm (1.97 in.)
5. Measuring element
6. O-ring

Figure 37

Nominal diameter	h - sensor length	
	Wafer type design	**Welding design**
DN 50, DN 65, DN 80 (2 in., 3 in.)	263 mm (10.35 in.)	425 mm (16.73 in.)
DN 100, DN 125, DN 150, DN 200 (4 in., 6 in., 8 in.)	425 mm (16.73 in.)	

Ordering Information

NOTICE
For dependancies and limiations please check the online Product Selection Assistant at www.abb.com/flow-selector.

The following table provides an overview of the possible combinations of plug-in card combinations that can be selected when ordering the device.

Main ordering information (outputs)	Additional ordering information		Slot OC1	Slot OC2
	Additional output 1	Additional output 2	Terminals V1 / V2	Terminals V3 / V4
G0	–	–	–	–
G1	–	–	24 V DC power supply (blue)	–
G2	–	–	–	Passive current output (red)
G3	–	–	Passive current output, 4 ... 20 mA (red)	Passive current output, 4 ... 20 mA (red)
G4	–	–	24 V DC power supply (blue)	Passive current output (red)
G0	DRT	–	24 V DC power supply (blue)	–
G0	DRT	DSN	24 V DC power supply (blue)	Passive digital input (yellow)
G0	DRT	DSG	24 V DC power supply (blue)	Passive digital output (green)
G0	DRT	DSA	24 V DC power supply (blue)	Passive current output, 4 ... 20 mA (red)
G0	DRN	–	Passive digital input (yellow)	–
G0	DRN	DSG	Passive digital input (yellow)	Passive digital output (green)
G0	DRN	DSA	Passive digital input (yellow)	Passive current output, 4 ... 20 mA (red)
G0	DRG	DSN	Passive digital output (green)	Passive digital input (yellow)
G0	DRG	DSA	Passive digital output (green)	Passive current output, 4 ... 20 mA (red)
G0	DRA	DSA	Passive current output, 4 ... 20 mA (red)	Passive current output, 4 ... 20 mA (red)
G0	DRA	DSG	Passive current output, 4 ... 20 mA (red)	Passive digital output (green)
G0	DRA	DSN	Passive current output, 4 ... 20 mA (red)	Passive digital input (yellow)

Main ordering information SensyMaster FMT430

Thermal Mass Flowmeter, for standard applications, compact and clever

Base model	**FMT430**	**XX**	**XX**	**X**	**X**	**XX**	**XX**	**XX**	**XX**	**X**
SensyMaster FMT430 Thermal Mass Flowmeter										
Explosion Protection Certification										
Without		Y0								
Measuring Medium										
Air or other clean gas (One gas component only)			C1							
Gas mixtures with max. 23.5 Vol% O2 (eg. Natural gas or Biogas)			C2							
Oxygen / gas mixtures > 23.5 Vol% O2, oil and grease-free, with O2 certificate (max. 150 °C / 302 °F)			P1							
Ammonia			H3							
Sensor Element Type / Temperature Range of Measuring Medium										
Standard ceramic sensor / Standard range -20 ... 150 °C (-4 ... 302 °F)				A						
Mounting Length / Flowmeter Sensor Material										
120 mm (4.7 in.) / AISI 316Ti SST (1.4571) (DN 25 ... DN 125 [1 ... 5 in.])				1)	1					
263 mm (10.4 in.) / AISI 316Ti SST (1.4571) (DN 25 ... DN 350 [1 ... 14 in.])				1)	2					
425 mm (17 in.) / AISI 316Ti SST (1.4571) (> DN 350 ... DN 700 [> 14 ... 28 in.])				1)	3					
775 mm (31 in.) / AISI 316Ti SST (1.4571) (> DN 700 [> 28in.])				1)	4					
Sensor Connection										
Flange DN 25, nominal pressure 4 MPa (40 bar, 580 psi)						D3				
Compression fitting, stainless steel, nominal pressure 2 Mpa (20 bar, 290 psi) (-20 ... 140 °C (-4 ... 284 °F)) (> DN80)						G2				
Thread DIN 11851, nominal pressure 1.6 Mpa (16 bar, 232 psi) (-20 ... 140 °C (-4 ... 284 °F))						F1				
Connection Design / Transmitter Housing Type / Transmitter Housing Material / Cable Glands										
Integral / Single compartment / Aluminium / 2 x M20 x 1.5							S1			
Integral / Single compartment / Aluminium / 2 x NPT 1/2 in.							S2			
Integral / Single compartment / Stainless Steel / 2 x M20 x 1.5							D1			
Integral / Single compartment / Stainless Steel / 2 x NPT 1/2 in.							D2			
Remote / Not specified (Remote TX or replacement Sensor)							Y0			
Connection Design / Sensor Housing Type / Sensor Housing Material / Cable Glands										
Remote / Single compartment / Aluminium / 1 x M20 x 1.5								A1		
Remote / Single compartment / Aluminium / 1 x NPT 1/2 in.								A2		
Remote / Single compartment / Stainless Steel / 1 x M20 x 1.5								U1		
Remote / Single compartment / Stainless Steel / 1 x NPT 1/2 in.								U2		
Without								Y0		

