high-accuracy
measurement
instruments

FICHA TÉCNICA DE PRODUTO

PRODUCT DATASHEET

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Data Sheet DS/FEP300-EN Rev. K

ProcessMaster FEP300
Electromagnetic flowmeter

The process industry's first choice

Measurement made easy

One solution for all your needs
— The versatile product tailored to meet all your process applications

Versatile and simple configuration
— Through glass configuration eliminating the need to remove the cover and reducing commissioning time
— Soft key based functionality
— “Easy Set-up” function

State-of-the-art memory technology
— Revolutionary data storage enables transmitter interchange without the need for reconfiguration

ScanMaster in situ verification software option
— Allows the customer to perform in-situ verification of the flowmeter and plant

Advanced diagnostics for real-life situations
— Simplified plant trouble shooting increases productivity and process safety
— Status messages in accordance with NAMUR
— Help texts in the display

Un-paralleled service ability
— Fault finding help texts in the display
— Minimized down time with replaceable electronics cartridge
— Universal transmitter reduces spare parts inventory costs and storage costs

Approvals for explosion protection
— In accordance with ATEX, IECEx, FM, cFM, NEPSI and GOST

HART, PROFIBUS PA, FOUNDATION Fieldbus
— Access to all status information

The Company

ABB is an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications. As a world leader in process automation technology our worldwide presence, comprehensive service and application oriented know-how make ABB a leading supplier of flow measurement products.

Introduction

Setting the standard for the process industry

ProcessMaster is designed specifically to meet the increased requirements on advanced flowmeters. The modular design concept offers flexibility, cost-saving operation and reliability whilst providing a long service life and exceptionally low maintenance.
Integration into ABB asset management systems and usage of the selfmonitoring and diagnostic functions increase the plant availability and reduce downtimes.

ScanMaster - the diagnostic tool

Can I rely on the measured values?
How can I determine the technical condition of my device? ScanMaster can answer these frequently asked questions.
And ScanMaster allows you to easily check the device for proper functioning either through its Infra-red service port or through the HART commands.

Advanced diagnostic functions

Using its advanced diagnostic functions, the device monitors both its own operability and the process.
Limit values for the diagnostic parameters can be set locally. When these limits are exceeded, an alarm is tripped.
For further analysis, the diagnostic data can be read out via an advanced DTM. Critical states can, thus, be recognized early and appropriate measures can be taken.
As a result, productivity is increased and downtimes are avoided. The status messages are classified in accordance with the NAMUR recommendations.
In the event of an error, a diagnostic-dependent help text appears on the display which considerably simplifies and accelerates the troubleshooting procedure. The gives maximum safety for the process.

Flow performance

Using a higher excitation frequency for the transmitter, ProcessMaster is a flowmeter with an especially short response time. With its advanced filtering methods, the device improves accuracy even under difficult conditions by separating the noise from the measuring signal. This leads to a maximum measuring error of 0.2 % of rate. Self-cleaning, double-sealed polished measuring electrodes enhance the device's reliability and performance.

Easy and quick commissioning

Advanced data storage inside the sensor eliminates the need to match sensor and transmitter in the field. The on-board sensor memory automatically identifies the transmitter. On power-on, the transmitter self-configuration function is run and replicates all sensor data and TAG specific parameters into the transmitter. This eliminates the opportunity for errors and leads to an increased startup speed and reliability.

Intuitive, convenient navigation

The factory-set parameters can be modified quickly and easily via the user-friendly display and the non-contact buttons, without opening the housing.
The "Easy Set-up" function reliably guides unpracticed users through the menu step by step.
The softkey-based functionality makes handling a breeze - it's just like using a cell phone. During the configuration, the permissible range of each parameter is indicated on the display and invalid entries are rejected.

Universal transmitter - powerful and flexible

The backlit display can be easily rotated without the need for any tools. The contrast is adjustable and the display fully configurable. The character size, number of lines and display resolution (number of decimals) can be set as required. In multiplex operation, several different display options can be pre-configured and invoked one after the
other.
The smart modular design of the transmitter unit allows for easy disassembly without the need to unscrew cables or unplug connectors.
Whether count pulses, 20 mA signals or the status output are active or passive, the universal transmitter always delivers the correct signal. HART is used as the standard protocol. Optionally, the transmitter is available with PROFIBUS PA or FOUNDATION Fieldbus communication.
The universal transmitter simplifies the spare parts inventory and reduces the stockholding costs.

Assured quality

ProcessMaster is designed and manufactured in accordance with international quality procedures (ISO 9001) and all flowmeters are calibrated on nationally-traceable calibration rigs to provide the end- user with complete assurance of both quality and performance of the meter.

ProcessMaster - always the first choice

ProcessMaster sets the standard for the process industry. It meets the various requirements of NAMUR. ProcessMaster is a universal device according to the Pressure Equipment Directive. In compliance with the requirements of NAMUR, the devices are categorized under category III for pipelines. As a result, ProcessMaster can be used universally. This reduces costs and increases safety.

Overview of the ProcessMaster series

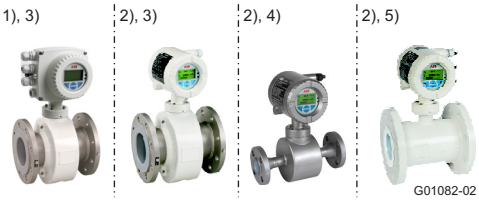
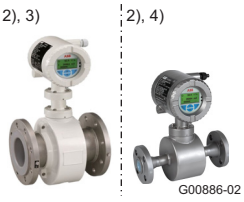
ProcessMaster is available in two series. ProcessMaster 300, which sets the standard in Process Flow measurement and ProcessMaster 500 with best in class extended functionality and options. The following table gives an overview.

	ProcessMaster	
	FEP300	FEP500
Measuring accuracy 0.4 % (optionally 0.2 %) of rate	X	-
Measuring accuracy 0.3 % (optionally 0.2 %) of rate	-	X
Batch functions Presetting counter, overrun correction, external start/stop, batch end contact	-	X
Other software functions Mass units, editable counter,	X	X
Two measuring ranges	-	X
Graphic display Line recorder function	X	X
Diagnostic functions Detection of gas bubbles or deposits on electrodes, conductivity monitoring, temperature monitoring, finger print, trend	-	X
Partially filled Recognition through partial filling electrode (TFE)	X	X
Hardware options Versions for extremely abrasive fluids: • Ceramic carbide liner, • Wolfram carbide electrodes, • Double layer electrodes	-	X
Startup functions Grounding check	-	X
Fieldbus PROFIBUS PA, FOUNDATION Fieldbus	X	X
Verifications / Diagnostic tool ScanMaster	X	X

This data sheet describes ProcessMaster 300.
For ProcessMaster 500 refer to data sheet DS/FEP500

Overview – models

Integral mount design

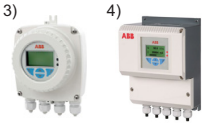
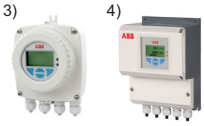
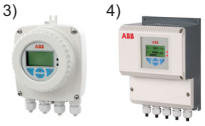
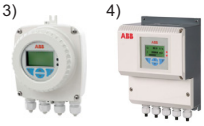
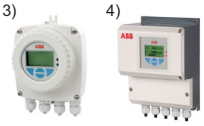
FEP311 (without explosion protection)	FEP315 (Zone 2 / Division 2)	FEP315 (Zone 1 / Division 1)
1), 3) 2), 3) 2), 4) 2), 5)  G01082-02	1), 3) 2), 3) 2), 4)  G00487-02	2), 3) 2), 4)  G00886-02

Measured error	Default: 0.4 % of measured value, 0.2 % of measured value
Nominal diameter range	DN 3 ... 2000 (1/10 " ... 80 ")
Process connection[6)]	Flange in accordance with DIN 2501 / EN 1092-1, ASME B16.5 / B16.47, JIS, AS2129
Nominal pressure	PN 10 … 100, ASME CL 150, 300, 600, 900, 1500, 2500
Liner	Hard rubber (DN 15 ... 2000), soft rubber (DN 50 ... 2000), PTFE (DN 10 ... 600), PFA (DN 3 ... 200), ETFE (DN 25 ... 600), Linatex (DN 50 ... 600)
Conductivity	> 5 µS/cm (20 µS/cm for demineralized water)
Electrodes	Stainless steel, Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium, tungsten carbide
Process connection material	Steel, stainless steel
IP rating	IP 65, IP 67
Measuring medium temperature	-25 ... 180 °C (-13 ... 356 °F)
Power supply	100 ... 230 V AC (-15 / +10%), 24 V AC (-30 / +10%), 24 V DC (-30 / +30%)
current output	4 ... 20 mA, active or passive
Pulse output	Can be configured locally as active or passive using software
Switch output / switch input	Optoelectronic coupler, programmable function
Display	Graphical display, configurable
Housing	Integral mount design: choice of single-compartment housing or dual-compartment housing.
Communication	HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus (option)
Explosion protection approvals	• ATEX / IECEx zone 1, 2, 21, 22 • NEPSI zone 1, 2 • FM / cFM Cl 1 Div 1 (≤ DN 300), Cl 1 Div 2 • GOST zone 1, 2
Pressure Equipment Directive 97/23/EC	Conformity assessment in accordance with category III, fluid group 1
CRN (Canadian Reg.Number)	On request

1) Single-compartment housing.
2) Dual-compartment housing.
3) Design level "B" sensor.
4) Design level "B" sensor, all versions made from stainless steel.
5) Design level "C" sensor, DN 25 … 600.
6) For information on flange thicknesses, see the chapters entitled "Dimensions for sensor design level „B"" on page 37 and "Dimensions for sensor design level „C"" on page 43.

Remote mount design

Sensor		
FEP321 (without explosion protection)	**FEP325 (Zone 2 / Division 2)**	**FEP325 (Zone 1 / Division 1)**
1) 2)  G01083-02	1)  G00489-01	1)  G00489-01

Transmitters					
FET321 (without explosion protection)	**FET325 (Zone 2, Division 2)**	**FET321 (without explosion protection)**	**FET325 (Zone 1, Division 1)**	**FET325 (Zone 2, Division 2)**	**FET321 (without explosion protection)**
3) 4)  G01084-02	3) 4)  G01084-02	3) 4)  G01084-02	4)  G00863-02	3) 4)  G01084-02	3) 4)  G01084-02

Sensor	
Measured error	Default: 0.4 % of measured value, 0.2 % of measured value
Nominal diameter range	DN 3 ... 2000 (1/10 " ... 80 ")
Process connection[5)]	Flange in accordance with DIN 2501 / EN 1092-1, ASME B16.5 / B16.47, JIS 10K
Nominal pressure	PN 10 … 100, ASME CL 150, 300, 600, 900, 1500, 2500
Liner	Hard rubber (DN 15 ... 2000), soft rubber (DN 50 ... 2000), PTFE (DN 10 ... 600), PFA (DN 3 ... 200), ETFE (DN 25 ... 600), Linatex (DN 50 ... 600)
Conductivity	> 5 µS/cm (20 µS/cm for demineralized water)
Electrodes	Stainless steel, Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium, tungsten carbide
Process connection material	Steel, stainless steel
IP rating	IP 65, IP 67, IP 68, (NEMA 4X)
Fluid temperature	-25 ... 180 °C (-13 ... 356 °F)
Transmitters	
Power supply	100 ... 230 V AC (-15 / +10 %), 24 V AC (-30 / +10 %), 24 V DC (-30 / +30 %)
current output	4 ... 20 mA, active or passive
Pulse output	Can be configured locally as active or passive using software
Switch output / switch input	Optoelectronic coupler, programmable function
Display	Graphical display, configurable
Housing	Field mount housing: choice of single-compartment housing or dual-compartment housing
Communication	HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus (option)
Approvals	
Explosion protection approvals	• ATEX / IECEx zone 1, 2, 21, 22 • FM / cFM Cl 1 Div 1 (≤ DN 300), Cl 1 Div 2 • NEPSI zone 1, 2 • GOST zone 1, 2
Pressure Equipment Directive 97/23/EC	Conformity assessment in accordance with category III, fluid group 1
CRN (Canadian Reg.Number)	On request

1) Design level "B" sensor.
2) Design level "C" sensor, DN 25 … 600.
3) Single-compartment housing.
4) Dual-compartment housing.
5) For information on flange thicknesses, see the chapters entitled "Dimensions for sensor design level „B"" on page 37 and "Dimensions for sensor design level „C"" on page 43.

Specification - general

Reference conditions

According to EN 29104

Fluid temperature	20 °C (68 °F) ± 2 K
Ambient temperature	20 °C (68 °F) ± 2 K
Supply power	Nominal voltage acc. to name plate U_n ± 1 %, frequency f ± 1 %
Installation conditions	- Upstream >10 x DN, straight section - Downstream >5 x DN, straight section
Warm-up phase	30 min.

Maximum measuring error

Impulse output

- Standard calibration:
  ± 0.4 % of measured value,
  ± 0.02 % $Qmax_{DN}$ (DN 3 … 2000)
- Optional calibration:
  ± 0.2 % of measured value,
  ± 0.02 % $Qmax_{DN}$ (DN 10 … 600, 800)

$Qmax_{DN}$: See table in Section "Flowmeter sizes, flow range" on page 7.

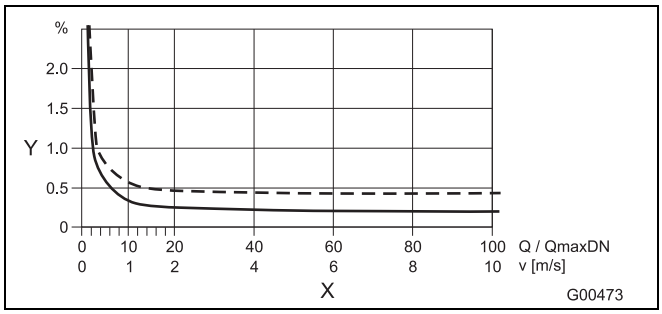


Fig. 1

Y Accuracy ± of measured value in [%]
X Flow velocity v in [m/s], Q / $Qmax_{DN}$ [%]

Analog output effects

Same as pulse output plus ± 0.1 % of measured value ± 0.01 mA

Reproducibility, response time

Reproducibility	≤ 0.11 % of measured value, t_{meas} = 100 s, v = 0.5 ... 10 m/s
Response time of current output with damping of 0.02 seconds	As step function 0 ... 99 % 5 τ ≥ 200 ms at 25 Hz excitation frequency 5 τ ≥ 400 ms at 12.5 Hz excitation frequency 5 τ ≥ 500 ms at 6.25 Hz excitation frequency

Flowmeter sizes, flow range

The flow range end value can be set between 0.02 x Q_{max}DN and 2 x Q_{max}DN.

Nominal diameter DN	Nominal diameter "	Min. flow range end value 0.02 x Q_{max}DN (≈ 0.2 m/s)	Q_{max}DN 0 … ≈ 10 m/s	Max. flow range end value 2 x Q_{max}DN (≈ 20 m/s)
3	1/10	0.08 l/min (0.02 US gal/min)	4 l/min (1.06 US gal/min)	8 l/min (2.11 US gal/min)
4	5/32	0.16 l/min (0.04 US gal/min)	8 l/min (2.11 US gal/min)	16 l/min (4.23 US gal/min)
6	1/4	0.4 l/min (0.11 US gal/min)	20 l/min (5.28 US gal/min)	40 l/min (10.57 US gal/min)
8	5/16	0.6 l/min (0.16 US gal/min)	30 l/min (7.93 US gal/min)	60 l/min (15.85 US gal/min)
10	3/8	0.9 l/min (0.24 US gal/min)	45 l/min (11.9 US gal/min)	90 l/min (23.78 US gal/min)
15	1/2	2 l/min (0.53 US gal/min)	100 l/min (26.4 US gal/min)	200 l/min (52.8 US gal/min)
20	3/4	3 l/min (0.79 US gal/min)	150 l/min (39.6 US gal/min)	300 l/min (79.3 US gal/min)
25	1	4 l/min (1.06 US gal/min)	200 l/min (52.8 US gal/min)	400 l/min (106 US gal/min)
32	1 1/4	8 l/min (2.11 US gal/min)	400 l/min (106 US gal/min)	800 l/min (211 US gal/min)
40	1 1/2	12 l/min (3.17 US gal/min)	600 l/min (159 US gal/min)	1200 l/min (317 US gal/min)
50	2	1.2 m3/h (5.28 US gal/min)	60 m3/h (264 US gal/min)	120 m3/h (528 US gal/min)
65	2 1/2	2.4 m3/h (10.57 US gal/min)	120 m3/h (528 US gal/min)	240 m3/h (1057 US gal/min)
80	3	3.6 m3/h (15.9 US gal/min)	180 m3/h (793 US gal/min)	360 m3/h (1585 US gal/min)
100	4	4.8 m3/h (21.1 US gal/min)	240 m3/h (1057 US gal/min)	480 m3/h (2113 US gal/min)
125	5	8.4 m3/h (37 US gal/min)	420 m3/h (1849 US gal/min)	840 m3/h (3698 US gal/min)
150	6	12 m3/h (52.8 US gal/min)	600 m3/h (2642 US gal/min)	1200 m3/h (5283 US gal/min)
200	8	21.6 m3/h (95.1 US gal/min)	1080 m3/h (4755 US gal/min)	2160 m3/h (9510 US gal/min)
250	10	36 m3/h (159 US gal/min)	1800 m3/h (7925 US gal/min)	3600 m3/h (15850 US gal/min)
300	12	48 m3/h (211 US gal/min)	2400 m3/h (10567 US gal/min)	4800 m3/h (21134 US gal/min)
350	14	66 m3/h (291 US gal/min)	3300 m3/h (14529 US gal/min)	6600 m3/h (29059 US gal/min)
400	16	90 m3/h (396 US gal/min)	4500 m3/h (19813 US gal/min)	9000 m3/h (39626 US gal/min)
450	18	120 m3/h (528 US gal/min)	6000 m3/h (26417 US gal/min)	12000 m3/h (52834 US gal/min)
500	20	132 m3/h (581 US gal/min)	6600 m3/h (29059 US gal/min)	13200 m3/h (58117 US gal/min)
600	24	192 m3/h (845 US gal/min)	9600 m3/h (42268 US gal/min)	19200 m3/h (84535 US gal/min)
700	28	264 m3/h (1162 US gal/min)	13200 m3/h (58118 US gal/min)	26400 m3/h (116236 US gal/min)
760	30	312 m3/h (1374 US gal/min)	15600 m3/h (68685 US gal/min)	31200 m3/h (137369 US gal/min)
800	32	360 m3/h (1585 US gal/min)	18000 m3/h (79252 US gal/min)	36000 m3/h (158503 US gal/min)
900	36	480 m3/h (2113 US gal/min)	24000 m3/h (105669 US gal/min)	48000 m3/h (211337 US gal/min)
1000	40	540 m3/h (2378 US gal/min)	27000 m3/h (118877 US gal/min)	54000 m3/h (237754 US gal/min)
1050	42	616 m3/h (2712 US gal/min)	30800 m3/h (135608 US gal/min)	61600 m3/h (271217 US gal/min)
1100	44	660 m3/h (3038 US gal/min)	33000 m3/h (151899 US gal/min)	66000 m3/h (290589 US gal/min)
1200	48	840 m3/h (3698 US gal/min)	42000 m3/h (184920 US gal/min)	84000 m3/h (369841 US gal/min)
1400	54	1080 m3/h (4755 US gal/min)	54000 m3/h (237755 US gal/min)	108000 m3/h (475510 US gal/min)
1500	60	1260 m3/h (5548 US gal/min)	63000 m3/h (277381 US gal/min)	126000 m3/h (554761 US gal/min)
1600	66	1440 m3/h (6340 US gal/min)	72000 m3/h (317006 US gal/min)	144000 m3/h (634013 US gal/min)
1800	72	1800 m3/h (7925 US gal/min)	90000 m3/h (396258 US gal/min)	180000 m3/h (792516 US gal/min)
2000	80	2280 m3/h (10039 US gal/min)	114000 m3/h (501927 US gal/min)	228000 m3/h (1003853 US gal/min)

Specifications - sensor

IP rating

In accordance with EN 60529
IP 65, P 67, NEMA 4X
IP 68 (for remote mount design only)

Pipe vibration

In accordance with EN 60068-2-6
Applicable to sensors in remote mount design and sensors in integral mount design with aluminum transmitter housing.
- In the 10 ... 58 Hz range, max. deflection 0.15 mm (0.006 inch)
- In the 58 ... 150 Hz range, max. acceleration 2 g

Installation length

The flange devices comply with the installation lengths specified in VDI/VDE 2641, ISO 13359, or according to DVGW (process sheet W420, design WP, ISO 4064 short).

Signal cable

For remote mount design only
A 5 m (16.4 ft) cable is included in the scope of delivery.
If more than 5 m (16.4 ft) is required, the cable can be ordered separately (for ordering information, see the table below or the chapter entitled "Accessories" on page 71).

	Signal cable	
Application	D173D031U01	D173D027U01
Non-Ex (< DN 15)	✕	✔
Non-Ex (≥ DN 15)	✔	✔
Zone 2 / Division 2 (< DN 15)	✕	✔
Zone 2 / Division 2 (≥ DN 15)	✔	✔
Zone 1 / Division 1 (all nominal diameters)	✕	✔

✕ Application not permitted
✔ Application permitted
Supplied as standard

On the transmitter design for use in Zone 1, Division 1 (model FET325), 10 m (32.8 ft) of signal cable is permanently connected to the transmitter.

Signal cable length and preamplifier

A preamplifier is required for cable lengths > 50 m (164 ft).
Maximum signal cable length between sensor and transmitter:

Preamplifier	Signal cable length
without	Max. 50 m (164 ft) for conductivity ≥ 5 µS/cm
with	Max. 200 m (656 ft) for conductivity ≥ 5 µS/cm

Temperature Data

The temperature range offered by the device is dependent on a number of different factors.
These factors include the measuring medium temperature, the ambient temperature, the operating pressure, the liner material and the approvals for the explosion protection.

Storage temperature

-40 ... 70 °C (-40 ... 158 °F)

Minimum permissible pressure depending on measuring medium temperature

Design level "B" sensor			
Liner	**Nominal Diameter**	**$P_{Operating}$ at mbar abs.**	**T_{medium} 1)**
Hard rubber	15 ... 2000 (1/2 ... 80")	0	< 90 °C (194 °F) < 80 °C (176 °F) 2)
Soft rubber	50 ... 2000 (2 ... 80")	0	< 60 °C (140 °F)
PTFE	10 ... 600 (3/8 ... 24")	270 400 500	< 20 °C (68 °F) < 100 °C (212 °F) < 130 °C (266 °F)
Thick PTFE, high-temp. design	25 … 80 100 … 250 300	0 67 27	< 180 °C (356 °F) < 180 °C (356 °F) < 180 °C (356 °F)
PFA	3 ... 200 (1/10 ... 8")	0	< 180 °C (356 °F)
ETFE	25 ... 600 (1 ... 24")	100	< 130 °C (266 °F)
Linatex2)	50 ... 600 (2 … 24“)	0	< 70 °C (158 °F)

Design level "C" sensor			
Liner	**Nominal Diameter**	**$P_{Operating}$ at mbar abs.**	**T_{medium} 1)**
Hard rubber	40 ... 600 (1 1/2 ... 24")	600	< 80 °C (176 °F)
PTFE	25 ... 600 (1 ... 24")	270 400 500	< 20 °C (68 °F) < 100 °C (212 °F) < 130 °C (266 °F)

1) For CIP/SIP cleaning, higher temperatures are permitted for limited time periods; refer to the table entitled "Maximum permissible cleaning temperature".
2) For China production site only.

Liner approvals on request; please contact ABB.

Maximum permissible cleaning temperature

CIP cleaning	Sensor lining	T_{max}	T_{max} minutes	$T_{amb.}$
Steam cleaning	PTFE, PFA	150 °C (302 °F)	60	25 °C (77 °F)
Fluids	PTFE, PFA	140 °C (284 °F)	60	25 °C (77 °F)

If the ambient temperature is > 25 °C, the difference must be subtracted from the max. cleaning temperature. T_{max} - Δ °C (Δ °C = $T_{amb.}$ - 25 °C).

Maximum ambient temperature depending on measuring medium temperature

Note

When using the device in potentially explosive atmospheres, note the additional temperature data in the chapter entitled "Ex relevant specifications" on page 21.

Integral mount design (standard sensor)

Liner	Flange material	Ambient temperature		Measuring medium temperature	
		Minimum	Maximum	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F) -5 °C (23 °F) 1)	90 °C (194 °F) 4) 80 °C (176 °F) 1)
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F) -5 °C (23 °F) 1)	90 °C (194 °F) 4) 80 °C (176 °F) 1)
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F) 45 °C (113 °F)	-10 °C (14 °F)	90 °C (194 °F) 130 °C (266 °F)
PTFE	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) 2)	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
PFA	Steel	-10 °C (14 °F)	60 °C (140 °F) 45 °C (113 °F)	-10 °C (14 °F)	90 °C (194 °F) 130 °C (266 °F)
PFA	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) 2)	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
Thick PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F) 45 °C (113 °F)	-10 °C (14 °F)	90 °C (194 °F) 130 °C (266 °F)
Thick PTFE	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) 2)	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
ETFE	Steel	-10 °C (14 °F)	60 °C (140 °F) 45 °C (113 °F)	-10 °C (14 °F)	90 °C (194 °F) 130 °C (266 °F)
ETFE	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) 2)	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
Linatex 1)	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	70 °C (158 °F)
Linatex 1)	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F)	-20 °C (-4 °F)	70 °C (158 °F)

Integral mount design (high-temperature sensor)3)

Liner	Flange material	Ambient temperature		Measuring medium temperature	
		Minimum	Maximum	Minimum	Maximum
PFA	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	180 °C (356 °F)
PFA	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) 2)	60 °C (140 °F)	-20 °C (-13 °F)	180 °C (356 °F)
Thick PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	180 °C (356 °F)
Thick PTFE	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) 2)	60 °C (140 °F)	-20 °C (-13 °F)	180 °C (356 °F)
ETFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) 2)	60 °C (140 °F)	-20 °C (-13 °F)	130 °C (266 °F)

1) For China production site only.
2) For (optional) low-temperature version only.
3) With sensor design level "B" only.
4) The maximum measuring medium temperature is reduced to 80 °C (176 °F) for design level "C" sensors with a hard rubber liner.

Note
When using the device in potentially explosive atmospheres, note the additional temperature data in the chapter entitled "Ex relevant specifications" on page 21.

Remote mount design (standard sensor)

Liner	Flange material	Ambient temperature		Measuring medium temperature	
		Minimum	Maximum	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F) -5 °C (23 °F) [1]	90 °C (194 °F) [4] 80 °C (176 °F) [1]
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F) -5 °C (23 °F) [1]	90 °C (194 °F) [4] 80 °C (176 °F) [1]
Soft rubber	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) [2]	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
PFA	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) [2]	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
Thick PTFE	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
Thick PTFE	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) [2]	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
ETFE	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
Linatex [1]	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	70 °C (158 °F)
Linatex [1]	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F)	-20 °C (-4 °F)	70 °C (158 °F)

Remote mount design (high-temperature sensor)[3]

Liner	Flange material	Ambient temperature		Measuring medium temperature	
		Minimum	Maximum	Minimum	Maximum
PFA	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	180 °C (356 °F)
PFA	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) [2]	60 °C (140 °F)	-25 °C (-13 °F)	180 °C (356 °F)
Thick PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	180 °C (356 °F)
Thick PTFE	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) [2]	60 °C (140 °F)	-25 °C (-13 °F)	180 °C (356 °F)
ETFE	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) [2]	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)

1) For China production site only.
2) For (optional) low-temperature version only.
3) With sensor design level "B" only.
4) The maximum measuring medium temperature is reduced to 80 °C (176 °F) for design level "C" sensors with a hard rubber liner.

