

ProcessMaster FEP300 Electromagnetic Flowmeter

The process industry's first
choice



Intuitive operation

- Softkey-based functionality
- “Easy Set-up” function

Non-contact buttons

- Parameterization of the device without the need to open the housing

Diagnostics for real-life situations

- Status messages in accordance with NAMUR
- Help texts in the display

Maximum measuring accuracy

- Maximum measuring error: 0.2 % of rate

Universal transmitter

- Reduces spare parts inventory costs and storage costs

Flowmeter sensor featuring state-of-the-art memory technology

- Prevents errors and enables quick and reliable commissioning

Approvals for explosion protection

- In accordance with ATEX, IECEx
- In accordance with FM, cFM, NEPSI, GOST

HART, PROFIBUS PA, FOUNDATION Fieldbus

- Access to all status information

ABB

ABB is an established world force in the design and manufacture of instrumentation for industrial process control.

Worldwide presence, comprehensive service and application-oriented know-how make ABB a leading supplier of flow measurement products.

Introduction**The industrial standard**

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 self-monitoring and diagnostic functions increase the plant availability and reduce downtimes.

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.

Superior and reliable new flowmeter sensor design

Self-cleaning, double-sealed polished measuring electrodes enhance the device's reliability and 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 max. measuring error of 0.2 % of rate.

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 mode, 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.

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.

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 with basic functionality and ProcessMaster 500 with extended functions 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.

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1 ProcessMaster 300 - Overview of technology

Model overview (compact design)		
FEP311 (without explosion protection)	FEP315 (Explosion protection Zone 2 / Div.2)	FEP315 (Explosion protection Zone 1 / Div.1)
 G00487	 G00487	 G00886
	ATEX / IEC Gases Zone 2 Dust Zone 21, 22	ATEX / IEC Gases Zone 1 Dust Zone 21, 22
	FM / cFM CL I Div 2 (NI, DIP)	FM / cFM CL I Div 1, 2 (XP, NI, DIP)
	NEPSI Zone 2	NEPSI Zone 1
	GOST Zone 2	GOST Zone 1
For further information about the instruments' explosion protection approval please refer to the Ex test certificates (available on the product CD or under www.abb.com/flow).		

Model number	FEP311, FEP315
Measured value error	Standard: 0.4 % of measured value Option: 0.2 % of rate
Nominal size range	DN 3 ... 2000 (1/10 " ... 80 ")
Process connection	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
Lining	Hard rubber (DN 15 ... 2000), soft rubber (DN 50 ... 2000), PTFE (DN 10 ... 600), PFA (DN 3 ... 200), ETFE (DN 25 ... 1000), Elastomer (DN 50 ... 600)
Conductivity	> 5 µS/cm (20 µS/cm for demineralized water)
Electrodes	Stainless steel, Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium
Process connection material	Steel, stainless steel
Ingress protection	IP 65, IP 67
Medium temperature	-25 ... 180 °C (-13 ... 356 °F)
Approvals	
Explosion protection approvals	<ul style="list-style-type: none"> • ATEX/IECEx Zone 1, 2, 21, 22 • FM / cFM Cl 1Div 1, 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
Transmitter	
Supply power	AC 100 ... 230 V (-15 / +10%), AC 24 V (-30 / +10%), DC 24 V (-30 / +30%)
Current output	4 ... 20 mA, active or passive
Impulse output	Can be configured locally as active or passive using software
Switch output	Optocoupler, programmable function
Contact input	Optocoupler, programmable function
Display	Graphical display, configurable
Housing	Integral mount design
Communication	HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus (option)

For food and beverage and pharmaceutical applications, refer to the HygienicMaster 300 data sheet

Model overview (remote mount design)					
Flowmeter sensor					
FEP321 (without explosion protection)	FEP325 (explosion protection Zone 2 / Div.) 2)		FEP325 (explosion protection Zone 1 / Div.) 1)		
					
G00489	G00489		G00862		
	ATEX / IEC Gases Zone 2 Dust Zone 21, 22		ATEX / IEC Gases Zone 1 Dust Zone 21, 22		
	FM / cFM CL I Div 2 (NI, DIP)		FM / cFM CL I Div 1, 2 (XP, NI, DIP)		
	NEPSI Zone 2		NEPSI Zone 1		
	GOST Zone 2		GOST Zone 1		
For further information about the instruments' explosion protection approval please refer to the Ex test certificates (available on the product CD or under www.abb.com/flow).					
Transmitter					
FET321 (without explosion protection)	FET325 (explosion protection Zone 2, Div.) 2)	FET321 (without explosion protection)	FET325 (explosion protection Zone 1, Div. 1)	FET325 (explosion protection Zone 2, Div. 2)	FET321 (without explosion protection)
					