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...Ordering Information

Main ordering information	**FMT430**	**XX**	**XX**	**X**	**X**	**XX**	**XX**	**XX**	**XX**	**X**
SensyMaster FMT430 Thermal Mass Flowmeter, for standard applications, compact and clever										
Outputs										
Current output 1 (active or passive), digitial output 1 & 2 (passive), HART									G0	
Current output 1 (active), digitial output 1 & 2 (passive), current output 2 (passive), HART									G2	
Current output 1 (active or passive), digitial output 1 & 2 (passive), digital Input (passive), HART									G8	
Without (Remote TX or replacement Sensor)									Y0	
Power Supply										
100...240V AC, 50/60Hz										A
24 V DC, +/- 20 %										B
Without (Remote TX or replacement Sensor)										Y

Additional ordering information SensyMaster FMT430

SensyMaster FMT430 Thermal Mass Flowmeter, for standard applications, compact and clever	**XX**	**XX**	**XXX**	**XXX**
Material Certificates				
Material monitoring with inspection certificate 3.1 acc. EN 10204	C2			
Declaration of compliance with the order 2.1 acc. EN 10204	C4			
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test	C6			
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI	CA			
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI with material analysis	C5			
Calibration Certificates				
Certificate of DAkkS calibration, 7 points, traceable acc. ISO / IEC 17025				
(Former DKD certificate, based on reference conditions with air)		CH		
Declaration of compliance for calibration 2.1 acc. EN 10204		CM		
Additional Output 1				
1 x Digital input			DRN	
1 x Digital output			DRG	
1 x Analog output passive (4 ... 20 mA)			DRA	
24 V DC transmitter loop power supply			DRT	
Additional Output 2				
1 x Digital input				DSN
1 x Digital output				DSG
1 x Analog output passive (4 ... 20 mA)				DSA

Continued on next page...

Additional ordering information						
SensyMaster FMT430 Thermal Mass Flowmeter, for standard applications, compact and clever	**XX**	**XX**	**XXX**	**XX**	**XX**	**XX**
Integrated Digital Display (LCD)						
No Display, with Blind Cover	L0					
With Push Buttons and Display (TTG) and Glass Cover	L2					
Documentation Language						
German		M1				
English		M5				
Configuration Type						
Parameters set to factory default			NC1			
Parameters set customer specific			NCC			
Calibration Type						
Accuracy grade B with standard measuring range, incl. factory certificate				R3		
Device Identification Plate						
Stainless steel plate with TAG no.					T1	
Stainless steel plate					T5	
Adhesive label with TAG no.					TC	
Additional stainless steel plate					TS	
Extended Diagnostic Options						
VeriMass Verification Software						V2

1) Nominal size ranges when using flanged pipe components or weld-on adapters without ball valve