Materials for sensors

Wetted parts

Part	Standard	Option
Liner	PTFE, PFA, ETFE, hard rubber, soft rubber	Linatex
Measurement and grounding electrode for: - Hard rubber - Soft rubber	Stainless steel 1.4571 (AISI 316Ti)	Hastelloy B-3 (2.4600), Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium, 1.4539 (AISI 904L), tungsten carbide
- PTFE, PFA, ETFE	Stainless steel 1.4539 (AISI 904L)	Stainless steel 1.4571 (AISI 316Ti) Hast. C-4 (2.4610) Hast. B-3 (2.4600) Titanium, tantalum, platinum-iridium
Grounding plate	Stainless steel	On request
Protection plate	Stainless steel	On request

Non-wetted parts (process connection)

Design level "B" sensor


G01340

Nominal Diameter	Standard	Option
DN 3 ... 15 (1/10 ... 1/2")	Stainless steel[1)]	-
DN 20 ... 400 (3/4 ... 16")	Steel (galvanized)[2)]	Stainless steel [1)]
DN 450 ... 2000 (18 ... 80")	Steel (painted)[2)]	-

Design level "B" sensor


G01342

Nominal Diameter	Standard	Option
DN 25 ... 400 (1 ... 16")	Stainless steel (AISI 316, 316L)	-

Design level "C" sensor


G01341

Nominal Diameter	Standard	Option
DN 25 ... 600 (1 ... 24")	Steel (painted) [2)]	-

The process connections are made of one of the materials listed below:

1) 1.4301 (AISI 304), 1.4307, 1.4404 (AISI 316L) 1.4435 (AISI 316L), 1.4541 (AISI 321) 1.4571 (AISI 316Ti), ASTM A182 F304, ASTM A182 F304L, ASTM A182 F316L, ASTM A182 F321, ASTM A182 F316TI, ASTM A182 F316, 0Cr18Ni9, 0Cr18Ni10, 0Cr17Ni13Mo2, 0Cr27Ni12Mo3, 1Cr18Ni9Ti, 0Cr18Ni12Mo2Ti
2) 1.0038, 1.0460, 1.0570, 1.0432, ASTM A105, Q255A, 20#, 16Mn

Sensor housing

Design level "B" sensor


G01340

Housing	
DN 3 ... 400 (1/10 ... 16")	Pair case, cast aluminum, painted, paint coat, ≥ 80 µm thick, RAL 9002
DN 450 … 2000 (18 ... 80")	Welded steel design, painted, paint coat, ≥ 80 µm thick, RAL 9002
Terminal box	Aluminum alloy, painted, ≥ 80 µm thick, gray white, RAL 9002
Meter tube	Stainless steel [3)]
Cable gland[4)]	Polyamide
	Stainless steel (in the case of explosion-proof design for ambient temperature of -40 °C [40 °F])

Design level "B" sensor


G01342

Housing + meter tube	
DN 25 ... 400 (1 ... 16")	Stainless steel (AISI 316, 316L)
Cable gland[4)]	Polyamide

Design level "C" sensor


G01341

Housing + meter tube	
DN 25 ... 600 (1 ... 24")	Steel, painted, paint coat, ≥ 80 µm thick, RAL 9002
Terminal box	Aluminum alloy, painted, ≥ 80 µm thick, gray white, RAL 9002
Cable gland[4)]	Polyamide

The meter tube is made of one of the materials listed below:

3) 1.4301, 1.4307, 1.4404, 1.4435, 1.4541, 1.4571
ASTM materials:
Grade TP304, TP304L, TP316L, TP321, TP316Ti, TP317L, 0Cr18Ni9, 00Cr18Ni10, 0CR17Ni14Mo2, 0Cr27Ni12Mo3, 0Cr18Ni10Ti
4) Cable gland with M20x1.5 or NPT thread, to be selected via the order number.

Overview sensor design level "C"

Sensor Size	Pressure rating	Carbon steel flange	PTFE	Hard rubber	Electrode design: Standard	Sensor temp. Range: Standard Ambient temp. range: -20 ... 60 °C
DN 25 (1")	DIN PN 10, DIN PN 16, DIN PN 25, DIN PN 40 ASME CL 150, CL 300 JIS 10 K	X	X	—	X	X
DN 32 (1 1/4")		X	X	—	X	X
DN 40 (1 1/2")		X	X	X	X	X
DN 50 (2")		X	X	X	X	X
DN 65 (2 1/2")		X	X	X	X	X
DN 80 (3")		X	X	X	X	X
DN 100 (4")		X	X	X	X	X
DN 125 (5")		X	X	X	X	X
DN 150 (6")		X	X	X	X	X
DN 200 (8")		X	X	X	X	X
DN 250 (10")		X	X	X	X	X
DN 300 (12")		X	X	X	X	X
DN 350 (14")		X	X	X	X	X
DN 400 (16")		X	X	X	X	X
DN 450 (18")		X	X	X	X	X
DN 500 (20")		X	X	X	X	X
DN 600 (24")		X	X	X	X	X

Material load

Limits for the permissible fluid temperature (TS) and permissible pressure (PS) are calculated on the basis of the lining and flange material used in the device (refer to the name plate on the device).

Flowmeter sensor design level “B”

DIN flange stainless steel up to DN 600 (24")

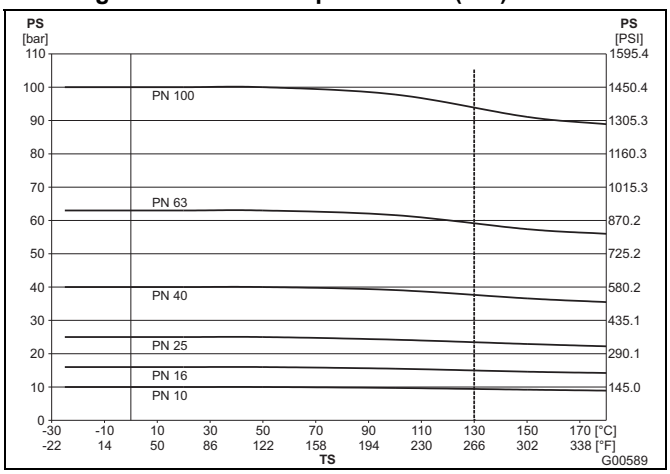


Fig. 2

ASME flange, stainless steel, up to DN 400 (16") (CL150/300) up to DN 1000 (40") (CL150)

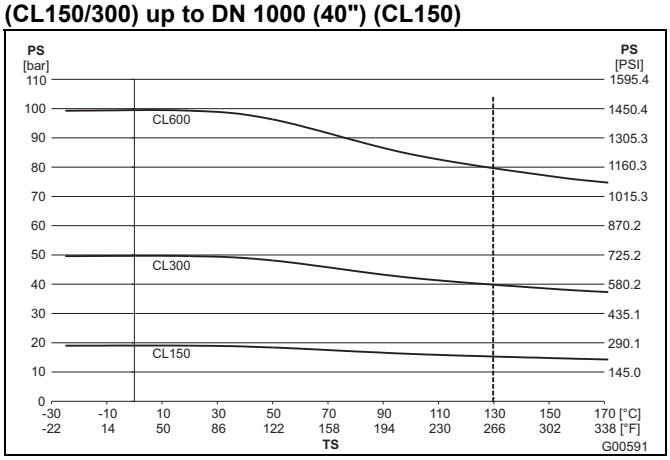


Fig. 3

DIN flange, steel, up to DN 600 (24")

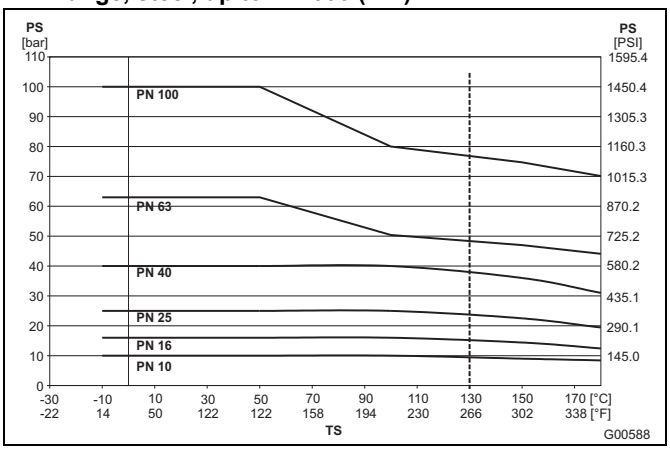


Fig. 4

ASME flange, steel, up to DN 400 (16") (CL150/300); up to DN 1000 (40") (CL150)

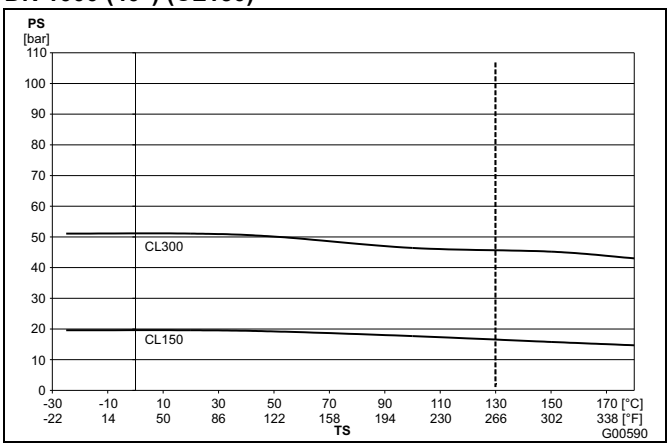


Fig. 5

JIS 10K-B2210 flange

Nominal diameter	Material	PN	TS	PS
32 ... 400 (1 1/4 ... 16")	Stainless steel	10	-25 ... 180 °C (-13 ... 356 °F)	10 bar (145 psi)
32 ... 400 (1 1/4 ... 16")	Steel	10	-10 ... 180 °C (14 ... 356 °F)	10 bar (145 psi)

DIN flange, stainless steel, DN 700 (28") up to DN 1000 (40")

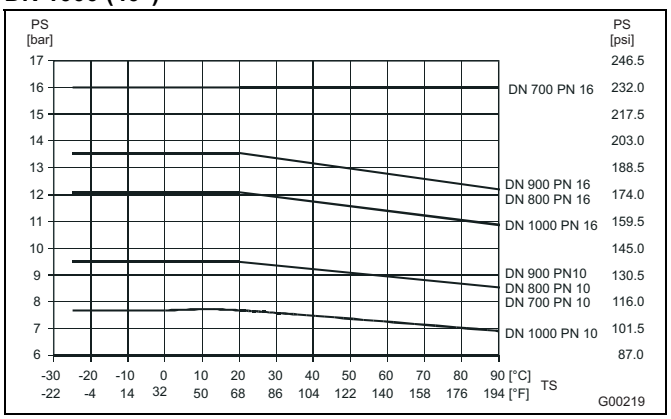


Fig. 6

DIN flange, steel, DN 700 (28") up to DN 1000 (40")

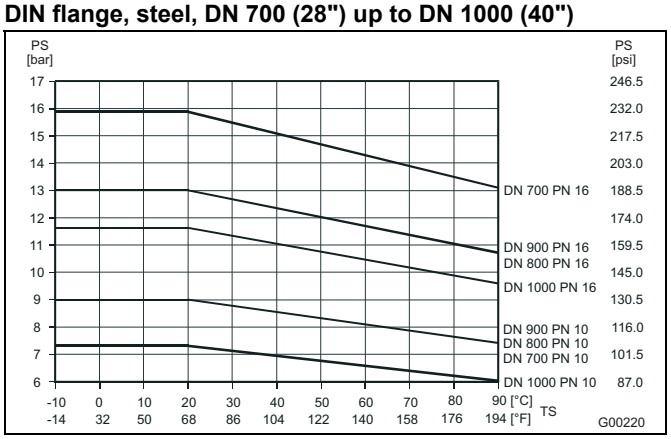


Fig. 7

ASME flange, Steel, DN 25 ... 400 (1 ... 24“)

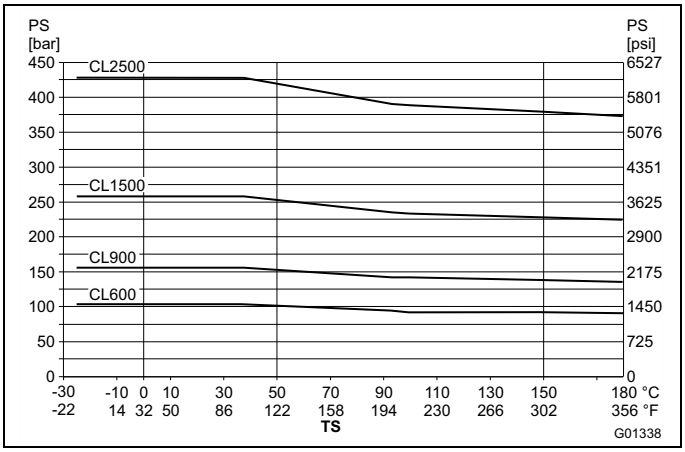


Fig. 8

ASME flange, stainless steel, DN 25 ... 400 (1 ... 24“)

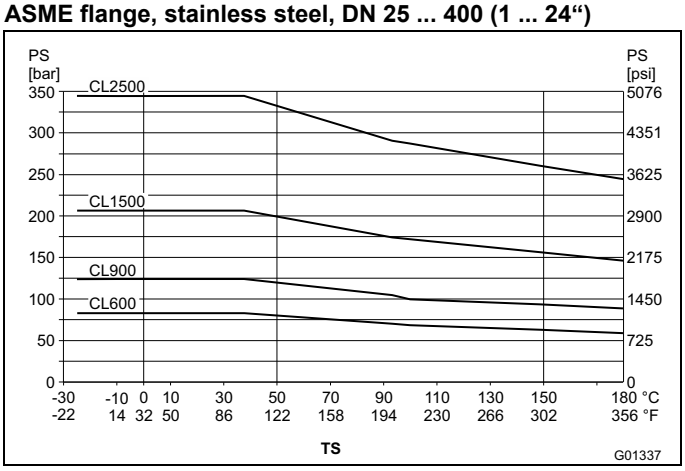


Fig. 9

Flowmeter sensor design level “C”

Steel casted housing, DN 25 ... 600 (1 ... 24“)

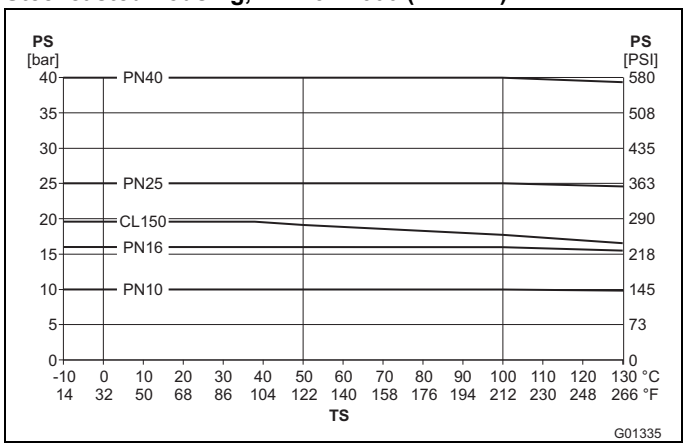


Fig. 10

Welded steel housing, DN 25 ... 600 (1 ... 24“)

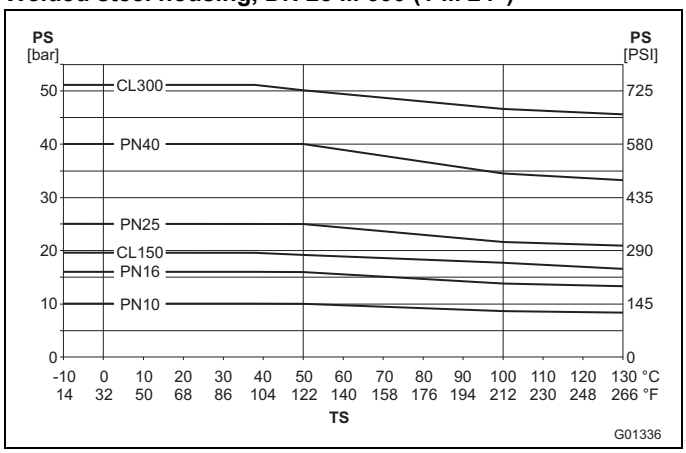


Fig. 11

Specifications - transmitter

IP rating

In accordance with EN 60529
IP 65, IP 67, NEMA 4X

Vibration

In accordance with EN 60068-2
Applicable to transmitters with remote mount design.
- In the 10 ... 58 Hz range, max. deflection 0.15 mm (0.006 inch) 1)
- In the 58 ... 150 Hz range, max. acceleration 2 g 1)

1) Peak load

Temperature Data

Ambient temperature
Standard: -20 ... 60 °C (-4 ... 140 °F)
Extended: -40 ... 60 °C (-40 ... 140 °F)

Storage temperature range
-40 ... 70 °C (-40 ... 158 °F)

Electrical data and options

Power supply

Supply voltage	100 ... 230 V AC (-15 % / +10 %), 47 ... 64 Hz 24 V AC (-30 % / +10 %), 47 ... 64 Hz 24 V DC (-30 % / +30 %), Ripple: < 5 %	
Power consumption	AC ≤ 20 VA Inrush current at 230 V: 8.8 A	DC 12 W Inrush current: 5.6 A
Screw terminals	Maximum 2.5 mm² (AWG 14)	

Isolation of inputs / outputs

The current output, digital outputs DO1 and DO2, and digital input are electrically isolated from the sensor input circuit and from each other. The same applies to the signal outputs of the versions with PROFIBUS PA and FOUNDATION Fieldbus.

Empty conduit detection

This function requires the following:
The conductivity of the measuring medium must be ≥ 20 µS/cm, the signal cable length must be ≤ 50 m (164 ft) and the nominal diameter DN must be ≥ DN 10. Furthermore, no preamplifier may be fitted to the sensor.

Mechanical properties

Integral mount design	Housing made of Aluminium	Housing made of stainless steel
Housing	Cast aluminum, painted	Stainless steel CF3M
Paint	Paint coat ≥ 80 µm thick, RAL 9002 (light gray)	-
Cable gland2)	Polyamide	Polyamide
	Stainless steel1)	Stainless steel1)

Remote mount design	
Housing	Cast aluminum, painted
Paint	Paint coat ≥ 80 µm thick, RAL 7012 (dark gray), front cover / rear cover RAL 9002 (light gray)
Cable gland2)	Polyamide
	Stainless steel1)
Weight	4.5 kg (9.92 lb)

1) In the case of hazardous area design for ambient temperature of -40 °C (40 °F)
2) Cable Gland with M20x1,5 thread or NPT thread with plug to be specified through modelcode

Electrical connections

HART, PROFIBUS PA and FOUNDATION Fieldbus protocols for devices that do not have an explosion-proof design

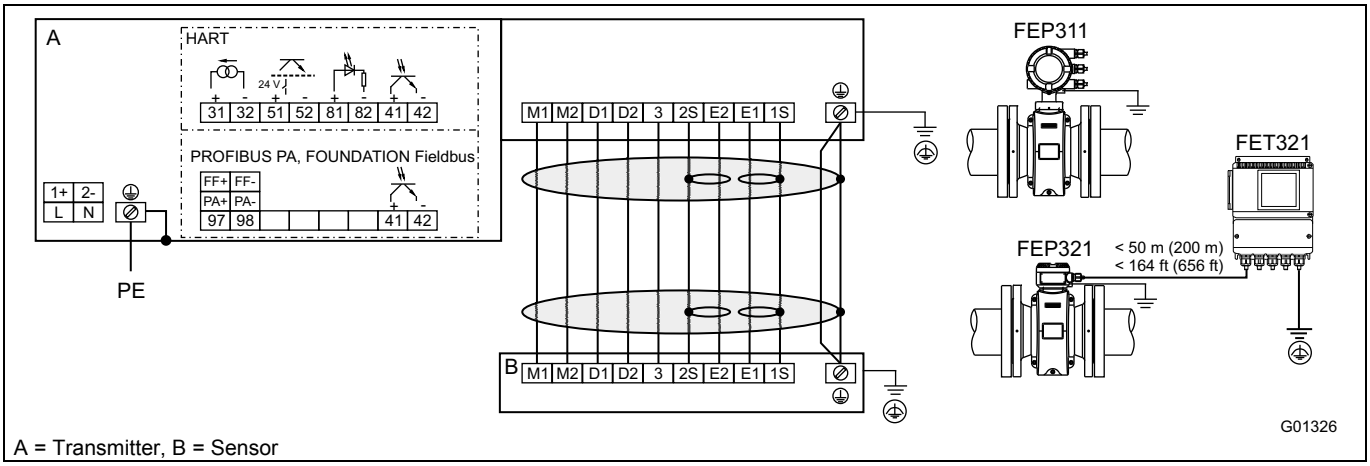


Fig. 12: HART-, PROFIBUS PA- and FOUNDATION Fieldbus protocol

Power supply connections

AC power supply	
Terminal	**Function / Notes**
L	Live / Phase
N	Neutral
PE / ⏚	Protective earth (PE)

DC power supply	
Terminal	**Function / Notes**
1+	+
2-	-
PE / ⏚	Protective earth (PE)

Sensor cable terminal connections

Only on remote mount design.

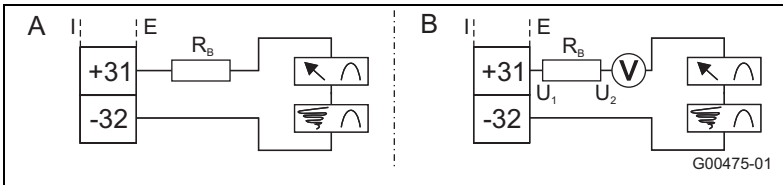
Terminal	Function / Notes	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
⏚ / SE	Shield	-
E1	Signal line	Violet
1S	Schield for E1	-
E2	Signal line	Blue
2S	Schield for E2	-
3	Measurement potential	Green

Output connections

Terminal	Function / Notes
31 / 32	**Current / HART output** The current output is available in "active" or "passive" mode.
97 / 98	**Digital communication** PROFIBUS PA (PA+ / PA-) or FOUNDATION fieldbus (FF+ / FF-) in acc. with IEC 61158-2.
51 / 52	**Digital output DO1 active / passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Pulse Output".
81 / 82	**Digital input / contact input** Function can be configured locally as „External output switch-off", „external totalizer reset", „external totalizer stop" or „other".
41 / 42	**Digital output DO2 passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Digital Output", flow direction signaling.
⏚	**Functional ground**

Electrical data

Current / HART output

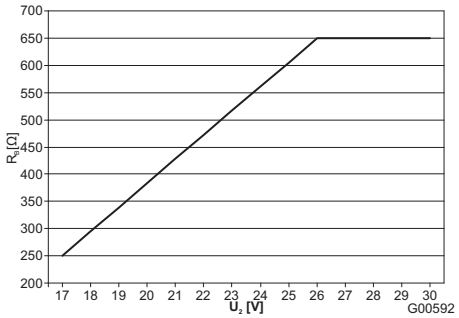


The current / HART output can be operated in "active" or "passive" mode.

A **Active:** 4 ... 20 mA, HART protocol (standard), load: 250 Ω ≤ R ≤ 650 Ω

B **Passive:** 4 ... 20 mA, HART protocol (standard), load: 250 Ω ≤ R ≤ 650 Ω
Supply voltage for the current output: minimum 11 V, maximum 30 V.

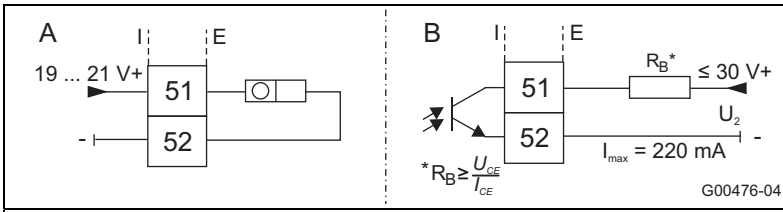
For Ex zone 1 / Div. 1 the maximum load is 300 Ω.



Max. permissible load (R_B) as a function of the source voltage (U_2)

Fig. 13: (I = internal, E = external)

Digital output DO1



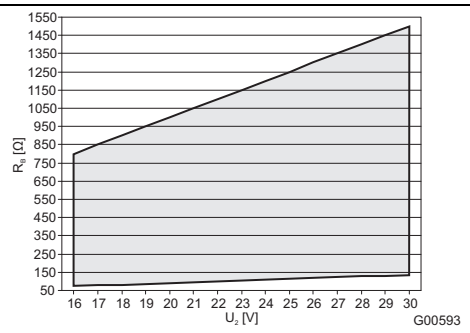
The output can be configured as an "active (A)" or "passive (B)" output (in the case of the transmitter with the dual-compartment housing, the output is configured using the software; in the case of the transmitter with the single-compartment housing, it is configured by means of jumpers on the transmitter backplane).

Configuration as "active" output:
- U = 19 ... 21 V, Imax = 220 mA , fmax ≤ 5250 Hz

Configuration as "passive" output
- Umax = 30 V, Imax = 220 mA, fmax ≤ 5250 Hz

Configuration as pulse output:
- Max. pulse frequency: 5250 Hz.
- Pulse width: 0.1 … 2000 ms.
- The pulse factor and pulse width are interdependent and are calculated dynamically.

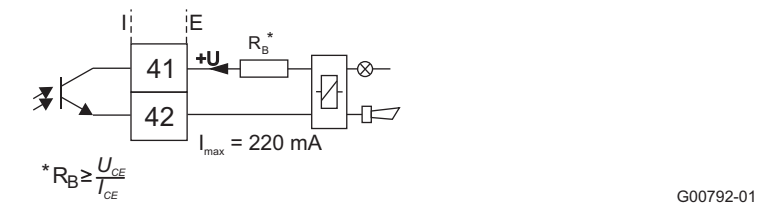
Configuration as contact output:
- Function: System alarm, empty pipe alarm, max. / min. alarm, flow direction signaling, other



Max. permissible load (R_B) as a function of the source voltage (U_2). ▒▒ = Permissible range

Fig. 14: (I = internal, E = external)

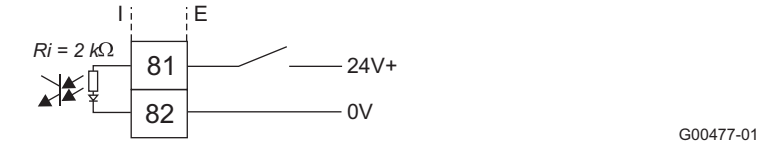
Digital output DO2



The output is always a "passive" output (optocoupler).
Data for the optocoupler:
U_{max} = 30 V, I_{max} = 220 mA, f_{max} ≤ 5250 Hz
For maximum load see diagram Fig. 14.

Fig. 15: (I = internal, E = external)

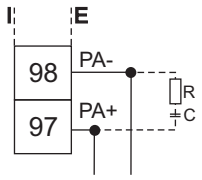
Digital input DI



Data for the optocoupler:
16 V ≤ U ≤ 30 V, Ri = 2 kΩ

Fig. 16: (I = internal, E = external)

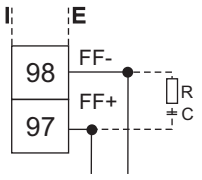
Digital communication



PROFIBUS PA (PA+ / PA-)

U = 9 ... 32 v, I = 10 mA (normal operation), I = 13 mA (in the event of an error / FDE)

Bus connection with integrated protection against polarity reversal. The bus address can be set via the DIP switches in the device (with dual-compartment transmitter housing only), the transmitter display or the fieldbus.