G00490	G00490		G00863	G00490	
	ATEX / IEC Gases Zone 2 Dust Zone 21, 22		ATEX / IEC Gases Zone 1 Dust Zone 21, 22	ATEX / IEC Gases Zone 2 Dust Zone 21, 22	
	FM / cFM CL I Div 2 (NI, DIP)		FM / cFM CL I Div 1, 2 (XP, NI, DIP)	FM / cFM CL I Div 2 (NI, DIP)	
	NEPSI Zone 2		NEPSI Zone 1		
	GOST Zone 2		GOST Zone 1		
For further information about the instruments' explosion protection approval please refer to the Ex test certificates (available on the product CD or under www.abb.com/flow).					
Flowmeter sensor		FEP321, FEP325			
Measured value error		Standard: 0.4 % of measured value Option: 0.2 % of rate).			
Nominal size range		DN 3 ... 2000 (1/10 " ... 80 ")			
Process connection		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			
Lining		Hard rubber (DN 15 ... 2000), soft rubber (DN 50 ... 2000), PTFE (DN 10 ... 600), PFA (DN 3 ... 200), ETFE (DN 25 ... 1000), Elastomer (DN 50 ... 600)			
Conductivity		> 5 µS/cm (20 µS/cm for demineralized water)			
Electrodes		Stainless steel, Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium			
Process connection material		Steel, stainless steel			
Ingress protection		IP 65, IP 67, IP 68, (NEMA 4X)			
Medium temperature		-25 ... 180 °C (-13 ... 356 °F)			
Approvals					
Explosion protection approvals		<ul style="list-style-type: none"> • ATEX/IECEx Zone 1, 2, 21, 22 • FM / cFM Cl 1 Div 1, 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			
Transmitter		FET321, FET325			
Supply power		AC 100 ... 230 V (-15 / +10%), AC 24 V (-30 / +10%), DC 24 V (-30 / +30%)			
Current output		4 ... 20 mA, active or passive			
Impulse output		Can be configured locally as active or passive using software			
Switch output		Optocoupler, programmable function			
Contact input		Optocoupler, programmable function			
Display		Graphical display, configurable			
Housing		Remote mount design			
Communication		HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus (option)			

For food and beverage and pharmaceutical applications, refer to the HygienicMaster 300 data sheet

2 Performance specifications

2.1 General

2.1.1 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 $U_n \pm 1 \%$, frequency $f \pm 1 \%$
Installation conditions	- Upstream >10 x DN, straight section - Downstream >5 x DN, straight section
Warm-up phase	30 min.

2.1.2 Maximum measuring error

Impulse output

- Standard calibration:
 $\pm 0.4 \%$ of measured value, $\pm 0.02 \%$ Q_{maxDN}
(DN 3 ... 2000)
- Optional calibration:
 $\pm 0.2 \%$ of measured value, $\pm 0.02 \%$ Q_{maxDN}
(DN 10 ... 600, 800)

Q_{maxDN} : See table in Section 2.4, "Flowmeter sizes, flow range".

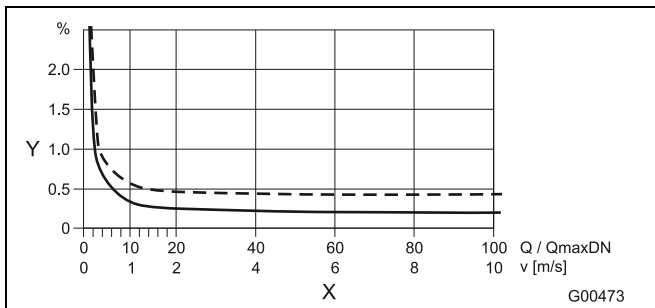


Fig. 1

- Y Accuracy \pm of measured value in [%]
- X Flow velocity v in [m/s], Q / Q_{maxDN} [%]

Analog output effects

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

2.2 Reproducibility, response time

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

2.3 Transmitter

2.3.1 Electrical properties

Supply power	AC 100 ... 230 V (-15 % / +10 %) AC 24 V (-30 % / +10 %) DC 24 V (-30 % / +30 %), ripple: < 5 %
Line frequency	47 ... 64 Hz
Excitation frequency	6 1/4 Hz, 7 1/2 Hz, 12 1/2 Hz, 15 Hz, 25 Hz, 30 Hz (50 / 60 Hz power supply)
Power consumption (flowmeter sensor including transmitter)	AC $S \leq 20$ VA DC $P \leq 12$ W (switch-on current 5.6 A)
Electrical connection	Screw terminals

2.3.1.1 Isolation of input/outputs

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

2.3.1.2 Empty pipe detection

The "empty pipe detection" function requires:

A conductivity of the measured fluid $\geq 20 \mu\text{S/cm}$, a signal cable length ≤ 50 m (164 ft), a nominal diameter $DN \geq DN 10$, and the flowmeter sensor must not be provided with a preamplifier.