...Ordering Information

Main ordering information SensyMaster FMT450

Base model	**FMT450**	**XX**	**XX**	**X**	**X**	**XX**	**XX**	**XX**	**XX**	**X**
SensyMaster FMT450 Thermal Mass Flowmeter, for advanced applications										
Explosion Protection Certification										
Without		Y0								
Measuring Medium										
Air or other clean gas (One gas component only)			C1							
Gas mixtures with max. 23.5 Vol% O2 (eg. Natural gas or Biogas)			C2							
Oxygen / gas mixtures > 23.5 Vol% O2, oil and grease-free,										
with O2 certificate (max. 150 °C / 302 °F)			P1							
Hydrogen (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)		1)	P2							
Helium (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)		1)	P3							
Ammonia			H3							
Sensor Element Type / Temperature Range of Measuring Medium										
Standard ceramic sensor / Standard range -20 ... 150 °C (-4 ... 302 °F)				A						
Standard ceramic sensor / High temperature range -20 ... 300 °C (-4 ... 572 °F)				B						
Mounting Length / Flowmeter Sensor Material										
120 mm (4.7 in.) / AISI 316Ti SST (1.4571) (DN 25 ... DN 125 [1 ... 5 in.])				2)	1					
263 mm (10.4 in.) / AISI 316Ti SST (1.4571) (DN 25 ... DN 350 [1 ... 14 in.])				2)	2					
425 mm (17 in.) / AISI 316Ti SST (1.4571) (> DN 350 ... DN 700 [> 14 ... 28 in.])				2)	3					
775 mm (31 in.) / AISI 316Ti SST (1.4571) (> DN 700 [> 28in.])				2)	4					
Sensor Connection										
Flange DN 25, nominal pressure 4 MPa (40 bar, 580 psi)						D3				
Compression fitting, stainless steel,										
nominal pressure 2 Mpa (20 bar, 290 psi) (-20 ... 140 °C (-4 ... 284 °F)) (> DN80)						G2				
Thread DIN 11851,										
nominal pressure 1.6 Mpa (16 bar, 232 psi) (-20 ... 140 °C (-4 ... 284 °F))						F1				
Connection Design / Transmitter Housing Type / Transmitter Housing Material / Cable Glands										
Integral / Single compartment / Aluminium / 2 x M20 x 1.5							S1			
Integral / Single compartment / Aluminium / 2 x NPT 1/2 in.							S2			
Integral / Single compartment / Stainless Steel / 2 x M20 x 1.5							D1			
Integral / Single compartment / Stainless Steel / 2 x NPT 1/2 in.							D2			
Remote / Not specified (Remote TX or replacement Sensor)							Y0			
Connection Design / Sensor Housing Type / Sensor Housing Material / Cable Glands										
Remote / Single compartment / Aluminium / 1 x M20 x 1.5								A1		
Remote / Single compartment / Aluminium / 1 x NPT 1/2 in.								A2		
Remote / Single compartment / Stainless Steel / 1 x M20 x 1.5								U1		
Remote / Single compartment / Stainless Steel / 1 x NPT 1/2 in.								U2		
Without								Y0		

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Main ordering information	**FMT450**	**XX**	**XX**	**X**	**X**	**XX**	**XX**	**XX**	**XX**	**X**
SensyMaster FMT450 Thermal Mass Flowmeter, for advanced applications										
Outputs										
Current output 1 (active or passive), digitial output 1 & 2 (passive), HART									G0	
Current output 1 (active), digitial output 1 & 2 (passive), current output 2 (passive), HART									G2	
Current output 1 (active or passive), digitial output 1 & 2 (passive), digital Input (passive), HART									G8	
Without (Remote TX or replacement Sensor)									Y0	
Power Supply										
100...240V AC, 50/60Hz										A
24 V DC, +/- 20 %										B
Without (Remote TX or replacement Sensor)										Y