G00248-01

FOUNDATION Fieldbus (FF+ / FF-)

U = 9 ... 32 v, I = 10 mA (normal operation), I = 13 mA (in the event of an error / FDE)

Bus connection with integrated protection against polarity reversal

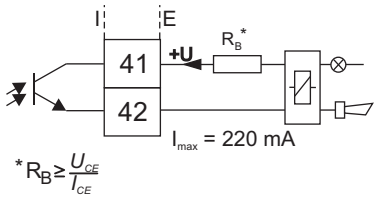
The resistance R and condenser C form the bus termination. They must be installed when the device is connected to the end of the entire bus cable. R = 100 Ω; C = 1 µF

Fig. 17: (I = internal, E = external)

Connection examples

Digital output DO2

E.g., for system monitoring, max. / min. alarm, empty meter tube or forward / reverse signal, or counting pulses (function can be configured using software)

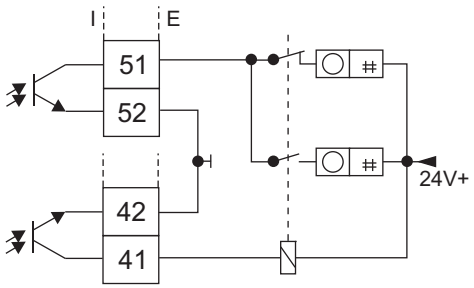


G00792-01

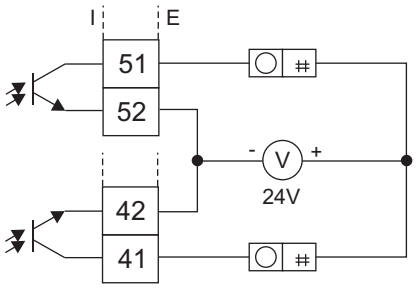
Fig. 18: (I = internal, E = external)

Digital outputs DO1 and DO2

Separate forward and reverse pulses



Separate forward and reverse pulses (alternative connection)

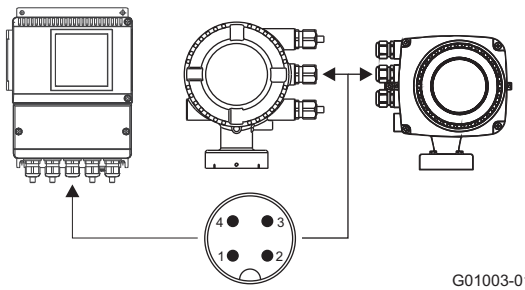


G00791

Fig. 19: (I = internal, E = external)

PROFIBUS PA - Connection via M12 plug

Only in non-hazardous areas



G01003-01

Pin assignment
(Front view showing pin insert and pins)
PIN 1 = PA+
PIN 2 = nc
PIN 3 = PA-
PIN 4 = shield

Fig. 20

Digital communication

HART protocol

The unit is registered with the HART Communication Foundation.

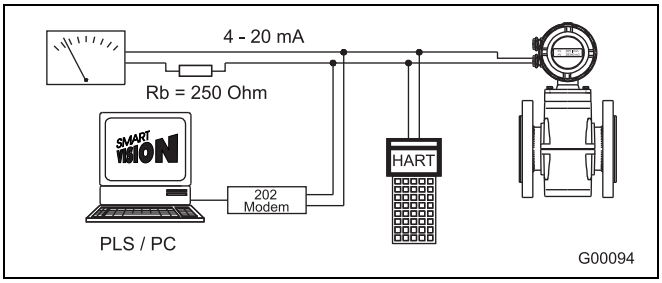


Fig. 21

Configuration	Directly on the device Software DAT200 Asset Vision Basic (+ HART-DTM)
Transmission	FSK modulation on current output 4 ... 20 mA acc. to Bell 202 standard
Max. signal amplitude	1.2 mA_{ss}
Current output load	Min. 250 Ω, max. = 560 Ω
Cable	AWG 24 twisted
Max. cable length	1500 m
Baud rate	1,200 baud
Display	Log. 1: 1,200 Hz Log. 0: 2,200 Hz

For additional information, see separate interface documentation.

System integration

In conjunction with the DTM (Device Type Manager) available for the device, communication (configuration, parameterization) can occur with the corresponding framework applications according to FDT 1.21 (DAT200 Asset Vision Basic).

Other tool/system integrations (e.g., Emerson AMS/Siemens PCS7) are available upon request.

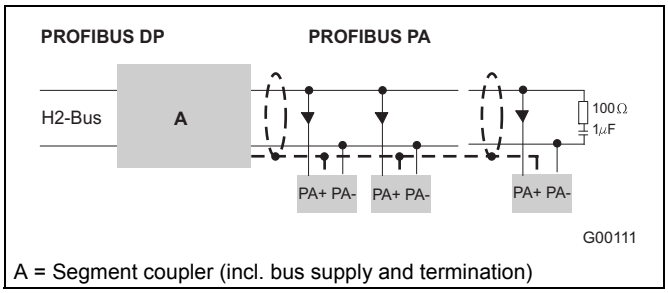
A free of charge version of the DAT200 Asset Vision Basic framework application for HART® or PROFIBUS is available upon request.

The required DTMs are contained on the DAT200 Asset Vision Basic DVD or in the DTM Library.

They can also be downloaded from www.abb.com/flow.

PROFIBUS PA

The interface conforms to profile 3.01 (PROFIBUS standard, EN 50170, DIN 19245 [PRO91]).



A = Segment coupler (incl. bus supply and termination)

Fig. 22: Example for PROFIBUS PA interface connection

PROFIBUS PA ID no	0x3430
Alternative standard ID no	0x9700 or 0x9740
Configuration	Directly on the device Software DAT200 Asset Vision Basic (+ PROFIBUS PA-DTM)
Transmission signal	Acc. to IEC 61158-2
Cable	Shielded, twisted cable (acc. to IEC 61158-2, types A or B are preferred)

Bus topology

- Tree and/or line structure
- Bus termination: passive at both ends of the main bus line (RC element R = 100 Ω, C = 1 µF)

Voltage / current consumption

- Average current consumption: 10 mA
- In the event of an error, the integrated FDE function (=Fault Disconnection Electronic) integrated in the device is ensures that the current consumption can rise to a maximum of 13 mA.
- The upper current limit is restricted electronically.
- The voltage on the bus line must lie in the range of 9 ... 32 V DC.

For additional information, see separate interface documentation.

System integration

ABB provides three different GSD files (equipment master data) which can be integrated in the system.

Users decide at system integration whether to install the full range of functions or only part.

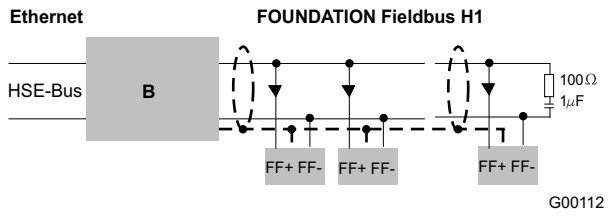
The change-over is done using the “ID-number selector” parameter.

ID number 0x9700, GSD file name: PA139700.gsd
ID number 0x9740, GSD file name: PA139740.gsd
ID number 0x3430, GSD file name: ABB_3430.gsd

The GSD files can be downloaded from www.abb.com/flow.

The files required for operation can be downloaded from www.profibus.com.

FOUNDATION Fieldbus (FF)



B = Linking device (incl. bus supply and termination)

Fig. 23: Example for FOUNDATION Fieldbus interface connection

Interoperability test campaign no.	ITK 5.20
Manufacturer ID	0x000320
Device ID	0x0124
Configuration	• Directly on the device • Via services integrated in the system • National configurator
Transmission signal	Acc. to IEC 61158-2

Bus topology

- Tree and/or line structure
- Bus termination: passive at both ends of the main bus line (RC element R = 100 Ω, C = 1 µF)

Voltage / current consumption

- Average current consumption: 10 mA
- In the event of an error, the integrated FDE function (=Fault Disconnection Electronic) integrated in the device is ensures that the current consumption can rise to a maximum of 13 mA.
- Upper current limit: electronically restricted.
- The voltage on the bus line must lie in the range of 9 ... 32 V DC.

Bus address

The bus address is automatically assigned or can be set in the system manually.
The identifier (ID) is formed using a unique combination of manufacturer ID, device ID, and device serial number.

System integration

The following are required:

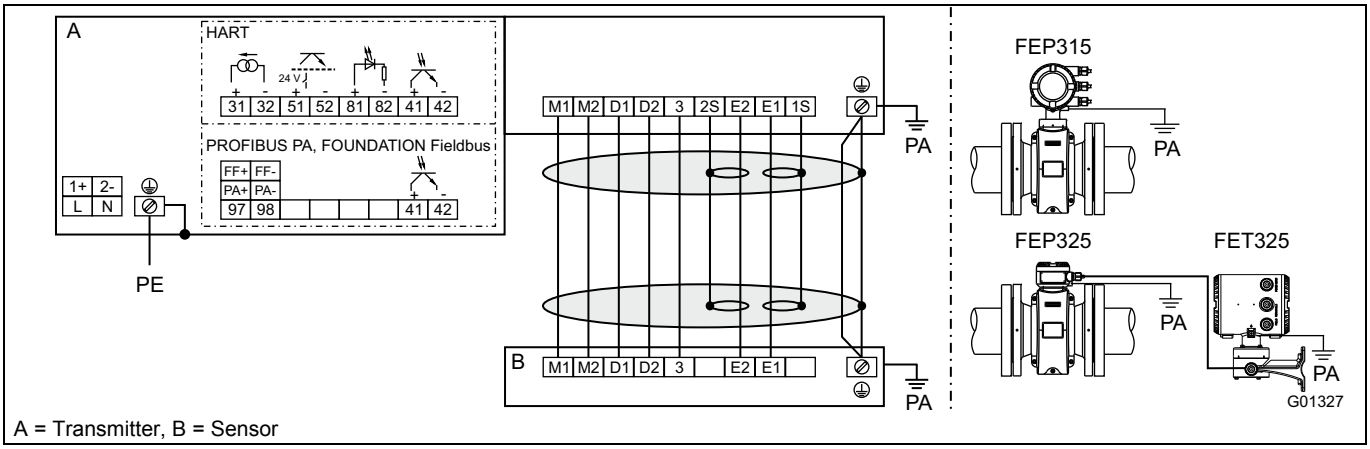
- DD (Device Description) file, which includes the device description.
- The CFF (Common File Format) file is required for engineering the segment. Engineering can be performed online or offline.

The files can be downloaded from www.abb.com/flow.
The files required for operation can also be downloaded from http://www.fieldbus.org.

Ex relevant specifications

Electrical connection for operation in zones 1, 21, 22 / Div 1

Flowmeter sensor and transmitter in zone 1 / Div 1



A = Transmitter, B = Sensor

Fig. 24: HART, PROFIBUS PA and FOUNDATION Fieldbus protocol

Power supply connections

AC power supply	
Terminal	**Function / Notes**
L	Live / Phase
N	Neutral
PE / ⏚	Protective earth (PE)

DC power supply	
Terminal	**Function / Notes**
1+	+
2-	-
PE / ⏚	Protective earth (PE)

Sensor cable terminal connections

Only on remote mount design.

Terminal	Function / Notes	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
⏚ / SE	Shield	-
E1	Signal line	Violet
1S	Schield for E1	-
E2	Signal line	Blue
2S	Schield for E2	-
3	Measurement potential	Green

Output connections

Terminal	Function / Notes
31 / 32	**Current / HART output** The current output is available in "active" or "passive" mode. The configuration must be specified ordering the meter, because it is not possible to change the configuration on site.
97 / 98	**Digital communication** PROFIBUS PA (PA+ / PA-) or FOUNDATION Fieldbus (FF+ / FF-) in acc. with IEC 61158-2.
51 / 52	**Digital output DO1 passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Pulse Output".
81 / 82	**Digital input / contact input** Function can be configured locally as „External output switch-off", „external totalizer reset", „external totalizer stop" or „other". Only available in conjunction with current output „passive".
41 / 42	**Digital output DO2 passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Digital Output", flow direction signaling.
PA	**Potential Equalization (PA)**

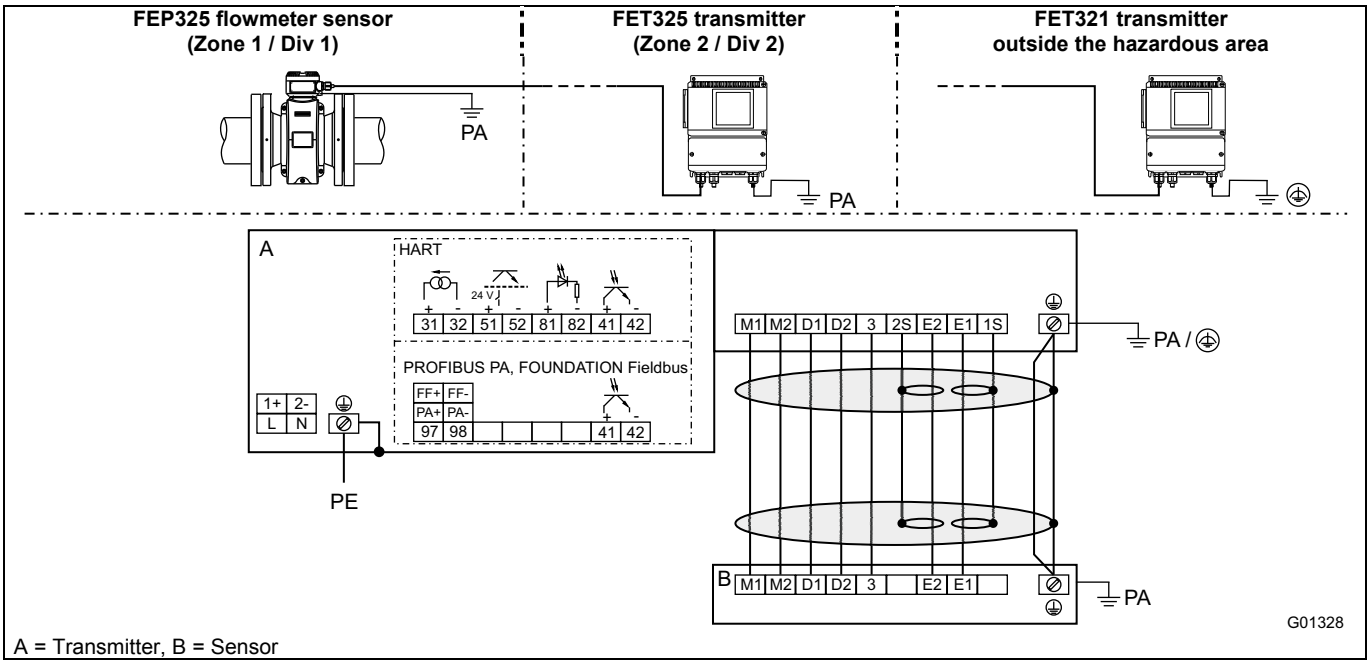
Note

The housing for the transmitter and flowmeter sensor must be connected to the potential equalization PA. The operator must ensure that when connecting the protective conductor (PE) no potential differences can occur between protective conductor and potential equalization (PA).

A temperature of 70 °C (158 °F) at the cable entry is assumed for the Ex calculations. Therefore, the cables used for the supply power and the signal inputs and outputs must have a minimum specification of 70 °C (158 °F).

For devices with remote mount design for use in FM / cFM Div. 1 or FM / cFM Div. 2 the signal cable between the flowmeter sensor and the transmitter must have a minimum length of 5 m (16.4 ft).

Flowmeter sensor in zone 1 / Div 1 and transmitter in zone 2 / Div 2 or outside the hazardous area



A = Transmitter, B = Sensor

Fig. 25: HART, PROFIBUS PA and FOUNDATION Fieldbus protocol

Power supply connections

AC power supply	
Terminal	**Function / Notes**
L	Live / Phase
N	Neutral
PE / ⏚	Protective earth (PE)

DC power supply	
Terminal	**Function / Notes**
1+	+
2-	-
PE / ⏚	Protective earth (PE)

Sensor cable terminal connections

Only on remote mount design.

Terminal	Function / Notes	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
⏚ / SE	Shield	-
E1	Signal line	Violet
1S	Schield for E1	-
E2	Signal line	Blue
2S	Schield for E2	-
3	Measurement potential	Green

Output connections

Terminal	Function / Notes
31 / 32	**Current / HART output** The current output is available in "active" or "passive" mode.
97 / 98	**Digital communication** PROFIBUS PA (PA+ / PA-) or FOUNDATION Fieldbus (FF+ / FF-) in acc. with IEC 61158-2.
51 / 52	**Digital output DO1 active / passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Pulse Output".
81 / 82	**Digital input / contact input** Function can be configured locally as „External output switch-off", „external totalizer reset", „external totalizer stop" or „other".
41 / 42	**Digital output DO2 passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Digital Output", flow direction signaling.
PA	**Potential Equalization (PA)**
⏚	**Functional ground** (only with transmitter outside the hazardous area)

Note

The housing for the transmitter and flowmeter sensor must be connected to the potential equalization PA. The operator must ensure that when connecting the protective conductor (PE) no potential differences can occur between protective conductor and potential equalization (PA).

A temperature of 70 °C (158 °F) at the cable entry is assumed for the Ex calculations. Therefore, the cables used for the supply power and the signal inputs and outputs must have a minimum specification of 70 °C (158 °F).

For devices with remote mount design for use in FM / cFM Div. 1 or FM / cFM Div. 2 the signal cable between the flowmeter sensor and the transmitter must have a minimum length of 5 m (16.4 ft).

Electrical data for operation in zones 1, 21, 22 / Div. 1

Devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter. For the correct current output design (active/passive), see the marking contained in the device's terminal box.

Dependent upon the device design, an "active" or a "passive" output will be available. For devices designed for use in Ex Zone 1, the current output cannot be reconfigured locally. The configuration required for the current output (active/passive) must be specified when the order is placed.

Model FEP315 or FET325

	Operating values		Type of protection Ex i, IS					
Inputs and outputs	**U_N [V]**	**I_N [mA]**	**U_O [V]**	**I_O [mA]**	**P_O [mW]**	**C_O [nF]**	**C_{OPA} [nF]**	**L_O [mH]**
Active current / HART output (**Terminals 31 / 32**) Load: 250 Ω ≤ R ≤ 300 Ω	30	30	20	100	500	210	195	6
			U_I [V]	**I_I [mA]**	**P_I [mW]**	**C_I [nF]**	**C_{IPA} [nF]**	**L_I [mH]**
			60	425 4)	2000 4)	8,4	24	0,065
Passive current / HART output (**Terminals 31 / 32**) Load: 250 Ω ≤ R ≤ 650 Ω	30	30	**U_I [V]**	**I_I [mA]**	**P_I [mW]**	**C_I [nF]**	**C_{IPA} [nF]**	**L_I [nH]**
			60	500 4)	2000 4)	8,4	24	170
Passive digital output DO2 (Terminals 41 / 42)	30	220	**U_I [V]**	**I_I [mA]**	**P_I [mW]**	**C_I [nF]**	**C_{IPA} [nF]**	**L_I [nH]**
			60	425[1] 4) 500[2] 4)	2000 4)	3,6	3,6	170
Passive digital output DO1 (Terminals 51 / 52)	30	220	60	425[1] 4) 500[2] 4)	2000 4)	3,6	3,6	170
Passive digital input DI (Terminals 81/82)[3]	30	10	60	500 4)	2000 4)	3,6	3,6	170

1) For "active" current output
2) For "passive" current output
3) Only available in conjunction with passive current output
4) Intrinsically safe single-channel or multi-channel barriers (supply isolators) with resistance characteristic must be used.

All inputs and outputs are electrically isolated from each other and from the power supply.

Note

The output circuits are designed in such a way that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits. It is not permitted to combine intrinsically safe and non-intrinsically safe circuits. In the case of intrinsically safe circuits, potential equalization is required.

The rated voltage of the non-intrinsically safe circuits is U_M = 60 V.

Provided that rated voltage U_M = 60 V is not exceeded if connections are established to non-intrinsically safe external circuits, intrinsic safety is still guaranteed.

Devices with PROFIBUS PA or FOUNDATION Fieldbus

When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter. For the correct design (PROFIBUS PA or FOUNDATION Fieldbus), see the marking contained in the device's terminal box.

For devices in Zone 1 / Div. 1 the bus termination must conform to the FISCO model or the explosion protection regulations, respectively.
For devices in Zone 2 / Div. 2 the bus termination must conform to the FNICO model or the explosion protection regulations, respectively.

Model FEP315 or FET325

The fieldbus and the digital output can be connected in zone 1 / Div. 1 in three different variants.

Variant 1: Intrinsically safe fieldbus connection in acc. with FISCO, intrinsically safe connection of the digital output

	Operating values		Type of protection Ex i, IS and FISCO					
Inputs and outputs	**U_N [V]**	**I_N [mA]**	**U_i [V]**	**I_i [mA]**	**P_i [mW]**	**C_i [nF]**	**C_{iPA} [nF]**	**L_i [µH]**
Passive digital output DO2 (terminals 41 / 42)	30	220	60	200 1)	5000 1)	3,6	3,6	0,17
Fieldbus (terminals 97 / 98)	32	30	17	380	5320	1	1	5

1) Intrinsically safe single-channel or multi-channel barriers (supply isolators) with resistance characteristic must be used.

Variant 2: Intrinsically safe fieldbus connection (not in acc. with FISCO!), intrinsically safe connection of the digital output

	Operating values		Type of protection Ex i, IS					
Inputs and outputs	**U_N [V]**	**I_N [mA]**	**U_i [V]**	**I_i [mA]**	**P_i [mW]**	**C_i [nF]**	**C_{iPA} [nF]**	**L_i [µH]**
Passive digital output DO2 (terminals 41 / 42)	30	220	60	200 1)	5000 1)	3,6	3,6	0,17
Fieldbus (terminals 97 / 98)	32	30	60	500	5000	1	1	5

1) Intrinsically safe single-channel or multi-channel barriers (supply isolators) with resistance characteristic must be used.

Variant 3: Fieldbus connection in acc. with FNICO (Zone 2, Div. 2), connection of digital output (Zone 2, Div. 2)

	Operating values		Type of protection Ex n, NI and FNICO					
Inputs and outputs	**U_N [V]**	**I_N [mA]**	**U_i [V]**	**I_i [mA]**	**P_i [mW]**	**C_i [nF]**	**C_{iPA} [nF]**	**L_i [µH]**
Passive digital output DO2 (terminals 41 / 42)	30	220	-	-	-	-	-	-
Fieldbus (terminals 97 / 98)	32	30	60	500 1)	5000 1)	1	1	5

1) Single-channel or multi-channel barriers (supply isolators) with resistance characteristic must be used.

All inputs and outputs are electrically isolated from each other and from the supply power.

Note
The output circuits are designed in such a way that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits. It is not permitted to combine intrinsically safe and non-intrinsically safe circuits. In the case of intrinsically safe circuits, potential equalization is required.
The rated voltage of the non-intrinsically safe circuits is UM = 60 V. Provided that rated voltage UM = 60 V is not exceeded if connections are established to non-intrinsically safe external circuits, intrinsic safety is still given.

Temperature data

Note
The maximum permissible measuring medium temperature depends on the liner and flange material, and is limited by the operating data in Table 1 and the Ex relevant specifications in Tables 2 ... n.

Table 1: Measuring medium temperature as a function of lining and flange material for models FEP315 and FEP325

Materials		Measuring medium temperature (operating values)	
Lining	**Flange**	**Minimum**	**Maximum**
Hard rubber	Steel	-10 °C (14 °F) -5 °C (23 °F) 1)	90 °C (194 °F) 80 °C (176 °F) 1)
Hard rubber	Stainless steel	-15 °C (5 °F) -5 °C (23 °F) 1)	90 °C (194 °F) 80 °C (176 °F) 1)
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Steel	-10 °C (14 °F)	180 °C (356 °F)
PFA	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
Thick PTFE	Steel	-10 °C (14 °F)	180 °C (356 °F)
Thick PTFE	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
ETFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

1) Only China production site

Table 2: Measuring medium temperature for model FEP315

Nominal diameter	Design	Temperature class	Ambient temperature											
			(- 40 °C)[1] - 20 °C ... + 40 °C				(- 40 °C)[1] - 20 °C ... + 50 °C				(- 40 °C)[1] - 20 °C ... + 60 °C			
			Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
			Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN 3 ... DN 100	NT	T1	130 °C								90 °C	30 °C	80 °C	40 °C
	HT		180 °C								120 °C	20 °C	120 °C	20 °C
	NT	T2	130 °C								90 °C	30 °C	80 °C	40 °C
	HT		180 °C								120 °C	20 °C	120 °C	20 °C
	NT	T3	130 °C								90 °C	30 °C	80 °C	40 °C
	HT		180 °C								120 °C	20 °C	120 °C	20 °C
	NT	T4	120 °C								90 °C	30 °C	80 °C	40 °C
	HT		120 °C								120 °C	20 °C	120 °C	20 °C
	NT	T5	85 °C								70 °C	30 °C	80 °C	40 °C
	HT		85 °C								85 °C	20 °C	85 °C	20 °C
	NT	T6	70 °C								70 °C	30 °C	70 °C	40 °C
	HT		70 °C								70 °C	20 °C	70 °C	20 °C
DN 125 ... DN 2000	NT	T1	130 °C								90 °C	30 °C	80 °C	40 °C
	HT		180 °C								120 °C	20 °C	120 °C	20 °C
	NT	T2	130 °C								90 °C	30 °C	80 °C	40 °C
	HT		180 °C								120 °C	20 °C	120 °C	20 °C
	NT	T3	130 °C								90 °C	30 °C	80 °C	40 °C
	HT		180 °C								120 °C	20 °C	120 °C	20 °C
	NT	T4	125 °C								90 °C	30 °C	80 °C	40 °C
	HT		125 °C								120 °C	20 °C	120 °C	20 °C
	NT	T5	90 °C								90 °C	30 °C	80 °C	40 °C
	HT		90 °C								90 °C	20 °C	90 °C	20 °C
	NT	T6	75 °C								75 °C	30 °C	75 °C	40 °C
	HT		75 °C								75 °C	20 °C	75 °C	20 °C

1) Low-temperature version (option)

NT: standard sensor design, T_{medium} maximum 130 °C (266 °F),
HT: high-temperature sensor design, T_{medium} maximum 180 °C (356 °F)
Not thermally insulated: The flowmeter sensor is not surrounded by pipe insulation material.
Thermally insulated: The flowmeter sensor is surrounded by pipe insulation material.

Note
The standard version includes explosion protection for gases and dust. Explosion protection for dust is only available for devices featuring a transmitter in a dual-compartment housing.

- If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.
- If the installation location for the device is classified as a potentially explosive area for gases only, the temperature data in the "Gas" column in the table must be taken into consideration.