Additional ordering information SensyMaster FMT450

SensyMaster FMT450 Thermal Mass Flowmeter, for advanced applications	**XX**	**XX**	**XXX**	**XXX**
Material Certificates				
Material monitoring with inspection certificate 3.1 acc. EN 10204	C2			
Declaration of compliance with the order 2.1 acc. EN 10204	C4			
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test	C6			
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI	CA			
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI with material analysis	C5			
Calibration Certificates				
Certificate of DAkkS calibration, 7 points, traceable acc. ISO / IEC 17025				
(Former DKD certificate, based on reference conditions with air)		CH		
Declaration of compliance for calibration 2.1 acc. EN 10204		CM		
Additional Output 1				
1 x Digital input			DRN	
1 x Digital output			DRG	
1 x Analog output passive (4 ... 20 mA)			DRA	
24 V DC transmitter loop power supply			DRT	
Additional Output 2				
1 x Digital input				DSN
1 x Digital output				DSG
1 x Analog output passive (4 ... 20 mA)				DSA

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...Ordering Information

Additional ordering information							
SensyMaster FMT450 Thermal Mass Flowmeter, for advanced applications	**XX**	**XX**	**XXX**	**XX**	**XX**	**XX**	**XX**
Integrated Digital Display (LCD)							
No Display, with Blind Cover	L0						
With Push Buttons and Display (TTG) and Glass Cover	L2						
Documentation Language							
German		M1					
English		M5					
Configuration Type							
Parameters set to factory default			NC1				
Parameters set customer specific			NCC				
Special Applications							
Filling application				PT			
Calibration Type							
Accuracy grade A with standard measuring range, incl. factory certificate				6)	R2		
Extended measuring range, non Ex version only, incl. factory certificate (Only standard accuracy)					R4		
Process gas calibration, up to two gas components, incl. factory certificate				9)	RP		
Process gas calibration, gas mixtures with more than two gas components, incl. factory certificate				8)	RM		
Device Identification Plate							
Stainless steel plate with TAG no.						T1	
Stainless steel plate						T5	
Adhesive label with TAG no.						TC	
Additional stainless steel plate						TS	
Extended Diagnostic Options							
VeriMass Verification Software							V2

1) With measured medium H2 or He in nominal size DN 25 ... DN 50 or 1 ...2 in., please use pipe component FMT092 with flow straightener

2) Nominal size ranges when using flanged pipe components or weld-on adapters without ball valve

Main ordering information SensyMaster FMT432 / FMT452 Thermal Mass Flowmeter Transmitter

Base model					
SensyMaster FMT432 Thermal Mass Flowmeter Transmitter	**FMT432**	**XX**	**XX**	**XX**	**XX**
SensyMaster FMT452 Thermal Mass Flowmeter Transmitter	**FMT452**	**XX**	**XX**	**XX**	**XX**
Explosion Protection Certification					
Without		Y0			
Connection Design / Transmitter Housing Type / Transmitter Housing Material / Cable Glands					
Remote / Single compartment, wall mounted / Aluminium / 4 x M20 x 1.5			W1		
Remote / Single compartment, wall mounted / Aluminium / 4 x NPT 1/2 in.			W2		
Remote / Dual compartment, wall mounted / Aluminium / 4 x M20 x 1.5			R1		
Remote / Dual compartment, wall mounted / Aluminium / 4 x NPT 1/2 in.			R2		
Outputs					
Current output 1 (active or passive), digital output 1 & 2 (passive), HART				G0	
Current output 1 (active or passive), digital output 1 & 2 (passive), current output 2 (passive), HART				G2	
Current output 1 (active or passive), digital output 1 & 2 (passive), digital Input (passive), HART				G8	
Power Supply					
100 ... 240 V AC, 50 / 60 Hz					A
24 V DC, +/- 20 %					B

Additional ordering information SensyMaster FMT432 / FMT452 Thermal Mass Flowmeter Transmitter

SensyMaster FMT432 Thermal Mass Flowmeter Transmitter	**XX**	**XXX**	**XXX**	**XX**
SensyMaster FMT452 Thermal Mass Flowmeter Transmitter	**XX**	**XXX**	**XXX**	**XX**
Mounting Bracket Shape / Material				
For 2 in. pipe mounting / Carbon steel	B1			
Additional Output 1				
1 x Digital input		DRN		
1 x Digital output		DRG		
1 x Analog output passive (4 ... 20 mA)		DRA		
24 V DC transmitter loop power supply		DRT		
Additional Output 2				
1 x Digital input			DSN	
1 x Digital output			DSG	
1 x Analog output passive (4 ... 20 mA)			DSA	
Integrated Digital Display (LCD)				
No Display, with Blind Cover				L0
With Push Buttons and Display (TTG) and Glass Cover				L1

Continued on next page...

...Ordering Information

Additional ordering information						
SensyMaster FMT432 Thermal Mass Flowmeter Transmitter	**XX**	**XXX**	**– –**	**XXX**	**XX**	**XX**
SensyMaster FMT452 Thermal Mass Flowmeter Transmitter	**XX**	**XXX**	**XX**	**XXX**	**XX**	**XX**
Documentation Language						
German	M1					
English	M5					
Configuration Type						
Parameters set to factory default		NC1				
Parameters set customer specific		NCC				
Special Applications						
Filling application		1)	PT			
Signal Cable Length						
Without signal cable				SC0		
5 m (approx. 15 ft)				SC1		
10 m (approx. 30 ft)				SC2		
20 m (approx. 66 ft)				SC4		
30 m (approx. 98 ft)				SC6		
50 m (approx. 164 ft)				SCA		
Device Identification Plate						
Stainless steel plate with TAG no.					T1	
Adhesive label with TAG no.					TC	
Additional stainless steel plate					TS	
Extended Diagnostic Options						
VeriMass Verification Software						V2

1) Only FMT452

SensyMaster FMT091 Pipe component / Wafer Design (Type 1)

Base model	**FMT091**	**X**	**XXX**	**XX**	**XX**	**XX**	**XX**	**XX**
SensyMaster FMT091 Pipe component / Wafer Design (Type 1)								
Design								
Standard		S						
Nominal Diameter								
DN 40 (1-1/2 in.)			040					
DN 50 (2 in.)			050					
DN 65 (2-1/2 in.)			065					
DN 80 (3 in.)			080					
DN 100 (4 in.)			100					
DN 125 (5 in.)			125					
DN 150 (6 in.)			150					
DN 200 (8 in.)			200					
Process Connection								
Flanges DIN PN 40				D4				
Flanges ANSI / ASME B16.5 Class 150, Schedule 40 S				A1				
Flanges ANSI / ASME B16.5 Class 300, Schedule 40 S				A3				
Sensor Connection								
Flange DN 25, nominal pressure 4 MPa (40 bar, 580 psi)					D3			
Measuring Medium								
Air or other clean gas						C1		
Gas mixtures with max. 23.5 Vol% O2						C2		
Oxygen / gas mixtures > 23.5 Vol% O2, oil and grease-free, with O2 certificate (max. 150 °C / 302 °F)						P1		
Hydrogen (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)					1)	P2		
Helium (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)					1)	P3		
Ammonia						H3		
Pipe Material								
Stainless steel AISI 316Ti (1.4571)							S2	
Mounting Length of the Sensor								
263 mm (10.4 in.)								L2
425 mm (17 in.)								L3

Continued on next page...

...Ordering Information

Additional ordering information SensyMaster FMT091

SensyMaster FMT091 Pipe component / Wafer Design (Type 1)		**XXX**	**XXX**	**XX**
Sensor Connection Options				
With ball valve (max. 150 °C / 302 °F)	2)	SCA		
With integrated hot-tap fitting, for pipe component DN 50 ... DN 80		SCB		
With integrated hot-tap fitting, for pipe component DN 100 ... DN 200		SCC		
Sensor Connection Accessories				
DN 25 blind flange to close flowmeter sensor connection, material stainless steel AISI 316Ti (1.4571)			SBA	
Certificates				
Material monitoring with inspection certificate 3.1 acc. EN 10204				C2
Declaration of compliance with the order 2.1 acc. EN 10204				C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test				C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI				CA
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI with material analysis				C5
Pressure test acc. AD2000				CB

1) Max. 0.8 MPa (8 bar, 116 psi). With DN 25 ... DN 50 (1 ... 2 in.): Please use pipe component FMT092 with flow straightener