Table 3: Measuring medium temperature for model FEP325

Nominal diameter	Design	Temperature class	Ambient temperature											
			(- 40 °C)[1] - 20 °C ... + 40 °C				(- 40 °C)[1] - 20 °C ... + 50 °C				(- 40 °C)[1] - 20 °C ... + 60 °C			
			Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
			Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
DN 3 ... DN 100	NT	T1	130 °C								110 °C	110 °C	110 °C	110 °C
	HT		180 °C								160 °C	150 °C	160 °C	150 °C
	NT	T2	130 °C								110 °C	110 °C	110 °C	110 °C
	HT		180 °C								160 °C	150 °C	160 °C	150 °C
	NT	T3	130 °C								110 °C	110 °C	110 °C	110 °C
	HT		180 °C								160 °C	150 °C	160 °C	150 °C
	NT	T4	120 °C								110 °C	110 °C	110 °C	110 °C
	HT		120 °C								120 °C	120 °C	120 °C	120 °C
	NT	T5	85 °C								85 °C	85 °C	85 °C	85 °C
	HT		85 °C								85 °C	85 °C	85 °C	85 °C
	NT	T6	70 °C								70 °C	70 °C	70 °C	70 °C
	HT		70 °C								70 °C	70 °C	70 °C	70 °C
DN 125 ... DN 2000	NT	T1	130 °C								110 °C	110 °C	110 °C	110 °C
	HT		180 °C								160 °C	150 °C	160 °C	150 °C
	NT	T2	130 °C								110 °C	110 °C	110 °C	110 °C
	HT		180 °C								160 °C	150 °C	160 °C	150 °C
	NT	T3	130 °C								110 °C	110 °C	110 °C	110 °C
	HT		180 °C								160 °C	150 °C	160 °C	150 °C
	NT	T4	125 °C								110 °C	110 °C	110 °C	110 °C
	HT		125 °C								125 °C	125 °C	125 °C	125 °C
	NT	T5	90 °C								90 °C	90 °C	90 °C	90 °C
	HT		90 °C								90 °C	90 °C	90 °C	90 °C
	NT	T6	75 °C								75 °C	75 °C	75 °C	75 °C
	HT		75 °C								75 °C	75 °C	75 °C	75 °C

1) Low-temperature version (option)

NT: standard sensor design, T_{medium} maximum 130 °C (266 °F).
HT: high-temperature sensor design, T_{medium} maximum 180 °C (356 °F).
Not thermally insulated: The flowmeter sensor is not surrounded by pipe insulation material.
Thermally insulated: The flowmeter sensor is surrounded by pipe insulation material.

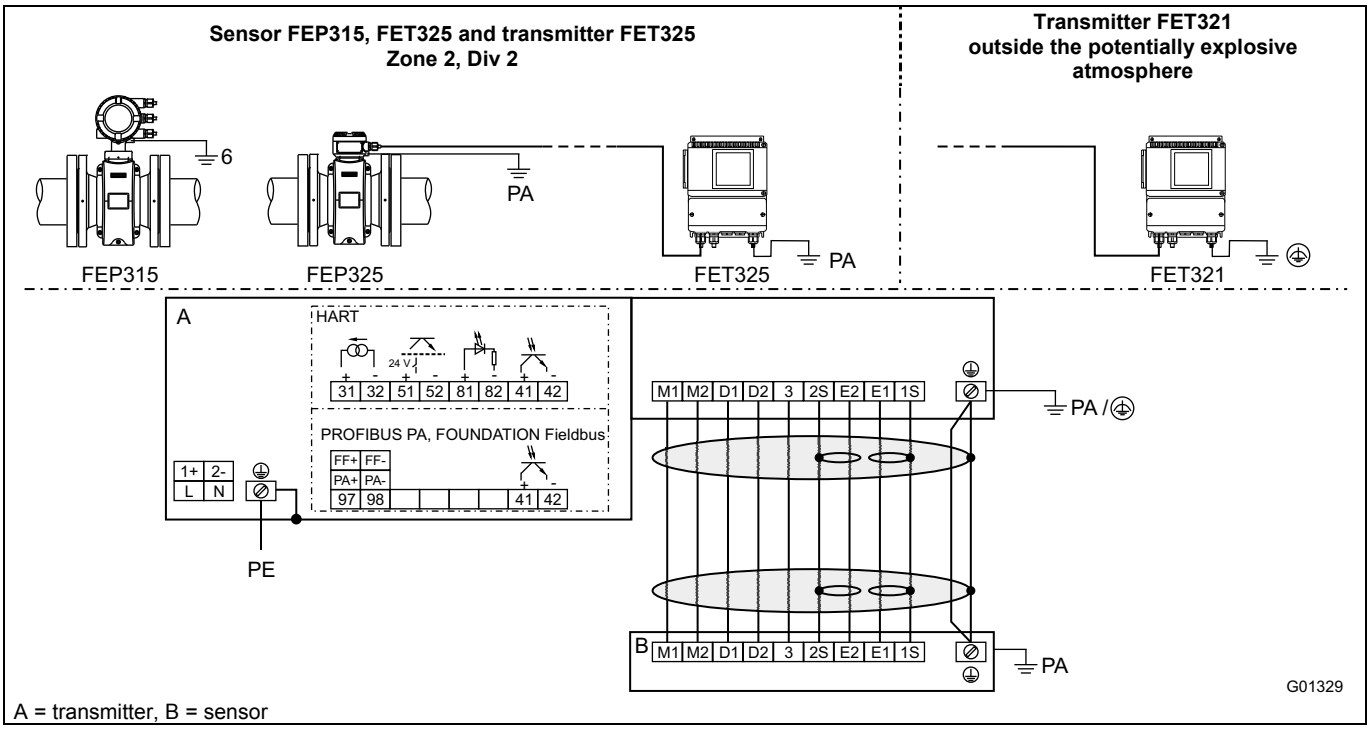
Note

The standard version includes explosion protection for gases and dust.

- If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.
- If the installation location for the device is classified as a potentially explosive area for gases only, the temperature data in the "Gas" columns in the table must be taken into consideration.

Electrical connection for operation in zone 2, 21, 22 / Div. 2

Sensor and transmitter in Zone 2 / Division 2, or transmitter outside the potentially explosive atmosphere



A = transmitter, B = sensor

Fig. 26: HART, PROFIBUS PA and FOUNDATION Fieldbus protocols

Power supply connections

AC power supply	
Terminal	**Function / Notes**
L	Live / Phase
N	Neutral
PE / ⏚	Protective earth (PE)

DC power supply	
Terminal	**Function / Notes**
1+	+
2-	-
PE / ⏚	Protective earth (PE)

Sensor cable terminal connections

Only on remote mount design.

Terminal	Function / Notes	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
⏚ / SE	Shield	-
E1	Signal line	Violet
1S	Schield for E1	-
E2	Signal line	Blue
2S	Schield for E2	-
3	Measurement potential	Green

Output connections

Terminal	Function / Notes
31 / 32	**Current / HART output** The current output is available in "active" or "passive" mode.
97 / 98	**Digital communication** PROFIBUS PA (PA+ / PA-) or FOUNDATION Fieldbus (FF+ / FF-) in acc. with IEC 61158-2.
51 / 52	**Digital output DO1 active / passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Pulse Output".
81 / 82	**Digital input / contact input** Function can be configured locally as „External output switch-off", „external totalizer reset", „external totalizer stop" or „other".
41 / 42	**Digital output DO2 passive** Function can be configured locally as „Pulse Output" or „Digital Output". Factory setting is „Digital Output", flow direction signaling.
PA	**Potential Equalization (PA)**
⏚	**Functional ground** (only for transmitter outside the hazardous area)

Note

The housing for the transmitter and flowmeter sensor must be connected to the potential equalization PA. The operator must ensure that when connecting the protective conductor (PE) no potential differences can occur between protective conductor and potential equalization (PA).

A temperature of 70 °C (158 °F) at the cable entry is assumed for the Ex calculations. Therefore, the cables used for the supply power and the signal inputs and outputs must have a minimum specification of 70 °C (158 °F).

Electrical data for operation in zones 2, 21, 22 / Div. 2

Devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter. For the correct current output design (active/passive), see the marking contained in the device's terminal box.

Model FEP315 or FET325

	Operating values		Type of protection Ex n/NI	
Signal inputs and outputs	**U_i [V]**	**I_i [mA]**	**U_i [V]**	**I_i [mA]**
Current / HARTOutput, active/passive (terminals 31/32) Load: 250 Ω ≤ R ≤ 650 Ω	30	30	30	30
Digital output DO1, active/passive (terminals 51/52)	30	220	30	220
Digital output DO2, passive (terminals 41/42)	30	220	30	220
Digital input **DI (terminals 81/82)**	30	10	30	10

All inputs and outputs are electrically isolated from each other and from the supply power.

Devices with PROFIBUS PA or FOUNDATION Fieldbus

When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter. For the correct design (PROFIBUS PA or FOUNDATION Fieldbus), see the marking contained in the device's terminal box.

For devices in Zone 2 / Div. 2 the bus termination must conform to the FNICO model or the explosion protection regulations, respectively.

Model FEP315 or FET325

	Operating values		Type of protection Ex n, NI and FNICO					
Inputs and outputs	**U_N [V]**	**I_N [mA]**	**U_i [V]**	**I_i [mA]**	**P_i [mW]**	**C_i [nF]**	**C_{iPA} [nF]**	**L_i [µH]**
Digital output DO2, passive (**terminals 41/42**)	30	220	-	-	-	-	-	-
Fieldbus (**terminals 97/98**)	32	30	32	500 [1)]	7000 [1)]	1	1	5

1) Single-channel or multi-channel barriers (supply isolators) with resistance characteristic must be used.

Temperature data

Table 1: Measuring medium temperature as a function of lining and flange material for models FEP315 and FEP325

Materials		Measuring medium temperature (operating values)	
Lining	**Flange**	**Minimum**	**Maximum**
Hard rubber	Steel	-10 °C (14 °F) -5 °C (23 °F) 1)	90 °C (194 °F) 80 °C (176 °F) 1)
Hard rubber	Stainless steel	-15 °C (5 °F) -5 °C (23 °F) 1)	90 °C (194 °F) 80 °C (176 °F) 1)
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Steel	-10 °C (14 °F)	180 °C (356 °F)
PFA	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
Thick PTFE	Steel	-10 °C (14 °F)	180 °C (356 °F)
Thick PTFE	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
Elastomer 2)	Steel	-10 °C (14 °F)	130 °C (266 °F)
Elastomer 2)	Stainless steel	-20 °C (-4 °F)	130 °C (266 °F)
ETFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

1) Only China production site
2) USA production site, only (only for FM / cFM Div 2)

Table 2: Measuring medium temperature for model FEP315

Nominal diameter		Design	Temperature class	Ambient temperature											
				- 20 °C ... + 40 °C				- 20 °C ... + 50 °C				- 20 °C ... + 60 °C			
				- 40 °C ... + 40 °C [1]				- 40 °C ... + 50 °C [1]				- 40 °C ... + 60 °C [1]			
				Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
				Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
ProcessMaster DN 3 ... DN 2000	HygienicMaster DN 3 ... DN 100	NT	T1	130 °C	130 °C	- - -	- - -	130 °C	100 °C [2] 110 °C [3]	- - -	- - -	80 °C	40 °C	- - -	- - -
		HT		180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C	40 °C
		NT	T2	130 °C	130 °C	- - -	- - -	130 °C	100 °C [2] 110 °C [3]	- - -	- - -	80 °C	40 °C	- - -	- - -
		HT		180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C	40 °C
		NT	T3	130 °C	130 °C	- - -	- - -	130 °C	100 °C [2] 110 °C [3]	- - -	- - -	80 °C	40 °C	- - -	- - -
		HT		180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C	40 °C
		NT	T4	130 °C	130 °C	- - -	- - -	130 °C	100 °C [2] 110 °C [3]	- - -	- - -	80 °C	40 °C	- - -	- - -
		HT		130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	40 °C	130 °C	40 °C

1) Low-temperature version (option)
2) Temperature values for ProcessMaster
3) Temperature values for HygienicMaster

NT: standard sensor design, T_{medium} maximum 130 °C (266 °F)

HT: high-temperature sensor design, T_{medium} maximum 180 °C (356 °F)

Not thermally insulated: The flowmeter sensor is not surrounded by pipe insulation material.
Thermally insulated: The flowmeter sensor is surrounded by pipe insulation material.

Note

The standard version includes explosion protection for gases and dust. Explosion protection for dust is only available for devices featuring a transmitter in a dual-compartment housing.

- If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.
- If the installation location for the device is classified as a potentially explosive area for gases only, the temperature data in the "Gas" column in the table must be taken into consideration.

Table 3: Measuring medium temperature for model FEP325

Nominal diameter		Design	Temperature class	Ambient temperature											
				- 20 °C ... + 40 °C				- 20 °C ... + 50 °C				- 20 °C ... + 60 °C			
				- 40 °C ... + 40 °C [1]				- 40 °C ... + 50 °C [1]				- 40 °C ... + 60 °C [1]			
				Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
				Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust
ProcessMaster DN 3 ... DN 2000 HygienicMaster DN 3 ... DN 100		NT	T1	130 °C	130 °C	- - -	- - -	130 °C	130 °C	- - -	- - -	110 °C [2] 120 °C [3]	110 °C	- - -	- - -
		HT		180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C
		NT	T2	130 °C	130 °C	- - -	- - -	130 °C	130 °C	- - -	- - -	110 °C [2] 120 °C [3]	110 °C	- - -	- - -
		HT		180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C
		NT	T3	130 °C	130 °C	- - -	- - -	130 °C	130 °C	- - -	- - -	110 °C [2] 120 °C [3]	110 °C	- - -	- - -
		HT		180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C
		NT	T4	130 °C	130 °C	- - -	- - -	130 °C	130 °C	- - -	- - -	110 °C [2] 120 °C [3]	110 °C	- - -	- - -
		HT		130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C
		NT	T5	95 °C	95 °C	- - -	- - -	95 °C	95 °C	- - -	- - -	95 °C	95 °C	- - -	- - -
		HT		95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C
		NT	T6	80 °C	80 °C	- - -	- - -	80 °C	80 °C	- - -	- - -	80 °C	80 °C	- - -	- - -
		HT		80 °C	80 °C	80 °C	80 °C	80 °C	80 °C	80 °C	80 °C	80 °C	80 °C	80 °C	80 °C

1) Low-temperature version (option)
2) Temperature values for ProcessMaster
3) Temperature values for HygienicMaster

NT: standard sensor design, T_{medium} maximum 130 °C (266 °F)
HT: high-temperature sensor design, T_{medium} maximum 180 °C (356 °F)
Not thermally insulated: The flowmeter sensor is not surrounded by pipe insulation material.
Thermally insulated: The flowmeter sensor is surrounded by pipe insulation material.

Note

The standard version includes explosion protection for gases and dust.

- If the installation location for the device is classified as a potentially explosive area for gases and dust, the temperature data in the "Gas & dust" columns in the table must be taken into consideration.
- If the installation location for the device is classified as a potentially explosive area for gases only, the temperature data in the "Gas" columns in the table must be taken into consideration.

Specifications for operation in areas with combustible dust

The device with dual-compartment transmitter housing is approved for use in potentially explosive areas (gas and dust).

The Ex certification is provided on the name plate.

DANGER - Risk of explosion!

The dust explosion protection is also provided by the housing.
Modifications to the housing are not allowed (e.g., removing or omitting parts).

Maximum allowable surface temperature

Model	Maximum surface temperature
FEP325	T 85 °C (185 °F) ... T_{medium}
FEP315	T 70 °C (158 °F) ... T_{medium}
FET325	T 70 °C (158 °F)

The maximum surface temperature is applicable to dust layers of up to 5 mm (0.20 inch) in thickness. The minimum permissible ignition and smoldering temperatures of the dust atmosphere should be calculated in accordance with IEC61241ff.

With thicker dust layers, the maximum permissible surface temperature must be reduced. The dust can be conductive or non-conductive. IEC61241ff must be observed.

Minimum signal cable length

In explosion protection areas, the signal cable cannot be shorter than 5 m (16.4 ft).

Installation requirements

Grounding

The flowmeter sensor must be connected to ground potential. For technical reasons, this potential should be identical to the potential of the metering fluid.
For plastic or insulated lined pipelines, the fluid is grounded by installing ground plates. When there are stray potentials present in the pipeline, a ground plate is recommended on both ends of the meter sensor.

Mounting

The following points must be observed during installation:

- The meter tube must always be completely full
- The flow direction must correspond to the marking, if present
- The maximum torque for all flange screws must be complied with These must be selected depending on the temperature, pressure, screw material, gasket material etc., and in accordance with the currently applicable regulations
- The devices must be installed without mechanical tension (torsion, bending)
- Flange devices with plane parallel counterflanges may only be installed with suitable gaskets
- Only flat 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 could influence the accuracy of the device
- The piping may not exert any inadmissible forces or torques on the device
- Do not remove the sealing plugs in the cable glands until you are ready to install the electrical cable
- When using a separate transmitter, this must be installed at a location that is largely free of vibrations
- Do not expose the transmitter to direct sunlight and provide for appropriate sun protection where necessary

Flow direction

The device measures the flowrate in both directions. Forward flow is the factory setting, as shown in Fig. 27.

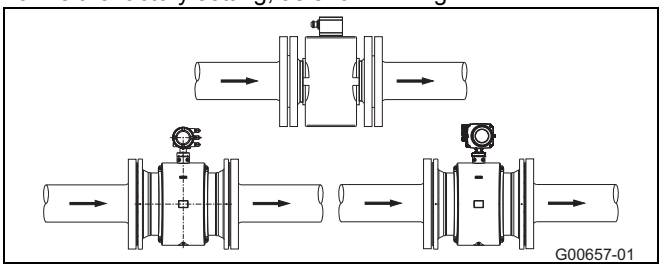


Fig. 27

Electrode axis

Electrode axis (1) should be horizontal if at all possible or no more that 45° from horizontal.

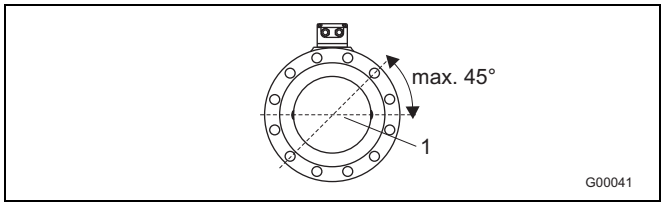


Fig. 28

Inlet and outlet pipe sections

The metering principle is independent of the flow profile as long as standing eddies do not extend into the metering section, such as may occur after double elbows (1), in the event of tangential inflow, or where half-open gate valves are located upstream of the flowmeter sensor.
In such cases, measures must be put in place to normalize the flow profile.

- Do not install fittings, manifolds, valves, etc., directly in front of the flowmeter sensor (1).
- Butterfly valves must be installed so that the valve plate does not extend into the flowmeter sensor.
- Valves or other turn-off components should be installed in the outlet pipe section (2).

Experience has shown that, in most installations, straight inlet sections 3 x DN long and straight outlet sections 2 x DN long are sufficient (DN = nominal diameter of the sensor Fig. 29).
For test stands, the reference conditions of 10 x DN straight inlet and 5 x DN straight outlet must be provided, in accordance with EN 29104 / ISO 9104.

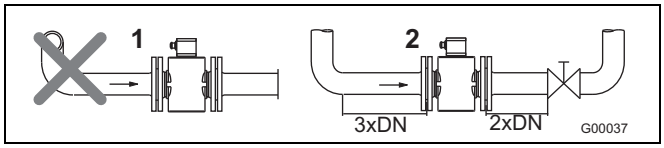


Fig. 29

Vertical connections

Vertical installation for measuring abrasive fluids, preferably with flow in upward direction.

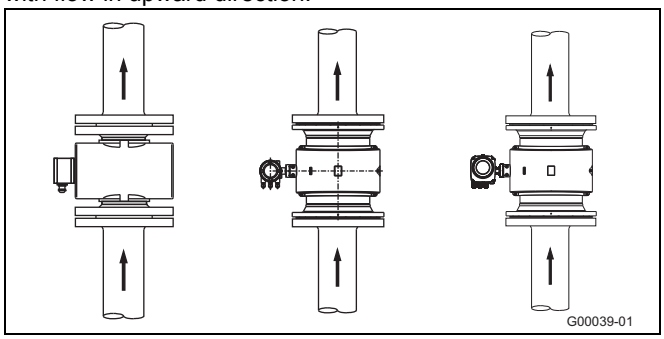


Fig. 30

Horizontal connections

- Meter tube must always be completely full.
- Provide for a slight incline of the connection for degassing.

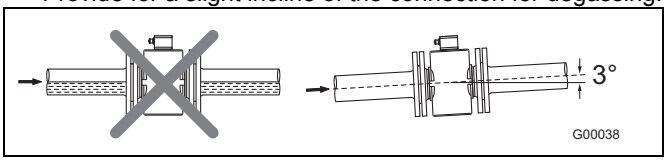


Fig. 31

Free inlet or outlet

- Do not install the flowmeter at the highest point or in the draining- off side of the pipeline, flowmeter runs empty, air bubbles can form (1).
- Provide for a siphon fluid intake for free inlets or outlets so that the pipeline is always full (2).

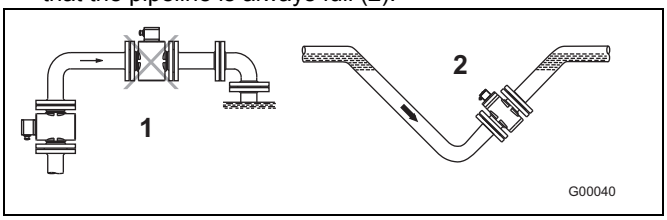


Fig. 32

Strongly contaminated measuring media

For strongly contaminated measuring media, a bypass connection according to the figure is recommended so that operation of the system can continue to run without interruption the during the mechanical cleaning.

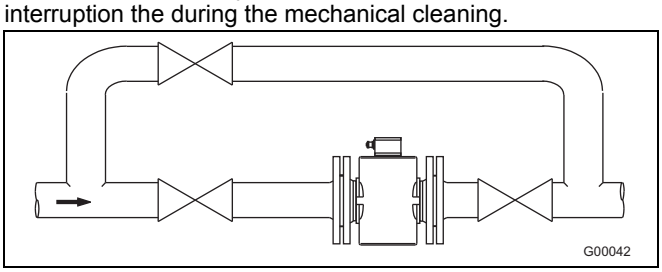


Fig. 33

Installation near pumps

If sensors are installed near pumps or other installations that cause vibration, the use of mechanical snubbers is recommended.

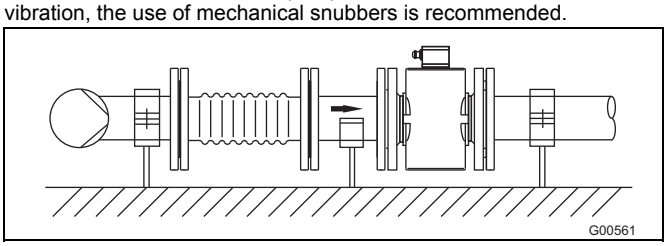


Fig. 34

Installation of the high temperature design

The high temperature design allows for complete thermal insulation of the sensor. The pipeline and sensor must be insulated after installing the unit according to the following illustration.

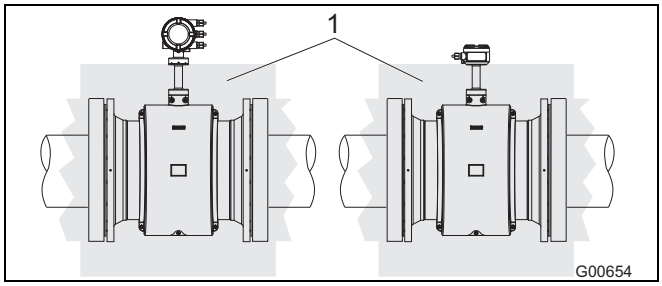


Fig. 35

1 Insulation

Installation in pipelines with larger nominal diameters

Determine the resulting pressure loss when using reduction pieces (1):

1. Calculate the diameter ratio d/D.
2. Determine the flow velocity based on the flow range nomograph (Fig. 37).
3. Read the pressure drop on the Y-axis in Fig. 37.

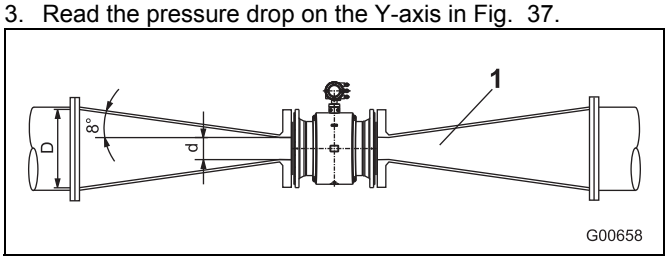


Fig. 36

1 Flange transition piece
d Inside diameter of the flowmeter
V flow velocity [m/s]
Δp pressure loss [mbar]
D Inside diameter of the pipeline

Nomograph for pressure drop calculations

For flange transition piece with $\alpha/2 = 8°$

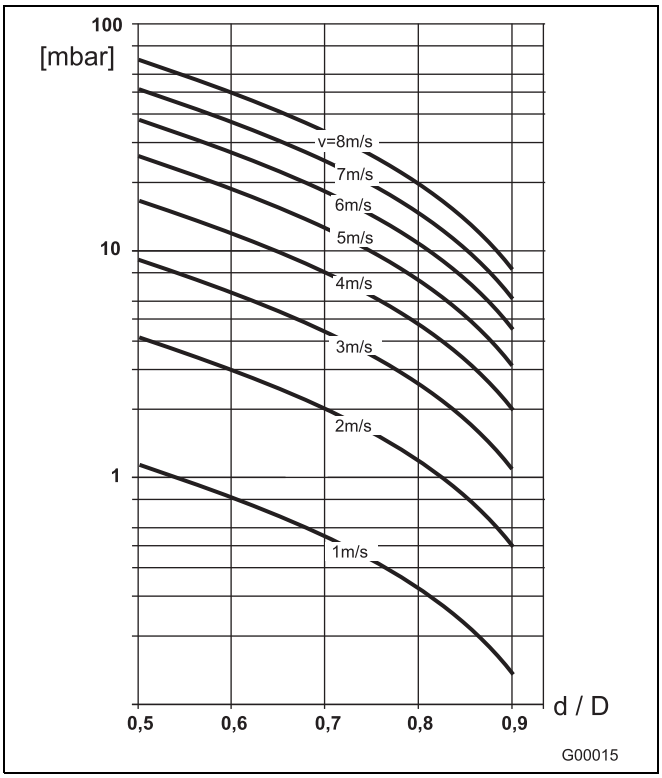


Fig. 37

Dimensions for sensor design level „B“

Flange DN 3 ... 125 (1/10 ... 5"), aluminum sensor housing (shell housing)

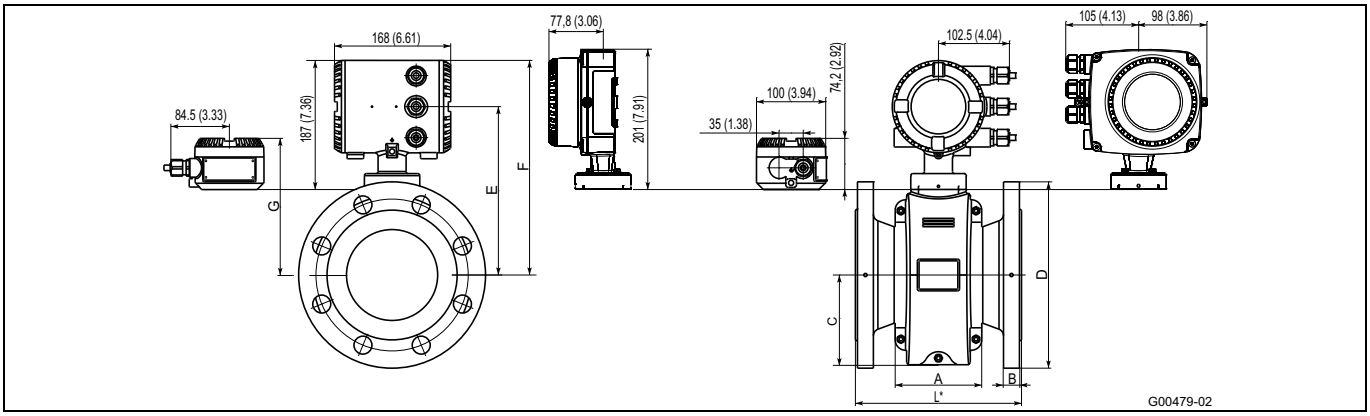


Fig. 38: Dimensions in mm (inches)

Dimensions mm (inch)										Approx. weight in kg (lb)	
DN	**Process connection**	**D**	**B**	**L** [2) 3) 8)]	**F** [4)]	**C**	**E** [4)]	**G** [4)]	**A**	**Integral**	**Remote**
3 ... 8 [5)] (1/8 ... 5/16 [6)])	EN 1092-1 [7)] PN 10 … 40 [1)]	90 (3.54)	19 (0.75)	200 (7.84)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	113 (4.45)	7 (15)	5 (11)
	ASME B16.5 CL 150	89 (3.50)	14.2 (0.56)								
10 (3/8 [6)])	ASME B16.5 CL 300	96 (3.78)	17.3 (0.68)								
	JIS 10K	90 (3.54)	15 (0.59)								
15 (1/2)	EN 1092-1 [7)] PN 10 … 40 [1)]	95 (3.74)	19 (0.75)	200 (7.84)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	113 (4.45)	7 (15)	5 (11)
	ASME B16.5 CL 150	89 (3.50)	14.2 (0.56)								
	ASME B16.5 CL 300	96 (2.72)	17.3 (0.68)								
	JIS 10K	95 (3.74)	15 (0.59)								
20 (3/4)	EN 1092-1 [7)] PN 10 … 40 [1)]	105 (4.13)	21 (0.83)	200 (7.84)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	113 (4.45)	8 (18)	6 (13)
	ASME B16.5 CL 150	98 (3.86)	15.7 (0.62)								
	ASME B16.5 CL 300	118 (4.65)	18.7 (0.74)								
	JIS 10K	100 (3.94)	17 (0.67)								
25 (1)	EN 1092-1 [7)] PN 10 … 40 [1)]	115 (4.53)	21 (0.83)	200 (7.84)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	113 (4.45)	9 (20)	7 (15)
	ASME B16.5 CL 150	108 (4.25)	17.2 (0.68)								
	ASME B16.5 CL 300	124 (4.88)	20.5 (0.81)								
	JIS 10K	125 (4.92)	17 (0.67)								
32 (1 1/4)	EN 1092-1 [7)] PN 10 … 40 [1)]	140 (5.51)	21 (0.83)	200 (7.87)	262 (10.31)	92 (3.62)	195 (7.68)	150 (5.91)	113 (4.45)	10 (22)	8 (18)
	ASME B16.5 CL 150	118 (4.65)	18.7 (0.74)								
	ASME B16.5 CL 300	134 (5.28)	22.1 (0.87)								
	JIS 10K	135 (5.31)	19 (0.75)								
40 (1 1/2)	EN 1092-1 [7)] PN 10 … 40 [1)]	150 (5.91)	21 (0.83)	200 (7.87)	262 (10.31)	92 (3.62)	195 (7.68)	150 (5.91)	113 (4.45)	11 (24)	9 (20)
	ASME B16.5 CL 150	127 (5.00)	20.5 (0.81)								
	ASME B16.5 CL 300	156 (6.14)	23.6 (0.93)								
	JIS 10K	140 (5.51)	19 (0.75)								

Tolerance for L: +0 / -3 mm (+0 / -0.018 inch)

Dimensions mm (inch)										Weight in kg (lb)	
DN	**Process connection**	**D**	**B**	**L** [2) 3) 8)]	**F** [4)]	**C**	**E** [4)]	**G** [4)]	**A**	**Integral**	**Remote**
50 (2)	EN 1092-1 [7)] PN 10 … 40 [1)]	165 (6.50)	23 (0.91)	200 (7.87)	268 (10.55)	97 (3.82)	201 (7.91)	156 (6.14)	115 (4.53)	12 (26)	10 (22)
	ASME B16.5 CL 150	153 (6.02)	22.1 (0.87)								
	ASME B16.5 CL 300	165 (6.50)	25.4 (1.0)								
	JIS 10K	155 (6.10)	19 (0.75)								
	AS2129 table D AS2129 table E	150 (5.91)									
65 (2 1/2)	EN 1092-1 [7)] PN 16 [1)]	185 (7.28)	22 (0.87)	200 (7.87)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)	104 (4.09)	15 (33)	13 (29)
	EN 1092-1 [7)] PN 40 [1)]	185 (7.28)	26 (1.02)							15 (33)	13 (29)
	ASME B16.5 CL 150	178 (7.01)	25.4 (1.0)							13 (29)	11 (24)
	ASME B16.5 CL 300	191 (7.52)	28.4 (1.12)							15 (33)	13 (29)
	JIS 10K	175 (6.89)	21 (0.83)							15 (33)	13 (29)
	AS2129 table D AS2129 table E	165 (6.50)								13 (29)	11 (24)
80 (3)	EN 1092-1 [7)] PN 10 … 40 [1)]	200 (7.87)	28 (1.10)	200 (7.87)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)	104 (4.09)	17 (38)	15 (33)
	ASME B16.5 CL 150	191 (7.52)	26.9 (1.06)							17 (38)	15 (33)
	ASME B16.5 CL 300	210 (8.27)	31.4 (1.24)							19 (42)	17 (38)
	JIS 10K	185 (7.28)	21 (0.83)							19 (42)	17 (38)
	AS2129 table D AS2129 table E	185 (7.28)								17 (38)	15 (33)
100 (4)	EN 1092-1 [7)] PN 16 [1)]	220 (8.66)	24 (0.94)	250 (9.84)	301 (11.85)	122 (4.80)	234 (9.21)	189 (7.44)	125 (4.92)	19 (42)	17 (38)
	EN 1092-1 [7)] PN 25 … 40 [1)]	235 (9.25)	28 (1.10)							23 (51)	21 (46)
	ASME B16.5 CL 150	229 (9.02)	27.4 (1.08)							21 (46)	19 (42)
	ASME B16.5 CL 300	254 (10.0)	35.8 (1.41)							30 (66)	28 (62)
	JIS 10K	210 (8.72)	21 (0.83)							19 (42)	17 (38)
	AS2129 table D AS2129 table E	215 (8.46)								21 (46)	19 (42)
125 (5)	EN 1092-1 [7)] PN 16 [1)]	250 (9.84)	25 (0.98)	250 (9.84)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)	125 (4.92)	22 (49)	20 (44)
	EN 1092-1 [7)] PN 25 … 40 [1)]	270 (10.63)	29 (1.14)							29 (64)	27 (60)
	ASME B16.5 CL 150	254 (10.0)	27.9 (1.10)							22 (49)	20 (44)
	ASME B16.5 CL 300	280 (11.02)	39.1 (1.54)							35 (77)	33 (73)
	JIS 10K	250 (9.84)	27 (1.06)							22 (49)	20 (44)
	AS2129 table D AS2129 table E	255 (10.04)								22 (49)	20 (44)

Tolerance for L: +0 / -3 mm (+0 / -0.018 inch)

1) Other pressure ratings on request.
2) If an earthing plate is fitted (attached to one side of the flange), dimension L increases as follows: by 3 mm (0.118 inch) for DN 3 ... 100, and by 5 mm (0.197 inch) for DN 125.
3) If protection plates are fitted (attached to both sides of the flange), dimension L increases as follows: by 6 mm (0.236 inch) for DN 3 ... 100, and by 10 mm (0.394 inch) for DN 125.
4) Depending on the device design, the dimensions change in accordance with the following table:

Device design		Dimension E, F	Dimension G
Without explosion protection	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Division 1	Standard temperature design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High temperature design	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Division 2	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)

5) Connection flange DN 10.
6) Connection flange 1/2".
7) Connecting dimensions in accordance with EN 1092-1. For DN 65, PN 16 in accordance with EN 1092-1, please order PN 40.
8) For devices with ordering code "Installation length JN" (China production site), the installation length corresponds to the ISO installation length.

Flange DN 150 ... 400 (6 ... 16"), aluminum sensor housing (shell housing)

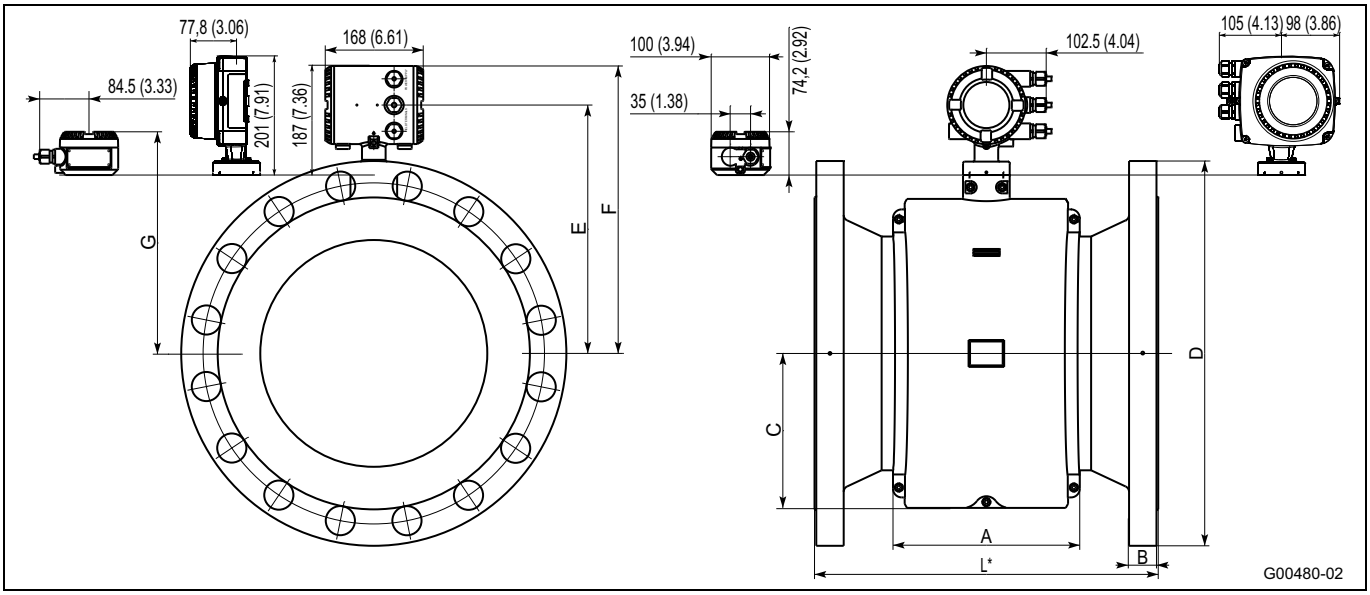


Fig. 39: Dimensions in mm (inches)

Dimensions mm (inch)										Approx. weight in kg (lb)	
DN	Process connection	D	B	L [2) 3)]	F [4)]	C	E [4)]	G [4)]	A	Integral	Remote
150 (6)	EN 1092-1 PN 16 [1)]	285 (11.22)	25 (0.98)	300 (11.81)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)	166 (6.54)	33 (73)	31 (68)
	EN 1092-1 PN 25 … 40 [1)]	300 (11.81)	31 (1.22)							39 (86)	37 (82)
	ASME B16.5 CL 150	280 (11.02)	29.4 (1.16)							33 (73)	31 (68)
	ASME B16.5 CL 300	318 (12.52)	40.5 (1.59)							47 (104)	45 (99)
	JIS 10K	280 (11.02)	28 (1.10)							33 (73)	31 (68)
	AS2129 table D AS2129 table E	280 (11.02)	—							33 (73)	31 (68)
200 (8)	EN 1092-1 PN 10 … 16 [1)]	340 (13.39)	28 (1.10)	350 (13.78)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)	200 (7.87)	41 (90)	39 (86)
	EN 1092-1 PN 25 [1)]	360 (14.17)	34 (1.34)							43 (95)	41 (90)
	EN 1092-1 PN 40 [1)]	375 (14.76)	38 (1.50)							43 (95)	41 (90)
	ASME B16.5 CL 150	345 (13.58)	33.6 (1.32)							50 (110)	48 (106)
	ASME B16.5 CL 300	381 (15)	46.1 (1.81)							72 (158)	70 (154)
	JIS 10K	330 (12.99)	33 (1.30)							43 (95)	41 (90)
	AS2129 table D AS2129 table E	335 (13.19)	—							50 (110)	48 (106)
250 (10)	EN 1092-1 PN 10 [1)]	395 (15.55)	30 (1.18)	450 (17.72)	413 (16.26)	198 (7.80)	346 (13.62)	301 (11.85)	235 (9.25)	61 (135)	59 (130)
	EN 1092-1 PN 16 [1)]	405 (15.94)	30 (1.18)							61 (135)	59 (130)
	EN 1092-1 PN 25 [1)]	425 (16.73)	36 (1.42)							65 (143)	63 (139)
	EN 1092-1 PN 40 [1)]	450 (17.72)	42 (1.65)							65 (143)	63 (139)
	ASME B16.5 CL 150	407 (16.02)	35.2 (1.39)							70 (154)	68 (150)
	ASME B16.5 CL 300	445 (17.52)	52.8 (2.08)							105 (232)	103 (227)
	JIS 10K	400 (15.75)	37 (1.46)							65 (143)	63 (139)
	AS2129 table D AS2129 table E	405 (15.94)	—							70 (154)	68 (150)

Tolerance for L: DN 150 ... 200 +0 / -3 mm (+0 / -0.118 inch), DN 250 ... 400 +0 / -5 mm (+0 / -0.197 inch)

Dimensions mm (inch)										Approx. weight in kg (lb)	
DN	Process connection	D	B	L [2) 3)]	F [4)]	C	E [4)]	G [4)]	A	Integral	Remote
300 (12)	EN 1092-1 PN 10 [1)]	445 (17.52)	31 (1.22)	500 (19.68)	436 (17.17)	228 (8.98)	369 (14.53)	324 (12.76)	272 (10.71)	74 (163)	72 (159)
	EN 1092-1 PN 16 [1)]	460 (18.11)	33 (1.30)							74 (163)	72 (159)
	EN 1092-1 PN 25 [1)]	485 (19.09)	39 (1.54)							80 (176)	78 (172)
	EN 1092-1 PN 40 [1)]	515 (20.28)	47 (1.85)							80 (176)	78 (172)
	ASME B16.5 CL 150	483 (19.02)	36.8 (1.45)							105 (232)	103 (227)
	ASME B16.5 CL 300	521 (20.51)	55.8 (2.20)							140 (309)	138 (304)
	JIS 10K	445 (17.52)	40 (1.57)							80 (176)	78 (172)
	AS2129 table D AS2129 table E	455 (17.19)	—							105 (232)	103 (227)
350 (14)	EN 1092-1 PN 10 [1)]	505 (19.88)	31 (1.22)	550 (21.65)	451 (17.76)	265 (10.43)	384 (15.12)	339 (13.35)	322 (12.68)	95 (209)	93 (203)
	EN 1092-1 PN 16 [1)]	520 (20.47)	35 (1.38)							95 (209)	93 (203)
	EN 1092-1 PN 25 [1)]	555 (21.85)	43 (1.69)							110 (243)	108 (238)
	ASME B16.5 CL 150	533 (20.98)	40.1 (1.58)							130 (278)	128 (282)
	ASME B16.5 CL 300	584 (22.99)	58.8 (2.31)							150 (331)	148 (326)
	JIS 10K	490 (19.29)	—							110 (243)	108 (238)
	AS2129 table D AS2129 table E	525 (20.67)	—							105 (232)	103 (227)
400 (16)	EN 1092-1 PN 10 [1)]	565 (22.24)	31 (1.22)	600 (23.62)	493 (19.41)	265 (10.43)	426 (16.77)	381 (15.00)	322 (12.68)	103 (227)	101 (223)
	EN 1092-1 PN 16 [1)]	580 (22.83)	37 (1.46)							103 (227)	101 (223)
	EN 1092-1 PN 25 [1)]	620 (24.41)	45 (1.77)							126 (278)	124 (273)
	ASME B16.5 CL 150	597 (23.50)	41.6 (1.64)							175 (386)	173 (381)
	ASME B16.5 CL 300	647 (25.47)	62.2 (2.45)							265 (584)	263 (580)
	JIS 10K	560 (22.05)	—							126 (278)	124 (273)
	AS2129 table D AS2129 table E	580 (22.83)	—							175 (386)	173 (381)

Tolerance for L: DN 150 ... 200 +0 / -3 mm (+0 / -0.118 inch), DN 250 ... 400 +0 / -5 mm (+0 / -0.197 inch)

1) Other pressure ratings on request.
2) If an earthing plate is fitted (attached to one side of the flange), the length L increases by 5 mm (0.197 inch).
3) If protection plates are fitted (attached to both sides of the flange), the length L increases by 10 mm (0.394 inch).
4) Depending on the device design, the dimensions change in accordance with the following table.

Device design		Dimension E, F	Dimension G
Without explosion protection	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Division 1	Standard temperature design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High temperature design	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Division 2	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)

Flange DN 450 ... 2000 (18 ... 80"), steel sensor housing

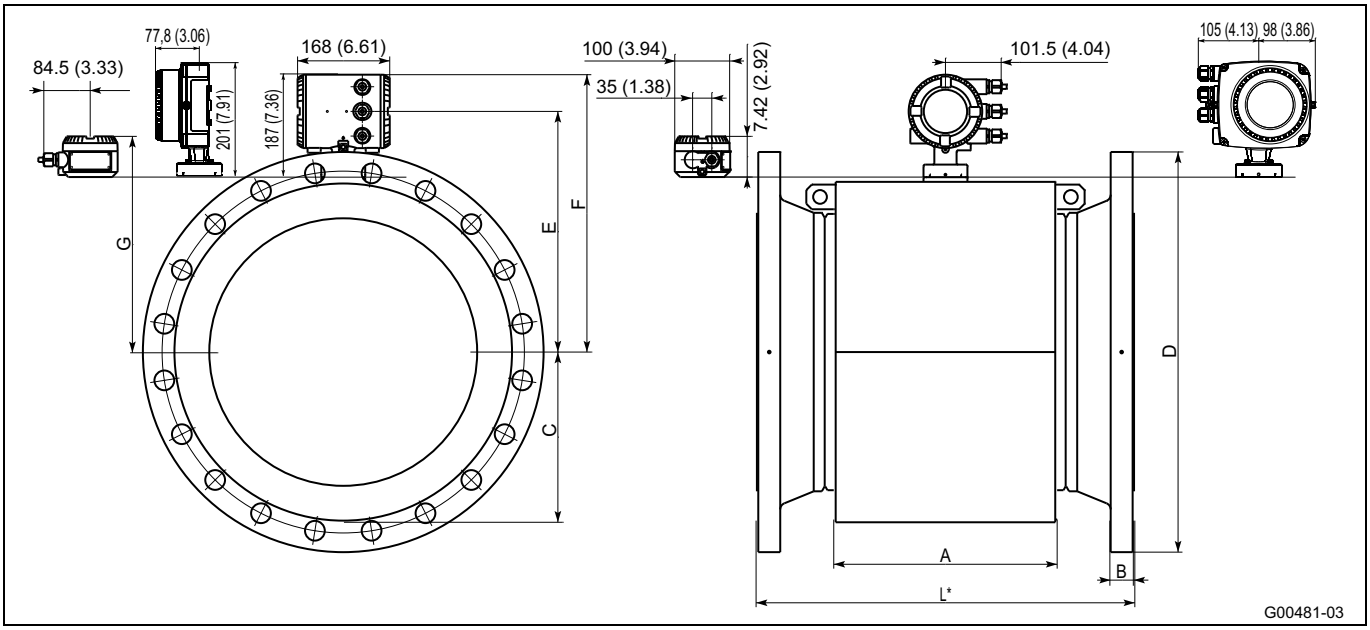


Fig. 40: Dimensions in mm (inches)

Dimensions mm (inch)										Approx. weight in kg (lb)	
DN	**Process connection**	**D**	**B**	**L** [2) 3)]	**F** [4)]	**C**	**E** [4)]	**G** [4)]	**A**	**Integral**	**Remote**
450 (18)	ASME B16.5 CL 150	635 (25.0)	44.6 (1.76)	686 (27.01)	501 (19.72)	310 (12.20)	434 (17.09)	389 (15.31)	407 (16.02)	260 (573)	258 (569)
	AS2129 table D AS2129 table E	640 (25.20)	—								
500 (20)	EN 1092-1 PN 10 [1)]	670 (26.38)	33 (1.30)	650 (25.59)	501 (19.72)	310 (12.20)	434 (17.09)	389 (15.31)	407 (16.02)	190 (419)	188 (415)
	EN 1092-1 PN 16 [1)]	715 (28.15)	39 (1.54)							240 (529)	238 (525)
	ASME B16.5 CL 150	699 (27.52)	47.9 (1.89)	762 (30.0)						300 (661)	298 (657)
	AS2129 table D AS2129 table E	705 (27.76)	—	650 (25.59)							
600 (24)	EN 1092-1 PN 10 [1)]	780 (30.71)	33 (1.30)	780 (30.71)	552 (21.73)	361 (14.21)	485 (19.09)	440 (17.32)	469 (18.46)	246 (542)	244 (537)
	EN 1092-1 PN 16 [1)]	840 (33.07)	41 (1.61)							318 (701)	316 (697)
	ASME B16.5 CL 150	813 (32.01)	52.8 (2.08)	914 (35.98)						425 (937)	423 (933)
	AS2129 table D AS2129 table E	825 (32.48)	—	780 (30.71)							
700 (28)	EN 1092-1 PN 10 [1)]	895 (35.24)	35 (1.38)	910 (35.83)	596 (23.46)	405 (15.94)	529 (20.83)	484 (19.06)	537 (21.14)	320 (706)	318 (701)
	EN 1092-1 PN 16 [1)]	910 (35.83)	41 (1.61)							440 (970)	438 (966)
	ASME 16.47 series B CL 150	837 (32.95)	49.6 (1.95)							350 (772)	348 (767)
760 (30)	ASME B16.5 CL 150	888 (34.96)	44.5 (1.75)	990 (38.96)	606 (23.86)	435 (17.13)	539 (21.22)	494 (19.45)	-	230 (507)	228 (503)
800 (32)	EN 1092-1 PN 10 [1)]	1015 (39.96)	37 (1.46)	1040 (40.94)	646 (25.43)	455 (17.91)	579 (22.8)	534 (21.02)	605 (23.82)	420 (926)	418 (922)
	EN 1092-1 PN 16 [1)]	1025 (40.35)	43 (1.69)							490 (1080)	488 (1076)
	ASME 16.47 series B CL 150	942 (37.09)	51 (2.01)							502 (1107)	500 (1102)

Tolerance for L: DN 450 ... 500 +0 / -5 mm (+0 / -0.197 inch), DN 600 ... 2000 +0 / -10 mm (+0 / -0.394 inch)

Dimensions mm (inch)										Approx. weight in kg (lb)	
DN	Process connection	D	B	L [2) 3)]	F [4)]	C	E [4)]	G [4)]	A	Integral	Remote
900 (36)	EN 1092-1 PN 10 [1)]	1115 (43.90)	39 (1.54)	1170 (46.06)	696 (27.40)	505 (19.88)	629 (24.76)	584 (22.99)	671 (26.42)	505 (1113)	503 (1109)
	EN 1092-1 PN 16 [1)]	1125 (44.29)	45 (1.77)							590 (1301)	588 (1296)
	ASME 16.47 series B CL 150	1157 (45.55)	57.3 (22.56)							680 (1499)	678 (1495)
1000 (40)	EN 1092-1 PN 10 [1)]	1230 (48.43)	39 (1.54)	1300 (51.18)	746 (29.37)	555 (21.85)	679 (26.73)	634 (24.96)	739 (29.09)	690 (1521)	688 (1516)
	EN 1092-1 PN 16 [1)]	1255 (49.41)	47 (1.85)							850 (1873)	848 (1869)
	ASME 16.47 series B CL 150	1175 (46.26)	60.6 (2.39)							880 (1940)	878 (1936)
1050 (42)	ASME 16.47 series B CL 150	1067 (42.01)	58.7 (2.31)	1365 (53.74)	771 (30.35)	580 (22.83)	704 (72.72)	659 (25.94)	739 (29.09)	932 (2055)	930 (2050)
1100 (44)	ASME 16.47 series B CL 150	1118 (44.02)	60.5 (2.38)	1430 (56.30)	—	—	—	—	739 (29.09)	962 (2121)	960 (2116)
1200 (48)	EN 1092-1 PN 10 [1)]	1455 (57.28)	43 (1.69)	1560 (61.42)	856 (33.7)	660 (25.98)	789 (31.06)	742 (29.21)	800 (31.5)	700 (1543)	698 (1538)
	EN 1092-1 PN 16 [1)]	1485 (58.46)	53 (2.09)							930 (2050)	928 (2046)
1400 (56)	EN 1092-1 PN 10 [1)]	1675 (65.94)	47 (1.85)	1820 (71.65)	950 (37.4)	755 (29.72)	884 (34.8)	838 (32.99)	900 (35.43)	810 (1786)	808 (1781)
	EN 1092-1 PN 16 [1)]	1685 (66.34)	57 (2.24)							1210 (2668)	1208 (2663)
1500 (60)	ASME 16.47 series B CL 150	1676 (65.98)	76.2 (3.00)	1950 (76.77)	996 (39.21)	805 (31.69)	929 (36.57)	884 (34.80)	900 (35.43)	1952 (4303)	1950 (4299)
1600 (64)	EN 1092-1 PN 10 [1)]	1915 (75.39)	51 (2.01)	2080 (81.89)	1060 (41.73)	865 (34.06)	994 (39.13)	948 (37.32)	990 (38.98)	1180 (2602)	1178 (2597)
	EN 1092-1 PN 16 [1)]	1930 ()	63 (2.48)							1630 (3593)	1628 (3589)
1800 (72)	EN 1092-1 PN 10 [1)]	2115 (83.27)	55 (2.17)	2340 (92.13)	1176 (46.3)	980 (38.58)	1109 (43.66)	1062 (41.81)	1080 (42.52)	1490 (3285)	1488 (3280)
	EN 1092-1 PN 16 [1)]	2130 (83.86)	67 (2.64)							2230 (4916)	2228 (4912)
2000 (80)	EN 1092-1 PN 10 [1)]	2325 (91.54)	59 (2.32)	2600 (102.36)	1286 (50.63)	1090 (42.91)	1219 (47.99)	1172 (46.14)	1170 (46.06)	1880 (4145)	1878 (4140)
	EN 1092-1 PN 16 [1)]	2345 (92.32)	71 (2.80)							2650 (5842)	2648 (5838)

Tolerance for L: DN 450 ... 500 +0 / -5 mm (+0 / -0.197 inch), DN 600 ... 2000 +0 / -10 mm (+0 / -0.394 inch)

1) Other pressure ratings on request.
2) If an earthing plate is fitted (attached to one side of the flange), dimension L increases as follows: by 5 mm (0.197 inch) for DN 400 ... 600.
3) If protection plates are fitted (attached to both sides of the flange), dimension L increases as follows: by 10 mm (0.394 inch) for DN 400 ... 600.
4) Depending on the device design, the dimensions change in accordance with the following table.