2) Correct sensor length: For pipe component DN 50 ... DN 100: h = 263 mm, from DN 125: h = 425 mm.
For weld-on adapter up to 150 mm: h = 263 mm, up to 500 mm: h = 425 mm, > 500 mm: h = 775 mm

SensyMaster FMT092 Pipe component, partial measuring section (type 2)

Base model	**FMT092**	**X**	**XXX**	**XX**	**XX**	**XX**	**XX**	**XX**
SensyMaster FMT092 Pipe component, partial measuring section (type 2)								
Design								
Standard		S						
Integrated flow straighteners		F						
Nominal Diameter								
DN 25 (1 in.)			025					
DN 40 (1-1/2 in.)			040					
DN 50 (2 in.)			050					
DN 65 (2-1/2 in.)			065					
DN 80 (3 in.)			080					
DN 100 (4 in.)			100					
DN 125 (5 in.) – on request			125					
DN 150 (6 in.) – on request			150					
DN 200 (8 in.) – on request			200					
Process Connection								
Flanges DIN PN 40				D4				
Flanges ANSI / ASME B16.5 Class 150, Schedule 40 S				A1				
Flanges ANSI / ASME B16.5 Class 300, Schedule 40 S				A3				
Thread 1 ... 3 in. NPT-m, nominal pressure 1.6 MPa (16 bar, 232 psi)				N6				
Sensor Connection								
Flange DN 25, nominal pressure 4 MPa (40 bar, 580 psi)					D3			
Thread DIN 11851, nominal pressure 1.6 MPa (16 bar, 232 psi)					F1			
Measuring Medium								
Air or other clean gas						C1		
Gas mixtures with max. 23.5 Vol% O2						C2		
Oxygen / gas mixtures > 23.5 Vol% O2, oil and grease-free, with O2 certificate (max. 150 °C / 302 °F)						P1		
Hydrogen (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)					1)	P2		
Helium (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)					1)	P3		
Ammonia						H3		
Pipe Material								
Stainless steel AISI 316Ti (1.4571)							S2	
Stainless steel AISI 304 (1.4301)							S3	
Mounting Length of the Sensor								
120 mm (4.7 in.)								L1
263 mm (10.4 in.)								L2
425 mm (17 in.)								L3

Continued on next page...

...Ordering Information

Additional ordering information SensyMaster FMT092

SensyMaster FMT092 Pipe component, partial measuring section (type 2)		XXX	XXX	XX
Sensor Connection Options				
With ball valve (max. 150 °C / 302 °F)	2)	SCA		
With integrated hot-tap fitting, for pipe component DN 50 ... DN 80		SCB		
With integrated hot-tap fitting, for pipe component DN 100 ... DN 200		SCC		
Sensor Connection Accessories				
DN 25 blind flange to close flowmeter sensor connection, material stainless steel AISI 316Ti (1.4571)			SBA	
Blind screw connection for Thread DIN 11851, to close flowmeter sensor connection, material stainless steel AISI 304 (1.4301)			SBB	
Certificates				
Material monitoring with inspection certificate 3.1 acc. EN 10204				C2
Declaration of compliance with the order 2.1 acc. EN 10204				C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test				C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI				CA
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI with material analysis				C5
Pressure test acc. AD2000				CB

1) Max. 0.8 MPa (8 bar, 116 psi). With DN 25 ... DN 50 (1 ... 2 in.): Please use pipe component FMT092 with flow straightener

2) Correct sensor length: For pipe component DN 50 ... DN 100: h = 263 mm, from DN 125: h = 425 mm.
For weld-on adapter up to 150 mm: h = 263 mm, up to 500 mm: h = 425 mm, > 500 mm: h = 775 mm

SensyMaster FMT094 Pipe component, weld-on adapter

Base model	**FMT094**	**X**	**XXX**	**XX**	**XX**	**XX**	**XX**	**XX**
SensyMaster FMT094 Pipe component, weld-on adapter								
Design								
Standard		S						
Nominal Diameter								
Selection for weld-on adapter			000					
Process Connection								
Selection for weld-on adapter				W2				
Sensor Connection								
Flange DN 25, nominal pressure 4 MPa (40 bar, 580 psi)					D3			
Compression fitting, stainless steel, nominal pressure 2 MPa (20 bar, 290 psi)					G2			
Thread DIN 11851, nominal pressure 1.6 MPa (16 bar, 232 psi)					F1			
Measuring Medium								
Air or other clean gas						C1		
Gas mixtures with max. 23.5 Vol% O2						C2		
Oxygen / gas mixtures > 23.5 Vol% O2, oil and grease-free, with O2 certificate (max. 150 °C / 302 °F)						P1		
Hydrogen (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)					1)	P2		
Helium (max. 8 bar / 0.8 MPa / 116 psi, including process gas calibration)					1)	P3		
Ammonia						H3		
Pipe Material								
Stainless steel AISI 316Ti (1.4571)							S2	
Carbon steel S 235 (1.0037)							C1	
Mounting Length of the Sensor								
120 mm (4.7 in.)								L1
263 mm (10.4 in.)								L2
425 mm (17 in.)								L3
775 mm (31 in.)								L4

Continued on next page...

Additional ordering information SensyMaster FMT094

SensyMaster FMT094 Pipe component, weld-on adapter		**XXX**	**XXX**	**XX**
Sensor Connection Options				
With ball valve (max. 150 °C / 302 °F)	2)	SCA		
With integrated hot-tap fitting, with weld on adapter for diameter DN 100 ... DN 300 (4 ... 12 in.)		SCD		
Sensor Connection Accessories				
DN 25 blind flange to close flowmeter sensor connection, material stainless steel AISI 316Ti (1.4571)			SBA	
Blind screw connection for Thread DIN 11851, to close flowmeter sensor connection, material stainless steel AISI 304 (1.4301)			SBB	
Certificates				
Material monitoring with inspection certificate 3.1 acc. EN 10204				C2
Declaration of compliance with the order 2.1 acc. EN 10204				C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test				C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI				CA
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI with material analysis				C5

1) Max. 0.8 MPa (8 bar, 116 psi). With DN 25 ... DN 50 (1 ... 2 in.): Please use pipe component FMT092 with flow straightener

2) Correct sensor length: For pipe component DN 50 ... DN 100: h = 263 mm, from DN 125: h = 425 mm.
For weld-on adapter up to 150 mm: h = 263 mm, up to 500 mm: h = 425 mm, > 500 mm: h = 775 mm

Sales

Service

Trademarks

Questionnaire

Customer:	**Date:**
Ms. / Mr.:	**Department:**
Telephone:	**Email:**

Modell:

☐ FMT230 ☐ FMT430 ☐ Not determined

☐ FMT250 ☐ FMT450

Application data:

Operating pressure min. / norm. / max. [bar abs, psi, other]

_____

Temperature min. / norm. / max. [°C, °F]

_____

Flow rate min. / norm. / max. [kg/h, lbs/h, Nm3/h, other]

_____

Normal conditions (in volume flow)

☐ 0°C, 1013mbar ☐ other

☐ 20°C, 1013mbar _____

Gas data:

Gas type (pure gas):

_____

Gas mixture (name, vol. %)1)	Component 1	Component 2	Component 3	Component 4	Component 5
	_____	_____	_____	_____	_____

Transmitter design:

Design:

☐ Integral mount design ☐ Single-compartment housing

☐ Remote mount design ☐ Dual- compartment housing

Signal cable length (remote mount design)

☐ 5 m ☐ 25 m

☐ 15 m

Communication:

☐ current output / HART

☐ Modbus RTU

Piping /pipe component

Nominal diameter / pressure rating [DIN / ASME]

_____

Inside diameter [mm]

_____

Pipe component design

☐ Wafer type FMT091

☐ Partial measuring section FMT092

☐ Welding adapter FMT094

1) In case of mixed gases the composition must be specified by stating the components: CH_4 90 %, C_2H_6 5 %, N_2 3 %, C_3H_8 1 %, Co_2 1 %

NOTE

The order can only be confirmed and a delivery date specified once full technical clearance has been obtained!

Notes

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/flow

3KXF421013R1001

DS/FMT430/450-EN Rev. B 06.2020