Device design		Dimension E, F	Dimension G
Without explosion protection	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Division 1	Standard temperature design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High temperature design	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Division 2	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)

Dimensions for sensor design level „C“

Flange DN 25 … 600 (18 … 24"), steel sensor housing

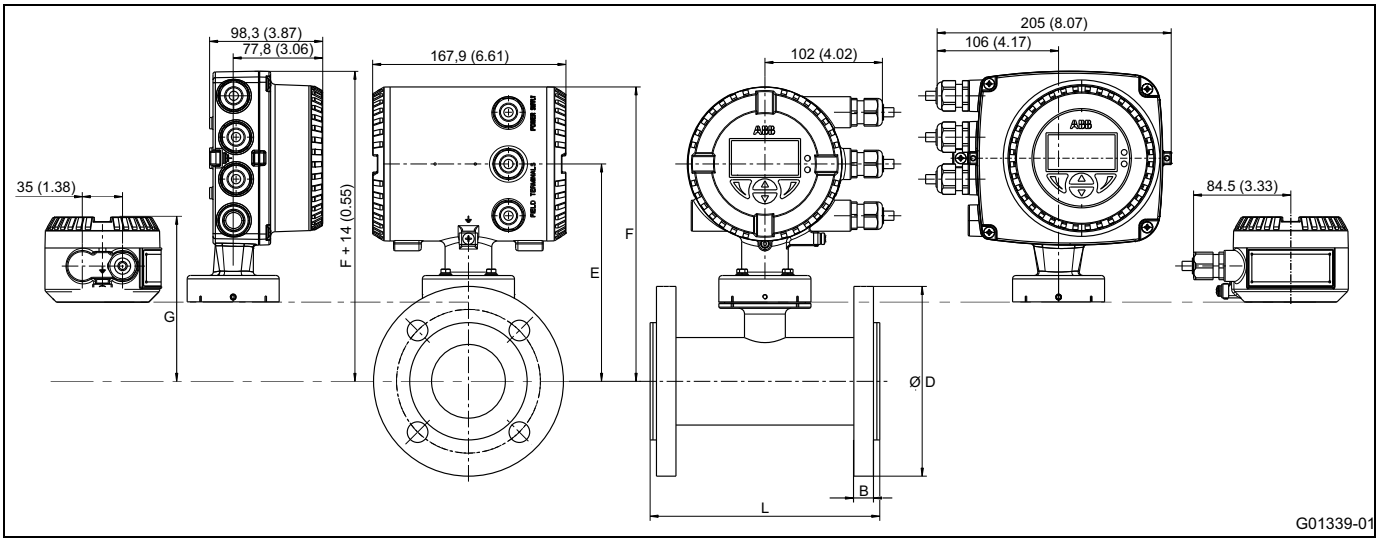


Fig. 41: Dimensions in mm (inches)

Dimensions mm (inch)								Approx. weight in kg (lb)	
DN	**Process connection**	**D**	**B**	**L** [2) 3)]	**F** [4)]	**E** [4)]	**G** [4)]	**Integral**	**Remote**
25 (1")	EN 1092-1 PN 10 ... 40 [1)]	115 (4.53)	23 (0.91)	200 (7.84)	244 (9.61)	177 (6.97)	131 (5.16)	9 (20)	7 (15)
	ASME B16.5 CL 150	115 (4.53)	23 (0.91)						
	ASME B16.5 CL 300	125 (4.92)	22 (0.87)						
	JIS 10K	115 (4.53)	23 (0.91)						
	AS2129 table D AS2129 table E	115 (4.53)	23 (0.91)						
32 (1 1/4")	EN 1092-1 PN 10 ... 40 [1)]	150 (5.91)	25 (0.98)	200 (7.84)	249 (9.80)	182 (7.17)	136 (5.35)	10 (22)	8 (18)
	ASME B16.5 CL 150	150 (5.91)	25 (0.98)						
	ASME B16.5 CL 300	135 (5.31)	23 (0.91)						
	JIS 10K	150 (5.91)	25 (0.98)						
	AS2129 table D AS2129 table E	150 (5.91)	25 (0.98)						
40 (1 1/2")	EN 1092-1 PN 10 ... 40 [1)]	150 (5.91)	23 (0.91)	200 (7.84)	254 (10.0)	187 (7.36)	141 (5.55)	11 (24)	9 (20)
	ASME B16.5 CL 150	150 (5.91)	23 (0.91)						
	ASME B16.5 CL 300	155 (6.10)	25 (0.98)						
	JIS 10K	140 (5.51)	21 (0.83)						
	AS2129 table D	150 (5.91)	23 (0.91)						
	AS2129 table E	135 (5.31)	23 (0.91)						
50 (2")	EN 1092-1 PN 10 ... 40 [1)]	165 (6.50)	27 (1.06)	200 (7.84)	257 (10.12)	190 (7.48)	144 (5.67)	12 (26)	10 (22)
	ASME B16.5 CL 150	165 (6.50)	27 (1.06)						
	ASME B16.5 CL 300	165 (6.50)	27 (1.06)						
	JIS 10K	165 (6.50)	27 (1.06)						
	AS2129 table D AS2129 table E	150 (5.91)	18 (0.71)						

Tolerance for L: +0 / -3 mm (+0 / -0.018 inch)

Dimensions mm (inch)								Approx. weight in kg (lb)	
DN	Process connection	D	B	L [2) 3)]	F [4)]	E [4)]	G [4)]	Integral	Remote
65 (2 1/2")	EN 1092-1 PN 10 ... 40 [1)]	185 (7.28)	30 (1.18)	200 (7.87)	271 (10.67)	204 (8.03)	158 (6.22)	15 (33)	13 (29)
	ASME B16.5 CL 150	180 (7.09)	30 (1.18)					13 (29)	11 (24)
	ASME B16.5 CL 300	190 (7.48)	29 (1.14)					15 (33)	13 (29)
	JIS 10K	185 (7.28)	30 (1.18)					15 (33)	13 (29)
	AS2129 table D AS2129 table E	165 (6.50)	18 (0.71)					13 (29)	11 (24)
80 (3")	EN 1092-1 PN 10 ... 40 [1)]	205 (8.07)	30 (1.18)	200 (7.87)	275 (10.83)	208 (8.19)	162 (6.38)	17 (38)	15 (33)
	ASME B16.5 CL 150	205 (8.07)	30 (1.18)					17 (38)	15 (33)
	ASME B16.5 CL 300	210 (8.27)	33 (1.30)					19 (42)	17 (38)
	JIS 10K	205 (8.07)	30 (1.18)					19 (42)	17 (38)
	AS2129 table D AS2129 table E	205 (8.07)	30 (1.18)					17 (38)	15 (33)
100 (4")	EN 1092-1 PN 10 ... 16 [1)]	235 (9.25)	29 (1.14)	250 (9.84)	306 (12.05)	239 (9.41)	193 (7.60)	24 (53)	22 (48)
	EN 1092-1 PN 25 … 40 [1)]	235 (9.25)	28 (1.10)					24 (53)	22 (48)
	ASME B16.5 CL 150	235 (9.25)	29 (1.14)					24 (53)	22 (48)
	ASME B16.5 CL 300	255 (10.04)	38 (1.50)					30 (66)	28 (62)
	JIS 10K	235 (9.25)	29 (1.14)					19 (42)	17 (38)
	AS2129 table D AS2129 table E	235 (9.25)	29 (1.14)					21 (46)	19 (42)
125 (5")	EN 1092-1 PN 10 ... 16 [1)]	270 (10.63)	38 (1.50)	250 (9.84)	318 (12.52)	251 (9.88)	205 (8.07)	25 (55)	23 (51)
	EN 1092-1 PN 25 … 40 [1)]	270 (10.63)	36 (1.42)					25 (55)	23 (51)
	ASME B16.5 CL 150	270 (10.63)	38 (1.50)					25 (55)	23 (51)
	ASME B16.5 CL 300	280 (11.02)	42 (1.65)					35 (77)	33 (73)
	JIS 10K	270 (10.63)	38 (1.50)					22 (49)	20 (44)
	AS2129 table D AS2129 table E	270 (10.63)	38 (1.50)					22 (49)	20 (44)
150 (6")	EN 1092-1 PN 10 ... 16 [1)]	300 (11.81)	31 (1.22)	300 (11.81)	339 (13.35)	272 (10.71)	226 (8.90)	33 (73)	31 (68)
	EN 1092-1 PN 25 … 40 [1)]	300 (11.81)	38 (1.50)					39 (86)	37 (82)
	ASME B16.5 CL 150	300 (11.81)	31 (1.22)					33 (73)	31 (68)
	ASME B16.5 CL 300	320 (12.60)	44 (1.73)					47 (104)	45 (99)
	JIS 10K	300 (11.81)	31 (1.22)					33 (73)	31 (68)
	AS2129 table D	300 (11.81)	31 (1.22)					33 (73)	31 (68)
	AS2129 table E	280 (11.02)	24 (0.94)					33 (73)	31 (68)

Tolerance for L: +0 / -3 mm (+0 / -0.018 inch)

Dimensions mm (inch)								Approx. weight in kg (lb)	
DN	Process connection	D	B	L [2) 3)]	F [4)]	E [4)]	G [4)]	Integral	Remote
200 (8")	EN 1092-1 PN 10 [1)]	375 (14.76)	35 (1.38)	350 (13.78)	364 (14.33)	297 (11.69)	252 (9.92)	41 (90)	39 (86)
	EN 1092-1 PN 16 [1)]	375 (14.76)	35 (1.38)					43 (95)	41 (90)
	ASME B16.5 CL 150	375 (14.76)	35 (1.38)					50 (110)	48 (106)
	ASME B16.5 CL 300	380 (14.96)	51 (2.01)					72 (158)	70 (154)
	JIS 10K	330 (12.99)	30 (1.18)					43 (95)	41 (90)
	AS2129 table D	335 (13.19)	35 (1.38)					50 (110)	48 (106)
	AS2129 table E	335 (13.19)	35 (1.38)					50 (110)	48 (106)
250 (10")	EN 1092-1 PN 10 [1)]	395 (15.55)	37 (1.46)	450 (17.72)	390 (15.35)	323 (12.72)	278 (10.94)	61 (135)	59 (130)
	EN 1092-1 PN 16 [1)]	405 (15.94)	37 (1.46)					65 (143)	63 (139)
	ASME B16.5 CL 150	405 (15.94)	37 (1.46)					70 (154)	68 (150)
	ASME B16.5 CL 300	445 (17.52)	61 (2.40)					105 (232)	103 (227)
	JIS 10K	405 (15.94)	37 (1.46)					65 (143)	63 (139)
	AS2129 table D	405 (15.94)	37 (1.46)					70 (154)	68 (150)
	AS2129 table E	405 (15.94)	25 (0.98)					70 (154)	68 (150)
300 (12")	EN 1092-1 PN 10 [1)]	445 (17.52)	38 (1.50)	500 (19.68)	415 (16.34)	348 (15.12)	303 (11.93)	74 (163)	72 (159)
	EN 1092-1 PN 16 [1)]	445 (17.52)	38 (1.50)					80 (176)	78 (172)
	ASME B16.5 CL 150	483 (19.02)	38 (1.50)					105 (232)	103 (227)
	ASME B16.5 CL 300	521 (20.51)	55 (2.17)					150 (331)	148 (326)
	JIS 10K	445 (17.52)	38 (1.50)					80 (176)	78 (172)
	AS2129 table D	455 (17.19)	38 (1.50)					105 (232)	103 (227)
	AS2129 table E	455 (17.19)	29 (1.14)					105 (232)	103 (227)
350 (14")	EN 1092-1 PN 10 [1)]	505 (19.88)	35 (1.38)	550 (21.65)	438 (17.24)	371 (14.61)	326 (12.83)	95 (209)	93 (203)
	EN 1092-1 PN 16 [1)]	520 (20.47)	40 (1.57)					110 (243)	108 (238)
	ASME B16.5 CL 150	533 (20.98)	54 (2.13)					105 (232)	103 (227)
	ASME B16.5 CL 300	584 (22.99)	80 (3.15)					140 (309)	138 (304)
	JIS 10K	490 (19.29)	31 (1.22)					110 (243)	108 (238)
	AS2129 table D	525 (20.67)	27 (1.06)					105 (232)	103 (227)
	AS2129 table E	525 (20.67)	38 (1.50)					105 (232)	103 (227)

Tolerance for L: DN 150 ... 200 +0 / -3 mm (+0 / -0.018 inch), DN 250 ... 600 +0 / -5 mm (+0 / -0.197 inch)

Dimensions mm (inch)								Approx. weight in kg (lb)	
DN	**Process connection**	**D**	**B**	**L** [2) 3)]	**F** [4)]	**E** [4)]	**G** [4)]	**Integral**	**Remote**
400 (16")	EN 1092-1 PN 10 [1)]	565 (22.24)	37 (1.46)	600 (23.62)	462 (18.19)	395 (15.55)	350 (13.78)	103 (227)	101 (223)
	EN 1092-1 PN 16 [1)]	580 (22.83)	43 (1.69)					126 (278)	124 (273)
	ASME B16.5 CL 150	597 (23.50)	57 (2.24)					175 (386)	173 (381)
	ASME B16.5 CL 300	647 (25.47)	88 (3.46)					265 (584)	263 (580)
	JIS 10K	560 (22.05)	33 (1.30)					126 (278)	124 (273)
	AS2129 table D	580 (22.83)	31 (1.22)					175 (386)	173 (381)
	AS2129 table E	580 (22.83)	39 (1.54)					175 (386)	173 (381)
450 (18")	ASME B16.5 CL 150	635 (25.00)	66 (2.60)	600 (23.62)	487 (19.17)	420 (16.54)	375 (14.76)	260 (573)	258 (569)
	AS2129 table D	640 (25.20)	30 (1.18)						
	AS2129 table E	640 (25.20)	40 (1.57)						
500 (20")	EN 1092-1 PN 10 [1)]	670 (26.38)	43 (1.96)	600 (23.62)	514 (20.24)	447 (17.60)	402 (15.83)	190 (419)	188 (415)
	EN 1092-1 PN 16 [1)]	715 (28.15)	51 (2.01)					240 (529)	238 (525)
	ASME B16.5 CL 150	699 (27.52)	69 (2.72)					300 (661)	298 (657)
	AS2129 table D	705 (27.76)	34 (1.34)						
	AS2129 table E	705 (27.76)	43 (1.69)						
600 (24")	EN 1092-1 PN 10 [1)]	780 (30.71)	47 (1.85)	800 (31.50)	569 (22.40)	502 (19.76)	457 (17.99)	246 (542)	244 (537)
	EN 1092-1 PN 16 [1)]	840 (33.07)	60 (2.36)					318 (701)	316 (697)
	ASME B16.5 CL 150	813 (32.01)	80 (3.15)					425 (937)	423 (933)
	AS2129 table D	825 (32.48)	47 (1.85)						
	AS2129 table E	825 (32.48)	53 (2.09)						

Tolerance for L: DN 150 ... 200 +0 / -3 mm (+0 / -0.018 inch), DN 250 ... 600 +0 / -5 mm (+0 / -0.197 inch)

1) Other pressure ratings on request.
2) If an earthing plate is fitted (attached to one side of the flange), dimension L increases by 5 mm (0.197 inch).
3) If protection plates are fitted (attached to both sides of the flange), dimension L increases by 10 mm (0.394 inch).
4) Depending on the device design, the dimensions change in accordance with the following table.

Device design		Dimension E, F	Dimension G
Without explosion protection	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Division 1	Standard temperature design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High temperature design	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Division 2	Standard temperature design	0	0
	High temperature design	+127 mm (+5 inch)	+127 mm (+5 inch)

Dimensions for high-pressure sensor version

Flange DN 15 ... 400 (1/2 ... 16"), high-pressure version, Sensor housing made of Aluminium (Clamp Shell)

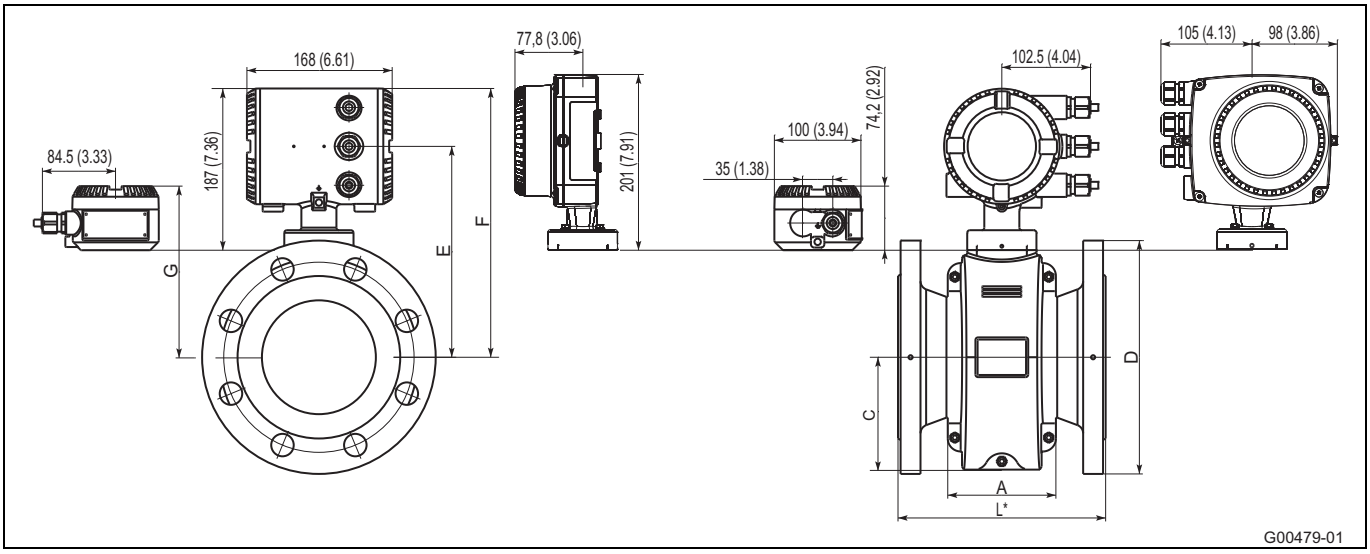


Fig. 42: Dimensions in mm (inch)

Dimensions mm (inch)									Approx. weight kg (lb)	
DN	**Process connection**	**D**	**L [1) 2)]**	**F [4)]**	**C**	**E [3)]**	**G [3)]**	**A**	**Integral**	**Remote**
15 (1/2“)	DIN 2636 PN 63 DIN 2637 PN 100	105 (4.13)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	113 (4.45)	10 (22)	8 (18)
	ASME B16.5, CL 600	95 (3.74)	270 (10.63)						12 (26)	10 (22)
25 (1“)	DIN 2636 PN 63 DIN 2637 PN 100	140 (5.51)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	113 (4.45)	12 (27)	10 (22)
	ASME B16.5, CL 600	124 (4.88)	270 (10.63)						12 (26)	10 (22)
	ASME B16.5, CL 900	149 (5.87)	300 (11.81)							
	ASME B16.5, CL 1500	149 (5.87)	300 (11.81)							
	ASME B16.5, CL 2500	158 (6.22)	350 (13.78)							
40 (1 1/2“)	DIN 2636 PN 63 DIN 2637 PN 100	170 (6.69)	280 (11.02)	262 (10.31)	92 (3.62)	195 (7.68)	150 (5.91)	113 (4.45)	13 / 14 (29 / 31)	11 / 12 (24 / 27)
	ASME B16.5, CL 600	156 (6.14)	280 (11.02)						13 (29)	11 (24)
	ASME B16.5, CL 900	177 (6.97)	300 (11.81)							
	ASME B16.5, CL 1500	177 (6.97)	350 (13.78)							
	ASME B16.5, CL 2500	203 (7.99)	400 (15.75)							
50 (2“)	DIN 2636 PN 63	180 (7.09)	280 (11.02)	268 (10.55)	97 (3.82)	201 (7.91)	156 (6.14)	115 (4.53)	15 (33)	13 (29)
	DIN 2637 PN 100	195 (7.68)	280 (11.02)						18 (40)	16 (35)
	ASME B16.5, CL 600	165 (6.50)	280 (11.02)						15 (33)	13 (29)
	ASME B16.5, CL 900	216 (8.50)	400 (15.75)							
	ASME B16.5, CL 1500	216 (8.50)	400 (15.75)							
	ASME B16.5, CL 2500	235 (9.25)	450 (17.72)							

Tolerance L: DN 25 ... 100 +0 / -3 mm (+0 / -0,018 inch), DN 150 … 200 +0 / -3 mm (+0 / -0,118 inch), DN 250 ... 400 +0 / -5 mm (+0 / -0,197 inch)

Dimensions mm (inch)									Approx. weight kg (lb)	
DN	**Process connection**	**D**	**L [1) 2)]**	**F [4)]**	**C**	**E [3)]**	**G [3)]**	**A**	**Integral**	**Remote**
65 (2 1/2“)	DIN 2636 PN 63	205 (8.07)	330 (12.99)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)	104 (4.09)	18 (40)	16 (35)
	DIN 2637 PN 100	220 (8.66)	330 (12.99)						23 (51)	21 (46)
	ASME B16.5, CL 600	190 (7.48)	330 (12.99)						20 (44)	18 (40)
	ASME B16.5, CL 900	244 (9.61)	400 (15.75)							
	ASME B16.5, CL 1500	244 (9.61)	400 (15.75)							
	ASME B16.5, CL 2500	266 (10.47)	450 (17.72)							
80 (3“)	DIN 2636 PN 63	215 (8.46)	340 (13.39)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)	104 (4.09)	22 (49)	20 (44)
	DIN 2637 PN 100	230 (9.06)	340 (13.39)						26 (57)	24 (53)
	ASME B16.5, CL 600	209 (8.23)	340 (13.39)						25 (55)	23 (51)
	ASME B16.5, CL 900	241 (9.49)	400 (15.75)							
	ASME B16.5, CL 1500	266 (10.47)	400 (15.75)							
	ASME B16.5, CL 2500	305 (12.01)	500 (19.68)							
100 (4“)	DIN 2636 PN 63	250 (9.84)	400 (15.75)	301 (11.85)	122 (4.8)	234 (9.21)	189 (7.44)	125 (4.92)	29 (64)	27 (60)
	DIN 2637 PN 100	265 (10.43)	400 (15.75)						38 (84)	26 (57)
	ASME B16.5, CL 600	273 (10.75)	400 (15.75)						46 (101)	44 (97)
	ASME B16.5, CL 900	292 (11.50)	400 (15.75)							
	ASME B16.5, CL 1500	311 (12.24)	420 (16.54)							
	ASME B16.5, CL 2500	355 (13.98)	600 (23.62)							
125 (5“)	DIN 2636 PN 63	295 (11.61)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)	125 (4.92)	on request	on request
	DIN 2637 PN 100	315 (12.4)	450 (17.72)							
	ASME B16.5, CL 600	330 (12.99)	400 (15.75)							
	ASME B16.5, CL 900	349 (13.74)	450 (17.72)							
	ASME B16.5, CL 1500	374 (14.72)	500 (19.68)							
	ASME B16.5, CL 2500	419 (16.50)	700 (27.56)							
150 (6“)	DIN 2636 PN 63	345 (13.58)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)	166 (6.54)	on request	on request
	DIN 2637 PN 100	355 (13.98)	450 (17.72)							
	ASME B16.5, CL 600	355 (13.98)	450 (17.72)							
	ASME B16.5, CL 900	381 (15.0)	500 (19.68)							
	ASME B16.5, CL 1500	393 (15.47)	600 (23.62)							
	ASME B16.5, CL 2500	482 (18.98)	800 (31.50)							

Tolerance L: DN 25 ... 100 +0 / -3 mm (+0 / -0,018 inch), DN 150 … 200 +0 / -3 mm (+0 / -0,118 inch), DN 250 ... 400 +0 / -5 mm (+0 / -0,197 inch)

Dimensions mm (inch)									Approx. weight kg (lb)	
DN	Process connection	D	L [1) 2)]	F [4)]	C	E [3)]	G [3)]	A	Integral	Remote
200 (8“)	DIN 2636 PN 63	415 (16.34)	500 (19.68)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)	200 (7.87)	on request	on request
	DIN 2637 PN 100	430 (16.93)	500 (19.68)							
	ASME B16.5, CL 600	419 (16.50)	500 (19.68)							
	ASME B16.5, CL 900	470 (18.50)	600 (23.62)							
	ASME B16.5, CL 1500	482 (18.98)	700 (27.56)							
	ASME B16.5, CL 2500	552 (21.73)	950 (37.40)							
250 (10“)	ASME B16.5, CL 600	508 (20.0)	500 (19.68)	413 (16.26)	198 (7.80)	346 (13.62)	301 (11.85)	235 (9.25)	on request	on request
	ASME B16.5, CL 900	546 (21.5)	700 (27.56)							
	ASME B16.5, CL 1500	584 (22.99)	850 (33.46)							
	ASME B16.5, CL 2500	673 (26.50)	1200 (47.24)							
300 (12“)	ASME B16.5, CL 600	559 (22.01)	750 (29.53)	436 (17.17)	228 (8.98)	369 (14.53)	324 (12.76)	272 (10.71)	on request	on request
	ASME B16.5, CL 900	609 (23.98)	800 (31.50)							
	ASME B16.5, CL 1500	673 (26.50)	950 (37.40)							
	ASME B16.5, CL 2500	762 (30.00)	1400 (55.12)							
350 (14“)	ASME B16.5, CL 600	603 (23.74)	750 (29.53)	451 (17.76)	265 (10.43)	384 (15.12)	339 (13.35)	322 (12.68)	on request	on request
	ASME B16.5, CL 900	641 (25.24)	850 (33.46)							
	ASME B16.5, CL 1500	749 (29.49)	1050 (41.34)							
400 (16“)	ASME B16.5, CL 600	686 (27.01)	800 (31.50)	493 (19.41)	265 (10.43)	426 (16.77)	381 (15.00)	322 (12.68)	on request	on request
	ASME B16.5, CL 900	705 (27.76)	900 (35.43)							
	ASME B16.5, CL 1500	825 (32.48)	1100 (43.31)							

Tolerance L: DN 25 ... 100 +0 / -3 mm (+0 / -0,018 inch), DN 150 … 200 +0 / -3 mm (+0 / -0,118 inch), DN 250 ... 400 +0 / -5 mm (+0 / -0,197 inch)

1) If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 ... 100 by 3 mm (0.118 inch; DN 125 by 5 mm (0.197 inch).
2) If protection plates are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 ... 100 by 6 mm (0.236 inch; DN 125 by 10 mm (0.394 inch).
3) Depending on the device design, the dimensions change according to the following table.

Device design		Dimension E, F	Dimension G
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High-temperature sensor design	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 inch)	+127 mm (+5 inch)

Flange DN 25... 400 (1 ... 16"), high-pressure version, Sensor housing made of stainless steel

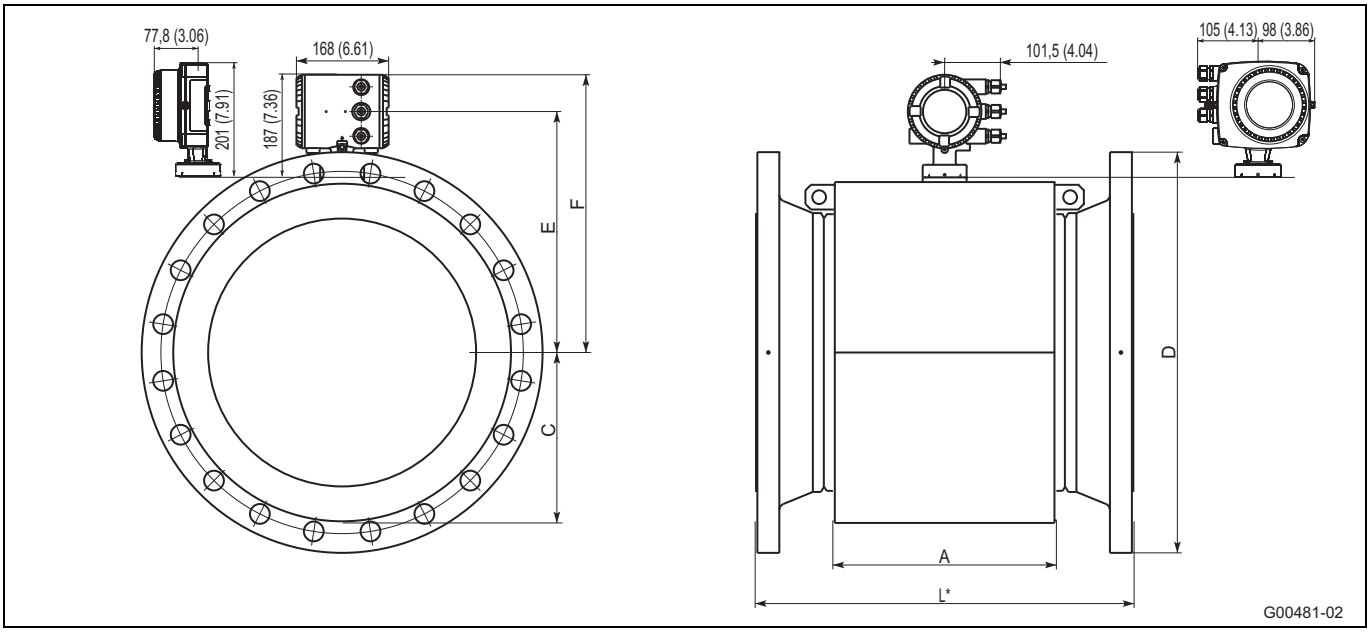


Fig. 43: Dimensions in mm (inch)

Dimensions [mm (inch)]								Approx. weight
DN	Process connection	D	L [1) 2)]	F [4)]	C	E [3)]	A	[kg (lb)]
25 (1“)	ASME B16.5 CL 600	124 (4.88)	270 (10.63)	283 (11.14)	73 (2.87)	216 (8.50)	105 (4.13)	12 (26)
	ASME B16.5 CL 900	149 (5.87)	300 (11.81)					
	ASME B16.5 CL 1500	149 (5.87)	300 (11.81)					
	ASME B16.5 CL 2500	158 (6.22)	350 (13.78)					
40 (1 1/2“)	ASME B16.5 CL 600	156 (6.14)	280 (11.02)	288 (11.34)	78 (3.07)	221 (8.70)	105 (4.13)	13 (29)
	ASME B16.5 CL 900	177 (6.97)	300 (11.81)					
	ASME B16.5 CL 1500	177 (6.97)	350 (13.78)					
	ASME B16.5 CL 2500	203 (7.99)	400 (15.75)					
50 (2”)	ASME B16.5 CL 600	165 (6.5)	280 (11.02)	305 (12.01)	85 (3.35)	238 (9.37)	105 (4.13)	15 (33)
	ASME B16.5 CL 900	216 (8.50)	400 (15.75)					
	ASME B16.5 CL 1500	216 (8.50)	400 (15.75)					
	ASME B16.5 CL 2500	235 (9.25)	450 (17.72)					
65 (2 1/2“)	ASME B16.5 CL 600	190 (7.48)	330 (12.99)	316 (12.44)	91 (3.58)	249 (9.80)	105 (4.13)	20 (44)
	ASME B16.5 CL 900	244 (9.61)	400 (15.75)					
	ASME B16.5 CL 1500	244 (9.61)	400 (15.75)					
	ASME B16.5 CL 2500	266 (10.47)	450 (17.72)					

Tolerance L: DN 25 ... 100 +0 / -3 mm (+0 / -0.018 inch)

Dimensions [mm (inch)]								Approx. weight
DN	Process connection	D	L [1) 2)]	F [4)]	C	E [3)]	A	[kg (lb)]
80 (3“)	ASME B16.5 CL 600	209 (8.23)	340 (13.39)	316 (12.44)	91 (3.58)	249 (9.80)	105 (4.13)	25 (55)
	ASME B16.5 CL 900	241 (9.49)	400 (15.75)					
	ASME B16.5 CL 1500	266 (10.47)	400 (15.75)					
	ASME B16.5 CL 2500	305 (12.01)	500 (19.68)					
100 (4“)	ASME B16.5 CL 600	273 (10.75)	400 (15.75)	331 (13.03)	91 (3.58)	249 (9.80)	109 (4.29)	46 (101)
	ASME B16.5 CL 900	292 (11.50)	400 (15.75)					
	ASME B16.5 CL 1500	311 (12.24)	420 (16.54)					
	ASME B16.5 CL 2500	355 (13.98)	600 (23.62)					
125 (5“)	ASME B16.5 CL 600	330 (12.99)	400 (15.75)	344 (13.54)	116 (4.57)	277 (10.91)	109 (4.29)	
	ASME B16.5 CL 900	349 (13.74)	450 (17.72)					
	ASME B16.5 CL 1500	374 (14.72)	500 (19.68)					
	ASME B16.5 CL 2500	419 (16.50)	700 (27.56)					
150 (6“)	ASME B16.5 CL 600	355 (13.98)	450 (17.72)	385 (15.16)	136 (5.35)	318 (12.52)	143 (5.63)	
	ASME B16.5 CL 900	381 (15.00)	500 (19.68)					
	ASME B16.5 CL 1500	393 (15.47)	600 (23.62)					
	ASME B16.5 CL 2500	482 (18.98)	800 (31.50)					
200 (8“)	ASME B16.5 CL 600	419 (16.50)	500 (19.69)	411 (16.18)	162 (6.38)	344 (13.54)	175 (6.89)	
	ASME B16.5 CL 900	470 (18.50)	600 (23.62)					
	ASME B16.5 CL 1500	482 (18.98)	700 (27.56)					
	ASME B16.5 CL 2500	552 (21.73)	950 (37.40)					
250 (10“)	ASME B16.5 CL 600	508 (20.00)	500 (19.68)	440 (17.32)	191 (7.52)	373 (14.68)	208 (8.19)	
	ASME B16.5 CL 900	546 (21.50)	700 (27.56)					
	ASME B16.5 CL 1500	584 (22.99)	850 (33.46)					
	ASME B16.5 CL 2500	673 (26.50)	1200 (47.25)					
300 (12“)	ASME B16.5 CL 600	559 (22.01)	750 (29.53)	457 (17.99)	209 (8.23)	390 (15.35)	243 (9.57)	
	ASME B16.5 CL 900	609 (23.98)	800 (31.50)					
	ASME B16.5 CL 1500	673 (26.50)	950 (37.40)					
	ASME B16.5 CL 2500	762 (30.00)	1400 (55.12)					

Tolerance L: DN 25 ... 100 +0 / -3 mm (+0 / -0.018 inch), DN 150 … 200 +0 / -3 mm (+0 / -0.118 inch), DN 250 … 400 +0 / -5 mm (+0 / -0.197 inch)

Dimensions [mm (inch)]								Approx. weight
DN	Process connection	D	L [1) 2)]	F [4)]	C	E [3)]	A	[kg (lb)]
350 (14“)	ASME B16.5 CL 600	603 (23.74)	750 (29.61)	501 (19.72)	221 (8.70)	434 (17.09)	271 (10.67)	
	ASME B16.5 CL 900	641 (25.24)	850 (33.46)					
	ASME B16.5 CL 1500	749 (29.49)	1050 (41.34)					
400 (16“)	ASME B16.5 CL 600	686 (27.01)	800 (31.50)	501 (19.72)	258 (10.16)	434 (17.09)	291 (11.46)	
	ASME B16.5 CL 900	705 (27.76)	900 (35.43)					
	ASME B16.5 CL 1500	825 (32.48)	1100 (43.31)					

Tolerance L: DN 25 ... 100 +0 / -3 mm (+0 / -0.018 inch), DN 150 … 200 +0 / -3 mm (+0 / -0.118 inch), DN 250 … 400 +0 / -5 mm (+0 / -0.197 inch)

1) If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 ... 100 by 3 mm (0.118 inch; DN 125 by 5 mm (0.197 inch).
2) If protection plates are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 ... 100 by 6 mm (0.236 inch; DN 125 by 10 mm (0.394 inch).
3) Depending on the device design, the dimensions change according to the following table.

Device design		Dimension E, F	Dimension G
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High-temperature sensor design	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 inch)	+127 mm (+5 inch)

Dimensions for transmitter

Model FET321 and FET325 (dual-compartment housing) for Ex zone 2 / Div 2

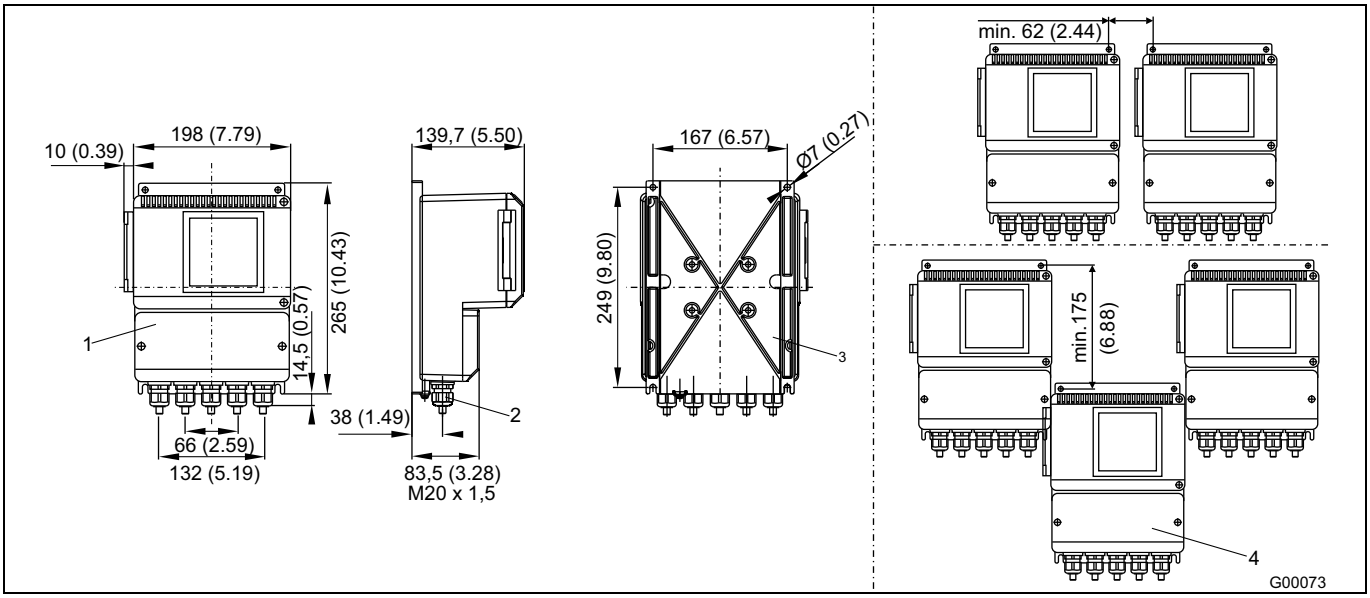


Fig. 44: Dimensions in mm (inch)

1 Field-mount housing with window
2 Cable gland M20 x 1.5
3 Installation holes for pipe mounting set, for 2" pipe installation
4 Protection class IP 67

Model FET325 (dual-compartment housing) for Ex zone 1 / Div 1

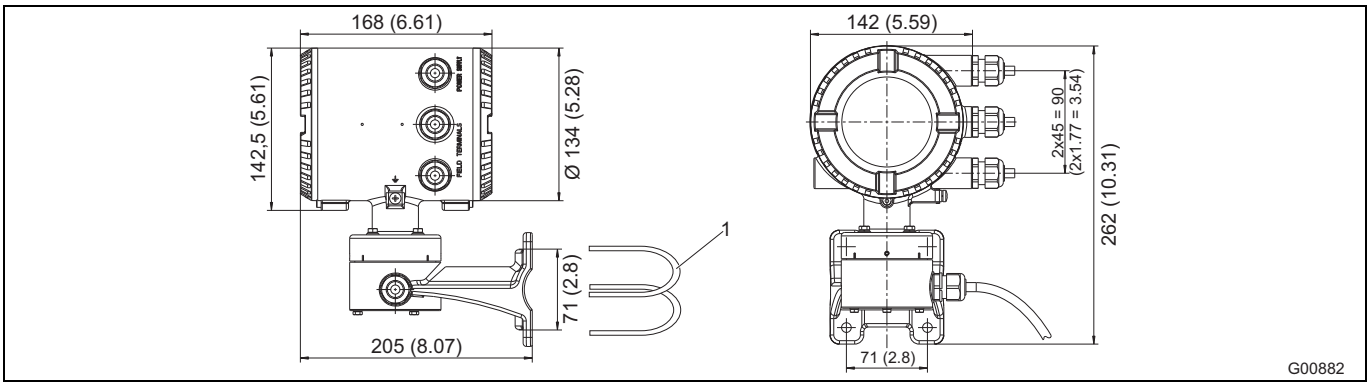


Fig. 45: Dimensions in mm (inch)

1 2“ Pipe mounting kit included (material: zinc plated carbon steel)

Model FET321 (single-compartment housing)

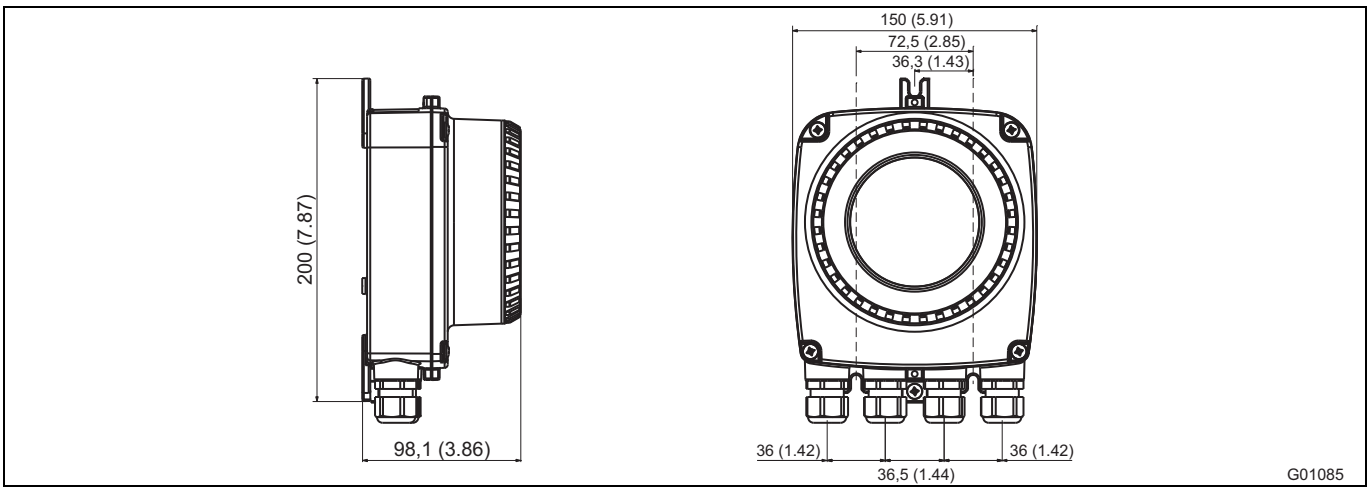


Fig. 46: Dimensions in mm (inch)

Ordering information

Electromagnetic flowmeter ProcessMaster - FEP311 and FEP315 , integral mount design

	Main order number																							Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP311**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
With explosion protection	**FEP315**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 3 (1/10 in.)		0	0	3																				
DN 4 (5/32 in.)		0	0	4																				
DN 6 (1/4 in.)		0	0	6																				
DN 8 (5/16 in.)		0	0	8																				
DN 10 (3/8 in.)		0	1	0																				
DN 15 (1/2 in.)		0	1	5																				
DN 20 (3/4 in.)		0	2	0																				
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
DN 450 (18 in.)		4	5	0																				
DN 500 (20 in.)		5	0	0																				
DN 550 (22 in.)	1)	5	5	0																				
DN 600 (24 in.)		6	0	0																				
DN 650 (26 in.)	1)	6	5	0																				
DN 700 (28 in.)		7	0	0																				
DN 760 (30 in.)		7	6	0																				
DN 800 (32 in.)		8	0	0																				
DN 900 (36 in.)		9	0	0																				
DN 1000 (40 in.)		0	0	1																				
DN 1050 (42 in.)		0	5	1																				
DN 1100 (44 in.)		1	0	1																				
DN 1200 (48 in.)		2	0	1																				
DN 1400 (54 in.)		4	0	1																				
DN 1500 (60 in.)		5	0	1																				
DN 1600 (66 in.)		6	0	1																				
DN 1800 (72 in.)		8	0	1																				
DN 2000 (80 in.)		0	0	2																				
Lining material																								
PTFE					A																			
ETFE					E																			
Thick PTFE					F																			
Hard rubber					H																			
Linatex				2)	J																			
PFA					P																			
Soft rubber					S																			
Electrode design																								
Standard						1																		
Standard + full filling electrode (TFE)					3)	2																		
Pointed head						5																		
Pointed head + full filling electrode (TFE)					3)	6																		

Continued on next page

1) Available with JIS-Flanges.
2) For US production only, model FEP315, FEP325 (Certificate: without PED, Process Connection: ASME Cl 150 / 300, Installation length: ASME CL 150, US-compliant length).
2) TFE electrode for detecting partially filled tubes, available from DN 50 (2 in.) with sensor design level "B". Not available for Zone 1 / Div 1.

Continued

		Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP311**	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
With explosion protection	**FEP315**	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
Signal electrode material																								
Stainless steel 1.4539 (904)							A																	
Hastelloy C-4 (2.4610)							D																	
Titanium							F																	
Tantalum							G																	
Hastelloy B-3 (2.4600)							H																	
Platinum-iridium							J																	
Stainless steel 1.4571 (316Ti)							S																	
Grounding accessories																								
Standard								1																
Grounding electrodes (for material, refer to "Signal electrode material")								2																
Grounding plate made of stainless steel, attached to one side of the flange							4)	3																
Protection plate made of stainless steel, attached to both sides of the flange							4)	4																
Process connection																								
Flange DIN PN 6								5)	D	0														
Flange DIN PN 10									D	1														
Flange DIN PN 16									**D**	**2**														
Flange DIN PN 25									D	3														
Flange DIN PN 40									D	4														
Flange DIN PN 64								6)	D	5														
Flange DIN PN 100								6)	D	6														
Flange, ASME CL 150								7)	A	1														
Flange, ASME CL 300								7)	A	3														
Flange, JIS 10K									J	1														
Flange, JIS 5K									J	2														
Flange, JIS 20K									J	3														
Flange, AS2129 table E								8)	E	4														
Flange, AS2129 table D								8)	E	5														
Process connection material																								
Steel											**B**													
Stainless steel flange										9)	D													
Certificates																								
Meter tube with PED approval												**0**												
Meter tube without PED approval (only China and US production sites. Specify installation length J1, J3 or JN)												1												
Acceptance test certificate (3.1) to EN 10204												2												
Pressure test to AD-2000												3												
Material certificate 3.1 to EN 10204 and pressure test to AD-2000												4												
Calibration																								
Standard accuracy											10)		**A**											
Increased accuracy											12)		B											
Standard accuracy + ScanMaster function											10)		K											
Increased accuracy + ScanMaster function											11)		L											
Witnessed factory calibration											12)		M											
5-point DKD calibration											13)		T											

Continued on next page

4) Can only be used for sensors ≤ DN 600 (24 in) and PTFE / thick PTFE / ETFE / PFA linings. Material: See data sheet.
5) Available from DN 1000 (40 in.)
6) DN 15 ... DN 200 (1/2 ... 8 in.) Hard rubber.
7) Flange DN 15 … 600 according to ASME B16.5. Flange > DN 600 according to ASME 16.47 Serie B.
8) Upon request
9) Material: See data sheet
10) Standard accuracy (0.4% of rate) assumes 2 calibration points. If more than 2 calibration points are required, you must specify 3 or 5 points under "Number of test points"
11) Increased accuracy (0.2% of rate) assumes 3 calibration points. If more than 3 calibration points are required, you must specify 5 points under "Number of test points". Available for DN10 (3/8 in.) ... 800 (32 in.)
12) 3rd party witnessed calibration
13) Available for nominal diameters DN 50 (2 in.) ... 600 (24 in.), DN 800 (32 in.)

Continued

	Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP311**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
With explosion protection	**FEP315**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												14)		**1**										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												14)		2										
High-temperature sensor design / -20 ... 60 °C (-4 ... 140 °F)												15)		3										
High-temperature sensor design / -40 ... 60 °C (-40 ... 140 °F)												15)		4										
Name plate																								
Sticker															**A**									
Stainless steel															B									
Stainless steel, and TAG label stainless steel															C									
Sticker, chinese language												19)			S									
Stainless steel, chinese language												19)			T									
Stainless steel, and TAG label stainless steel, chinese language												19)			U									
Signal cable length																								
No cable																0								
Explosion protection																								
None															16)		**A**							
ATEX / IEC Zone 1 / 21																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															17)		R							
NEPSI Zone1															18)		U							
NEPSI Zone2															18)		V							
Protection type for transmitter / sensor																								
Standard / IP67 (NEMA 4X)																18)		**1**						
Other																		9						
Cable gland																								
M20 x 1.5																			**A**					
1/2 in. NPT																			B					
PF 1/2 in.																		15)	C					
Power supply																								
100 ... 230 V AC, 50 Hz																				1				
24 V AC / DC, 50 Hz																				2				
100 ... 230 V AC, 60 Hz																				3				
24 V AC / DC, 60 Hz																				4				
Signal inputs and outputs																								
HART + 20 mA passive + pulses + contact input / output																			19)		B			
HART + 20 mA active + pulses + contact input / output																			20)		C			
HART + 20 mA active + pulses + contact output																			21)		D			
PROFIBUS PA + contact output																					E			
FOUNDATION Fieldbus + contact output																					F			
Default settings / Diagnostics																								
Parameters are at factory settings / Standard																						1		
Parameters are set according to customer specifications / Standard																						3		
Design Level																								
Sensordesign Level B																						26)	B	
Sensordesign Level C																						26)	C	

Continued on next page

14) Maximum fluid temperature for standard sensor design: 130 °C with PTFE, PFA, ETFE, thick PTFE,
90 °C (80 °C for China production site) with hard rubber,
60 °C with soft rubber,
70 °C with Linatex,
-40 °C only in conjunction with stainless steel flange.
15) Maximum fluid temperature for high-temperature sensor design: 180 °C with PFA, thick PTFE. 130 °C with ETFE, PTFE. Thick PTFE available for DN 25 ... DN 300, PFA available for DN 10 ... DN 200. -40 °C only in conjunction with stainless steel flange.
16) Only with model FEP311.
17) Div 1 available up to DN 300 (12 in.).
18) Production site: China.
19) Transmitter degree of protection = IP67 (NEMA 4X) with single-compartment and dual-compartment housing
20) Available with Ex design Zone 2 / Div 2 or Zone 1 / Div1.
21) Available with Ex design Zone 2 / Div 2.
22) Available with Ex design Zone 1 / Div 1.
23) Specified by ABB. Sesordesign Level C with model FEP311 only

Continued

	Main order number																							Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP311**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
With explosion protection	**FEP315**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
Accessories																								
None																								AY
Plug connector																								
M12 x 1 fieldbus																						24)		U2
Transmitter housing design																								
Single-compartment housing / Aluminium																						25)		H1
Dual-compartment housing / Aluminium																								H2
Lay Length																								
Flanges, ASME CL 150, ISO-compliant installation length																								JA
Flanges, ASME CL 300, ISO-compliant installation length																								JC
Flanges (Chinese installation length) (production site: China. Certificate: Without PED approval)																						26)		JN
Sensor housing material																								
Aluminium / Carbon steel																								SMA
Additional certificates																								
Russia, metrological and GOST R certificate																								CG1
Kazakhstan, metrological and GOST K certificate																								CG2
Ukraine, metrological certificate																								CG3
Belarus, metrological certificate																								CG6
Additional Ex certificates and approvals																								
Russia, GOST-Ex and RTN certificate																								EG7
Kazakhstan, Ex applications certificate																								EG3
Ukraine, GOST Ex and Ex application certificate																								EG5
Belarus, GGTN certificate																								EG9
Inmetro (Brazil)																						27)		EB1
Number of test points																								
3 points																								T3
5 points																								T5
Language of documentation																								
German																								M1
English																								M5
Chinese																								M6
Russian																								MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																								MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																								ME
Shipping Register Certificates																								
Marine class approval (DNV)																								CL5
SIL2 - Declaration of Conformity																								
SIL2 - Declaration of Conformity																								CS

24) Only for PROFIBUS PA Not for model FEP315
25) Not available with Ex design Zone 1
26) To be coded in case of FM approval only.
27) Inmetro only in conjunction with explosion protection ATEX / IECEx Zone 1 (code "L") or ATEX / IECEx Zone 2/21 (code "M") and transmitter housing design "dual-compartment housing " (code H2).

Electromagnetic flowmeter ProcessMaster - FEP321 and FEP325, remote mount design

		Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP321**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
With explosion protection	**FEP325**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 3 (1/10 in.)		0	0	3																				
DN 4 (5/32 in.)		0	0	4																				
DN 6 (1/4 in.)		0	0	6																				
DN 8 (5/16 in.)		0	0	8																				
DN 10 (3/8 in.)		0	1	0																				
DN 15 (1/2 in.)		0	1	5																				
DN 20 (3/4 in.)		0	2	0																				
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
DN 450 (18 in.)		4	5	0																				
DN 500 (20 in.)		5	0	0																				
DN 550 (22 in.)	1)	5	5	0																				
DN 600 (24 in.)		6	0	0																				
DN 650 (26 in.)	1)	6	5	0																				
DN 700 (28 in.)		7	0	0																				
DN 760 (30 in.)		7	6	0																				
DN 800 (32 in.)		8	0	0																				
DN 900 (36 in.)		9	0	0																				
DN 1000 (40 in.)		0	0	1																				
DN 1050 (42 in.)		0	5	1																				
DN 1100 (44 in.)		1	0	1																				
DN 1200 (48 in.)		2	0	1																				
DN 1400 (54 in.)		4	0	1																				
DN 1500 (60 in.)		5	0	1																				
DN 1600 (66 in.)		6	0	1																				
DN 1800 (72 in.)		8	0	1																				
DN 2000 (80 in.)		0	0	2																				
Lining material																								
PTFE					A																			
ETFE					E																			
Thick PTFE					F																			
Hard rubber					H																			
Linatex				2)	J																			
PFA					P																			
Soft rubber					S																			
Electrode design																								
Standard						1																		
Standard + full filling electrode (TFE)					3)	2																		
Pointed head						5																		
Pointed head + full filling electrode (TFE)					3)	6																		

Continued on next page

1) Available with JIS flanges.
2) Upon request: Available with model FEP321 DN 50 … 600 (2 … 24 in.)
3) TFE electrode for detecting partially filled tubes, available from DN 50 (2 in.) with sensor design level "B". Not available for Zone 1 / Div 1.

Continued

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP321**	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	XX
With explosion protection	**FEP325**	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	XX
Signal electrode material																								
Stainless steel 1.4539 (904)							A																	
Hastelloy C-4 (2.4610)							D																	
Titanium							F																	
Tantalum							G																	
Hastelloy B-3 (2.4600)							H																	
Platinum-iridium							J																	
Stainless steel 1.4571 (316Ti)							S																	
Tungsten carbide coated							T																	
Grounding accessories																								
Standard								1																
Grounding electrodes (for material, refer to "Signal electrode material")								2																
Grounding plate made of stainless steel, attached to one side of the flange							4)	3																
Protection plate made of stainless steel, attached to both sides of the flange							4)	4																
Process connection																								
Flange DIN PN 6								5)	D	0														
Flange DIN PN 10									D	1														
Flange DIN PN 16									D	2														
Flange DIN PN 25									D	3														
Flange DIN PN 40									D	4														
Flange DIN PN 64								6)	D	5														
Flange DIN PN 100								6)	D	6														
Flange, ASME CL 150								7)	A	1														
Flange, ASME CL 300								7)	A	3														
Flange, JIS 10K									J	1														
Flange, JIS 5K								8)	J	2														
Flange, JIS 20K								8)	J	3														
Flange, AS2129 table E								8)	E	4														
Flange, AS2129 table D								8)	E	5														
Process connection material																								
Steel											B													
Stainless steel flange										9)	D													
Certificates																								
Meter tube with PED approval												0												
Meter tube without PED approval (only China and US production sites. Specify installation length J1, J3 or JN)												1												
Acceptance test certificate (3.1) to EN 10204												2												
Pressure test												3												
Material certificate 3.1 to EN 10204 and pressure test												4												
Calibration																								
Standard accuracy											10)		A											
Increased accuracy											11)		B											
Standard accuracy + ScanMaster function											10)		K											
Increased accuracy + ScanMaster function											11)		L											
Witnessed factory calibration											12)		M											
5-point DKD calibration											13)		T											

Continued on next page

4) Can only be used for sensors ≤ DN 600 (24 in) and PTFE / thick PTFE / ETFE / PFA linings. Material: See data sheet. For Hard rubber, Soft rubber and Linatex please use loose grounding rings.
5) Available from DN 1000 (40 in.)
6) DN 15 ... DN 200 (1/2 ... 8 in.) Hard rubber
7) Flange DN 15 … 600 according to ASME B16.5. Flange > DN 600 according to ASME 16.47 Series B
8) Upon request
9) Material: See data sheet
10) Standard accuracy (0.4% of rate) assumes 2 calibration points. If more than 2 calibration points are required, you must specify 3 or 5 points under "Number of test points"
11) Increased accuracy (0.2% of rate) assumes 3 calibration points. If more than 3 calibration points are required, you must specify 5 points under "Number of test points". Available for DN10 (3/8 in.) ... 800 (32 in.)
12) 3rd party witnessed calibration
13) Available for nominal diameters DN 50 (2 in.) ... 600 (24 in.), DN 800 (32 in.)

Continued

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP321**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	XX
With explosion protection	**FEP325**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	XX
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												14)		1										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												14)		2										
High-temperature sensor design / -20 ... 60 °C (-4 ... 140 °F)												15)		3										
High-temperature sensor design / -40 ... 60 °C (-40 ... 140 °F)												15)		4										
Name plate																								
Sticker															A									
Stainless steel															B									
Stainless steel, and TAG label stainless steel															C									
Sticker, chinese language													19)		S									
Stainless steel, chinese language													19)		T									
Stainless steel, and TAG label stainless steel, chinese language													19)		U									
Signal cable length														16)										
No cable																0								
5 m (approx. 15 ft.) standard cable																1								
10 m (approx. 30 ft.) standard cable																2								
20 m (approx. 60 ft.) standard cable																3								
30 m (approx. 100 ft.) standard cable																4								
50 m (approx. 165 ft.) standard cable																5								
80 m (approx. 260 ft.) standard cable																6								
100 m (approx. 325 ft.) standard cable																7								
150 m (approx. 490 ft.) standard cable																8								
Explosion protection																								
None															17)		A							
ATEX / IEC Zone 1																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															18)		R							
NEPSI Zone1															19)		U							
NEPSI Zone2															19)		V							
Protection type for transmitter / sensor																								
Standard / IP 67 (NEMA 4X)															20)			1						
Standard / IP 68 (NEMA 6P)															20)	21)		2						
Standard / IP 68 (NEMA 6P), signal cable fitted and potted															20)	22)		3						
Cable gland																								
M20 x 1.5																			A					
1/2 in. NPT																			B					
PF 1/2 in.																			C					
Power supply																								
None																				0				
Signal inputs and outputs																								
None																			17)		Y			
Default settings / Diagnostics																								
Parameters are at factory settings / Standard diagnostic functions activated																						1		
Parameters are set according to customer specifications / Standard diagnostic functions activated																						3		

Continued on next page

14) Maximum fluid temperature for standard sensor design: 130 °C with PTFE, PFA, ETFE, thick PTFE,
90 °C (80 °C for China production site) with hard rubber,
60 °C with soft rubber,
70 °C with Linatex,
-40 °C only in conjunction with stainless steel flange.

15) Maximum fluid temperature for high-temperature sensor design: 180 °C with PFA, thick PTFE. 130 °C with ETFE, PTFE. Thick PTFE available for DN 25 ... DN 300, PFA available for DN 10 ... DN 200. -40 °C only in conjunction with stainless steel flange.

16) For flowmeter sensor model FEP325 designed for zone 1 / Div 1, signal cable length can be max. 50 m (164 ft) in combination with transmitter model FET321 or transmitter model FET 325 designed for zone 2 / Div 2. For sensor model FEP325 designed for zone 1 / Div 1, signal cable length can be max. 10 m (32.8 ft) in combination with transmitter model FET325 designed for zone 1 / Div 1.

17) Model FEP321 only.

18) Div 1 available up to DN 300 (12 in.).

19) Production site: China.

20) Transmitter degree of protection = IP67 (NEMA 4X) with single-compartment and dual-compartment housing.

21) Only with external transmitter, sealing compound (optional) D141B038U01.

22) Not available with FET325 transmitter in zone1 / Div1 design.

Continued

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP321**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**XX**
With explosion protection	**FEP325**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**XX**
Design Level																								
Sensordesign Level B																					23)		B	
Sensordesign Level C																					23)		C	

Accessories		
None		AY
With preamplifier, integrated into sensor housing	24)	AP
Lay length		
Flanges, ASME CL 150, ISO-compliant installation length		JA
Flanges, ASME CL 300, ISO-compliant installation length		JC
Flanges (Chinese installation length) (production site: China. Certificate: Without PED approval)	25)	JN
Connection box material		
Aluminum		UTA
Sensor housing material		
Aluminium / Carbon steel		SMA
Power frequency		
50 Hz (When ordering the sensor without a transmitter, specify the mains frequency.)		F5
60 Hz (When ordering the sensor without a transmitter, specify the mains frequency.)		F6
Additional certificates		
Russia, metrological and GOST R certificate		CG1
Kazakhstan, metrological and GOST K certificate		CG2
Ukraine, metrological certificate		CG3
Belarus, metrological certificate		CG6
Additional Ex certificates and approvals		
Russia, GOST-Ex and RTN certificate		EG7
Kazakhstan, Ex applications certificate		EG3
Ukraine, GOST Ex and Ex application certificate		EG5
Belarus, GGTN certificate		EG9
Inmetro (Brazil)	26)	EB1
Number of test points		
3 points		T3
5 points		T5
Language of documentation		
German		M1
English		M5
Chinese		M6
Russian		MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)		MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)		ME
Shipping Register Certificates		
Marine class approval (DNV)		CL5
SIL2 - Declaration of Conformity		
SIL2 - Declaration of Conformity		CS

23) Specified by ABB. Sesordesign Level C with model FEP321 only.
24) Preamplifier required if signal cable length is > 50 m (>160 ft). Preamplifier not available for zone1 / Div1.
25) To be coded in case of FM approval only.
26) Inmetro only in conjunction with explosion protection ATEX / IECEx Zone 1 (code "L") or ATEX / IECEx Zone 2/21 (code "M).

Electromagnetic flowmeter ProcessMaster - FEP311 and FEP315, integral mount design, high pressure version

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP311**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
With explosion protection	**FEP315**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
Lining material																								
ETFE					E																			
Hard rubber					H																			
Electrode design																								
Standard						1																		
Pointed head						5																		
Signal electrode material																								
Hastelloy C-4 (2.4610)							D																	
Stainless steel 1.4571 (316Ti)							S																	
Grounding accessories																								
Standard								1																
Process connection																								
Flange ASME CL 600									A	6														
Flange ASME CL 900									A	7														
Flange ASME CL 1500									A	8														
Flange ASME CL 2500							1)		A	9														
Flange ASME CL 600 RTJ									H	6														
Flange ASME CL 900 RTJ									H	7														
Flange ASME CL 1500 RTJ									H	8														
Flange ASME CL 2500 RTJ							1)		H	9														
Process connection material																								
Steel											B													
Stainless steel flange									2)		D													
Certificates																								
Meter tube with PED approval												0												
Calibration																								
Standard accuracy											3)		A											
Increased accuracy											4)		B											
Standard accuracy + ScanMaster function											3)		K											
Increased accuracy + ScanMaster function											4)		L											
Witnessed factory calibration											5)		M											

Continued on next page

1) Available up to DN 300 (12 in.)
2) Material: See data sheet
3) Standard accuracy (0.4% of rate) assumes 2 calibration points. If more than 2 calibration points are required, you must specify 3 or 5 points under "Number of test points"
4) Increased accuracy (0.2% of rate) assumes 3 calibration points. If more than 3 calibration points are required, you must specify 5 points under "Number of test points". Available for DN10 (3/8 in.) ... 800 (32 in.)
5) 3rd party witnessed calibration

Continued

	Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP311**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**XX**
With explosion protection	**FEP315**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**XX**
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												6)		**1**										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												6)		2										
Name plate																								
Sticker															**A**									
Stainless steel															B									
Stainless steel, and TAG label stainless steel															C									
Signal cable length																								
No cable																0								
Explosion protection															7)									
None															8)		**A**							
ATEX / IEC Zone 1 / 21																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															9)		R							
Protection type for transmitter / sensor																								
Standard / IP67 (NEMA 4X)																10)		**1**						
Other																		9						
Cable gland																								
M20 x 1.5																			**A**					
1/2 in. NPT																			B					
PF 1/2 in.																		8)	C					
Power supply																								
100 ... 230 V AC, 50 Hz																				1				
24 V AC / DC, 50 Hz																				2				
100 ... 230 V AC, 60 Hz																				3				
24 V AC / DC, 60 Hz																				4				
Signal inputs and outputs																								
HART + 20 mA passive + pulses + contact input / output																			11)		B			
HART + 20 mA active + pulses + contact input / output																			12)		C			
HART + 20 mA active + pulses + contact output																			13)		D			
PROFIBUS PA + contact output																					E			
FOUNDATION Fieldbus + contact output																					F			
Default settings / Diagnostics																								
Parameters are at factory settings / Standard																						1		
Parameters are set according to customer specifications / Standard																						3		
Design-Level																								
Sensordesign Level B																					14)		B	

Continued on next page

6) Maximum fluid temperature for standard sensor design:
130 °C with ETFE, 90 °C (194 °F) with hard rubber
-40 °C only in conjunction with stainless steel flange.
7) Explosion protection only possible in conjunction with dual-compartment transmitter housing.
8) Only with model FEP311.
9) Div 1 available up to DN 300 (12 in.).
10) Transmitter degree of protection = IP67 (NEMA 4X) with single-compartment and dual-compartment housing
11) Not Available with design Zone 2 / Div 2 or Zone 1 / Div1.
12) Choice with design Zone 2 / Div 2.
13) Choice with design Zone 1 / Div 1.
14) Specified by ABB.

Continued

	Main order number																							Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP311**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
With explosion protection	**FEP315**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
Accessories																								
None																								AY
Steckverbinder																								
Feldbus M12 x 1																						15)		U2
Transmitter housing design																								
Single-compartment housing / Aluminium																						16)		H1
Dual-compartment housing / Aluminium																								H2
Dual-compartment housing / Stainless steel																						17)		H4
Sensor housing material																								
Aluminium / Carbon steel																						18)		SMA
Stainless steel																						19)		SMS
Number of test points																								
3 points																								T3
5 points																								T5
Material Sourcing																								
Material sourcing limitations apply																								MS1
Language of documentation																								
German																								M1
English																								M5
Chinese																								M6
Russian																								MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																								MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																								ME
Material Certifications																								
Test report 2.2 acc. EN 10204 confirmation of material																								C1
Material monitoring with inspection certificate 3.1 acc. EN 10204																								C2
Material monitoring with inspection certificate 3.2 acc. EN 10204																								C3
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 (inclusive heat analysis)																								CA
Certificate of accuracy 2.1 acc. EN 10204																								CM
Material monitoring NACE MR 0175 / MR 0103 if applicable, with inspection certificate 3.1 acc. EN 10204																								CN
Others																								CZ
Tests and Reports																								
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (X-Ray) acc. to ASME																								NA
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (Dye Pen Test) acc. to ASME																								NB
Pressure test acc. AD2000 acc. to ASME																								N6
Welder qualification & welding procedure certificate acc. to ASME																								NF

15) Only for PROFIBUS PA Not for model FEP315.
16) Not available with Ex design Zone 1
17) In conjunction with sensor housing material Stainless steel.
18) In conjunction with Transmitter housing design (Aluminium) only.
19) In conjunction with Transmitter housing design (Stainless steel) only.

Electromagnetic flowmeter ProcessMaster - FEP321 and FEP325, remote mount design, high pressure version

		Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	27	
Without explosion protection	**FEP321**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
With explosion protection	**FEP325**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
Lining material																								
ETFE					E																			
Hard rubber					H																			
Electrode design																								
Standard						1																		
Pointed head						5																		
Signal electrode material																								
Hastelloy C-4 (2.4610)							D																	
Stainless steel 316Ti (1.4571)							S																	
Grounding accessories																								
Standard								1																
Process connection																								
Flanges ANSI Class 600 RF									A	6														
Flanges ANSI Class 900 RF									A	7														
Flanges ANSI Class 1500 RF									A	8														
Flanges ANSI Class 2500 RF							1)		A	9														
Flange ANSI Class 600 RTJ									H	6														
Flange ANSI Class 900 RTJ									H	7														
Flange ANSI Class 1500 RTJ									H	8														
Flange ANSI Class 2500 RTJ							1)		H	9														
Process connection material																								
Steel											B													
Stainless steel flange									2)		D													
Usage Certifications																								
Meter tube with PED approval												0												
Calibration Type																								
Standard accuracy											3)		A											
Increased accuracy											4)		B											
Standard accuracy + ScanMaster function											3)		K											
Increased accuracy + ScanMaster function											4)		L											
Witnessed factory calibration											5)		M											

Continued on next page

1) Available up to DN 300 (12 in.)
2) Material: See data sheet
3) Standard accuracy (0.4% of rate) assumes 2 calibration points. If more than 2 calibration points are required, you must specify 3 or 5 points under "Number of test points"
4) Increased accuracy (0.2% of rate) assumes 3 calibration points. If more than 3 calibration points are required, you must specify 5 points under "Number of test points". Available for DN10 (3/8 in.) ... 800 (32 in.)
5) 3rd party witnessed calibration

Continued

	Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP321**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**XX**
With explosion protection	**FEP325**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**XX**
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												6)		1										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												6)		2										
Name plate																								
Adhesive label															A									
Stainless steel															B									
Stainless steel and TAG plate (stainless steel)															C									
Signal Cable Length and Type													7)											
No cable																0								
5 m (15 ft) standard cable																1								
10 m (30 ft) standard cable																2								
20 m (60 ft) standard cable																3								
30 m (100 ft) standard cable																4								
50 m (165 ft) standard cable																5								
80 m (260 ft) standard cable																6								
100 m (325 ft) standard cable																7								
150 m (490 ft) standard cable																8								
Other																9								
Explosion Protection Certification																								
None															8)		A							
ATEX / IEC Zone 1																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															9)		R							
Protection Class Transmitter / Protection Class Sensor																								
IP 67 (NEMA 4X) / IP 67 (NEMA 4X)																10)		1						
IP 67 (NEMA 4X) / IP 68 (NEMA 6P), cable not fitted and potted																11)		2						
IP 67 (NEMA 4X) / IP 68 (NEMA 6P), cable fitted and potted																12)		3						
Cable Conduits																								
M20 x 1.5																			A					
1/2 in. NPT																			B					
PF 1/2 in.																	13)		C					
Power supply																								
Without																				0				
Input and Output Signal Type																								
Without																					Y			
Configuration Type / Diagnostics Type																								
Parameters set to factory defaults / Standard diagnostic functions activated																						1		
Parameters set customer-specific / Standard diagnostic functions activated																						3		
Design Level																								
Design Level B																					14)		B	

Continued on next page

6) Maximum fluid temperature for standard sensor design:
130 °C with ETFE, 90 °C (194 °F) with hard rubber
-40 °C only in conjunction with stainless steel flange.

7) For flowmeter sensor model FEP325 designed for zone 1 / Div 1, signal cable length can be max. 50 m (164 ft) in combination with transmitter model FET321 or transmitter model FET 325 designed for zone 2 / Div 2.
For sensor model FEP325 designed for zone 1 / Div 1, signal cable length can be max. 10 m (32.8 ft) in combination with transmitter model FET325 designed for zone 1 / Div 1.

8) Model FEP321 only.

9) Div 1 available up to DN 300 (12 in.).

10) Transmitter degree of protection = IP67.

11) Only available with remote transmitter, sealing compound (optional) D141B038U01.

12) Not available with FET325 transmitter in zone1 / Div1 design.

13) Not available with Zone 2 / Div 2 or Zone 1 / Div1.

14) Specified by ABB.

Continued

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP321**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
With explosion protection	**FEP325**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
Accessories																								
None																								AY
With pre-amplifier installed in sensor terminal box																						15)		AP
Connectionbox Material																								
Aluminum																								UTA
Sensor housing material																								
Aluminum < DN 450 / Carbon Steel > DN 400																								SMA
Power Frequency																								
50 Hz (If the Sensor is ordered without a Transmitter, the line frequency has to be specified here)																								F5
60 Hz (If the Sensor is ordered without a Transmitter, the line frequency has to be specified here)																								F6
Number of test points																								
3 points																								T3
5 points																								T5
Material Sourcing																								
Material sourcing limitations apply																								MS1
Language of documentation																								
German																								M1
English																								M5
Chinese																								M6
Russian																								MB
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																								MW
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																								ME
Material Certifications																								
Test report 2.2 acc. EN 10204 confirmation of material																								C1
Material monitoring with inspection certificate 3.1 acc. EN 10204																								C2
Material monitoring with inspection certificate 3.2 acc. EN 10204																								C3
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 (inclusive heat analysis)																								CA
Certificate of accuracy 2.1 acc. EN 10204																								CM
Material monitoring NACE MR 0175 / MR 0103 if applicable, with inspection certificate 3.1 acc. EN 10204																								CN
Others																								CZ
Tests and Reports																								
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (X-Ray) acc. to ASME																								NA
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (Dye Pen Test) acc. to ASME																								NB
Pressure test acc. AD2000 acc. to ASME																								N6
Welder qualification & welding procedure certificate acc. to ASME																								NF

15) Preamplifier required if signal cable length is > 50 m (>160 ft). Preamplifier not available for zone1 / Div1.

Remote transmitter - FET321, FET325

		Main order number									Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	XX
Without explosion protection	**FET321**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
With explosion protection	**FET325**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
Sensor temperature range / Ambient temperature range											
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)		1									
Standard sensor design / -40 ... 60 °C (-4 ... 140 °F)		2									
High-temperature sensor design / -20 ... 60 °C (-4 ... 140 °F)		3									
High-temperature sensor design / -40 ... 60 °C (-4 ... 140 °F)		4									
Name plate											
Sticker			A								
Stainless steel			B								
Stainless steel, and TAG label stainless steel			C								
Sticker, chinese language		3)	S								
Stainless steel, chinese language		3)	T								
Stainless steel, and TAG label stainless steel, chinese language		3)	U								
Signal cable length											
No cable			1)	0							
Explosion protection 2)											
None			2)	10)	A						
ATEX / IEC Zone 1				2)	L						
ATEX / IEC Zone 2 / 21				2)	M						
usFMc Div 2 Zone 2				2)	P						
usFMc Div 1			2)	10)	R						
NEPSI Zone1		2)	3)	10)	U						
NEPSI Zone2			2)	3)	V						
Protection type for transmitter / sensor											
Standard / IP 67 (NEMA 4X)						1					
Cable gland											
M20 x 1.5							A				
1/2 in. NPT							B				
PF 1/2 in.						9)	C				
None							Y				
Power supply											
100 ... 230 V AC, 50 Hz								1			
24 V AC / DC, 50 Hz								2			
100 ... 230 V AC, 60 Hz								3			
24 V AC / DC, 60 Hz								4			
Signal inputs / outputs											
HART + 20 mA passive + pulses + contact input / output								5)	B		
HART + 20 mA active + pulses + contact input / output								6)	C		
HART + 20 mA active + pulses + contact output								7)	D		
PROFIBUS PA + contact output									E		
FOUNDATION Fieldbus + contact output									F		
Default settings / Diagnostics											
Without / standard diagnostic functions									8)	0	
Parameters are at factory settings / Standard diagnostic functions activated										1	
Parameters are set according to customer specifications / Standard diagnostic functions activated										3	

Continued on next page

1) For model FET325 designed for Ex Zone 1 / Div 1, 10 m (32.81 ft) of cable is connected to the transmitter.
2) Model FET325 only.
3) Production site: China.
4) Protection type for transmitter = IP 67 (NEMA 4X) with single-compartment housing and dual-compartment housing, IP 20 with panel mount housing.
5) Choice with design Zone 2 / Div 2 or Zone 1 / Div 1 or without explosion protection.
6) Choice with design Zone 2 / Div 2 or without explosion protection.
7) Choice with design Zone 1 / Div 1.
8) Must be selected if transmitter is being ordered as a spare part or without a sensor.
9 Only for model FET321.
10) Only available with Dual-compartment housing.

Continued

	Main order number										Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	XX
Without explosion protection	**FET321**	X	X	X	X	X	X	X	X	X	**XX**
With explosion protection	**FET325**	X	X	X	X	X	X	X	X	X	**XX**
Plug connector											
M12 x 1 fieldbus										11)	U2
Transmitter housing design											
Single-compartment housing / Aluminium										12)	H1
Dual-compartment housing / Aluminium											H2
Additional options											
With Gore-Tex membrane										12)	KG
Other certificates											
PMO approval (only for USA)											CR
Additional certificates											
Russia, metrological and GOST R certificate											CG1
Kazakhstan, metrological and GOST K certificate											CG2
Ukraine, metrological certificate											CG3
Belarus, metrological certificate											CG6
Additional Ex certificates and approvals											
Russia, GOST-Ex and RTN certificate											EG7
Kazakhstan, Ex applications certificate											EG3
Ukraine, GOST Ex and Ex application certificate											EG5
Belarus, GGTN certificate											EG9
Inmetro (Brazil)										13)	EB1
Language of documentation											
German											M1
English											M5
Chinese											M6
Russian											MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)											MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)											ME
Shipping Register Certificates											
Marine class approval (DNV)											CL5
SIL2 - Declaration of Conformity											
SIL2 - Declaration of Conformity											CS

11) Only for Profibus PA, not for model FET325.
12) Available with Model FET521 and FET525 Zone 2 / Div 2.
13) Inmetro only in conjunction with explosion protection ATEX / IECEx Zone 1 (code "L") or ATEX / IECEx Zone 2/21 (code "M") and transmitter housing design "dual-compartment housing " (code H2).

Transmitter plug-in module - FET301

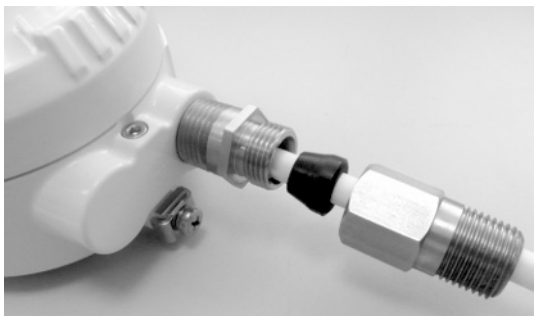
	Main order number									Additional order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	X
	FET301	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Temperature Range of Installation / Ambient Temperature Range											
Standard design / -20 ... 60 °C (-4 ... 140 °F)		1									
Name Plate											
Adhesive label			A								
Signal Cable Length and Type											
Without signal cable				0							
Explosion Protection Certification											
Without					A						
Protection Class Transmitter / Protection Class Sensor											
Others						9					
Cable Conduits											
Others							Z				
Power Supply											
100 ... 230 V AC, 50 Hz								1			
24 V AC / DC, 50 Hz								2			
100 ... 230 V AC, 60 Hz								3			
24 V AC / DC, 60 Hz								4			
Input and Output Signal Type											
HART + 20 mA passive + Pulse + Contact I/O									B		
HART + 20 mA active + Pulse + Contact I/O									C		
PROFIBUS PA + contact output									E		
FOUNDA FOUNDATION Fieldbus + contact output									F		
Configuration Type / Diagnostics Type											
Without / Standard diagnostic functions								1)		0	
Language of Documentation											
German											M1
English											M5
Chinese											M6
Russian											MB
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)											MW
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)											ME
SIL2 - Declaration of Conformity											
SIL2 - Declaration of Conformity											CS

1) To be specified if Transmitter is ordered without Sensor or as a spare part.

Flowmeter sensor simulator - FXC4000

	Main order number						
Version number	1 – 5	6	7	8	9	10
	55XC4	**X**	**X**	**X**	**X**	**X**
Flow Signal Setting						
Without (adapter only)		0				
3-position digitswitch with 1000 steps		1				
Power Supply						
Without (adapter only)			0			
110 ... 240 V AC 50 / 60 Hz // With Schuko plug			1			
24 ... 48 V AC / DC // With 4 mm plug			2			
110 ... 240 V AC 50 / 60 Hz // With US plug			3			
Accessories						
Without				0		
Adapter for converter type FXE4000-E4, FXM2000-XM2, FXF2000-DF23				1		
Adapter board for converter type FSM4000-S4				5		
Adapter plate for converter FET321, FET325, FET521, FET525				6		
Design level (specified by ABB)					*	
Name Plate						
German						1
English						2
French						3

Accessories

Description	Order number
Diagnostic and verification software - ScanMaster FZC500 ScanMaster allows you to easily check the installed device for proper functioning. The determined test and verification results are stored in a database and can be printed if required. ScanMaster is based on DTM technology and can be run on Asset Vision Basic or other frame applications (as of FDT 1.2). There are two ways to communicate with the device. - Via a HART modem (e.g. NHA121Nx (explosion-proof design) or NHA121No (standard design)) - Via FZA100 infrared service port adapter FZA100	FZC500
Infrared service port adapter FZA100  G00788	FZA100
Installation set for 2" pipe installation in dual-compartment field-mount housing  G00789	612B091U07
Installation set for NPT 1/2" cable gland For sealing the cable conduit during outdoor installation.  G01312	3KXF081300L0001
Signal cable for nominal diameter ≥ DN 15 (1/2 inch) out of potentially explosive areas and in zone 2 / Div. 2	D173D031U01
Signal cable for all applications (including zone 1, 2 / Div. 1, 2)	D173D027U01

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