2.3.2 Mechanical properties

Integral mount design (transmitter mounted directly on the flowmeter sensor)	
Housing	Cast aluminum, painted
Paint	Paint coat $\geq 80 \mu\text{m}$ thick, RAL 9002 (light gray)
cable gland used	Polyamide, stainless steel (version for ambient temperature $-40 \text{ }^\circ\text{C}$ (40 °F))
Remote mount design	
Housing	Cast aluminum, painted
Paint	Paint coat $\geq 80 \mu\text{m}$ thick, mid-section RAL 7012 (dark gray), front cover/rear cover RAL 9002 (light gray)
cable gland used	Polyamide, stainless steel (version for ambient temperature $-40 \text{ }^\circ\text{C}$ (40 °F))
Weight	4.5 kg (9.92 lb)

2.3.2.1 Storage temperature, ambient temperature

Ambient temperature

$-20 \dots 60 \text{ }^\circ\text{C}$ ($-4 \dots 140 \text{ }^\circ\text{F}$) standard

$-40 \dots 60 \text{ }^\circ\text{C}$ ($-40 \dots 140 \text{ }^\circ\text{F}$) Advanced mode

Storage temperature

$-40 \dots 70 \text{ }^\circ\text{C}$ ($-40 \dots 158 \text{ }^\circ\text{F}$)

2.3.2.2 Protection class for transmitter housing

IP 65, IP 67, NEMA 4X

2.3.2.3 Vibration according to EN 60068-2

Transmitter

- In the range 10 ... 58 Hz with max. 0.15 mm (0.006 inch) deflection*
- In the range 58 ... 150 Hz max. 2 g acceleration*

* = Peak load

2.4 Flowmeter sizes, flow range

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

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

3 Functional specifications

3.1 Flowmeter sensor

3.1.1 Protection type according to EN 60529

IP 65, P 67, NEMA 4X

IP 68 (for external flowmeter sensors only)

3.1.2 Pipeline vibration according to EN 60068-2-6

The following applies to compact devices:
(transmitter mounted directly on the flowmeter sensor)

- In the 10 ... 58 Hz range with max. 0.15 mm (0.006 inch) deflection
- In the 58 ... 150 Hz range with max. 2 g acceleration

The following applies to devices with a separate transmitter:
Transmitter

- In the 10 ... 58 Hz range with max. 0.15 mm (0.006 inch) deflection
- In the 58 ... 150 Hz range with max. 2 g acceleration

Flowmeter sensor

- In the 10 ... 58 Hz range with max. 0.15 mm (0.006 inch) deflection
- In the 58 ... 150 Hz range with max. 2 g acceleration

3.1.3 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).

3.1.4 Signal cable (for external transmitters only)

A 5 m (16.4 ft) cable is supplied.

If you require more than 5 m (16.4 ft), a cable can be purchased using order number D173D027U01.

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

Alternatively, the cable with order number AD173D031U01 can be used for transmitters without explosion protection (model FEP321, FEH321) from DN15 and for transmitters for use in Zone 2 (model FEP325, FEH325) from DN15.

Preamplifier

Max. signal cable length between flowmeter sensor and transmitter:

a) Without preamplifier:

- Max. 50 m (164 ft) for conductivity $\geq 5 \mu\text{S/cm}$

A preamplifier is required for cables $> 50 \text{ m}$ (164 ft).

b) With preamplifier

- Max. 200 m (656 ft) for conductivity $\geq 5 \mu\text{S/cm}$

3.1.5 Temperature range

Storage temperature

-40 ... 70 °C (-40 ... 158 °F)

Min. permissible pressure as a function of fluid temperature

Lining	Nominal diameter	P _{Operating} at mbar abs.	T _{Operating} 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)
Elastomer ³⁾	50 ... 600 (2 ... 24")	100	< 130 °C (266 °F)
ETFE	25 ... 1000 (1 ... 40")	100	< 130 °C (266 °F)

1) For CIP/SIP cleaning, higher temperatures are permitted for limited time periods; refer to the table titled "Maximum permissible cleaning temperature".

2) Only China production site.

3) Only USA production site.

Max. 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 $> 25 \text{ °C}$, the difference must be subtracted from the max. cleaning temperature. $T_{\text{max}} - \Delta \text{ °C}$.

($\Delta \text{ °C} = T_{\text{amb}} - 25 \text{ °C}$)

Maximum ambient temperature as a function of fluid temperature



Important

When using the device in explosion hazardous areas, the additional temperature specifications in the section titled "Ex relevant specifications" on the data sheet or in the the separate Ex safety instructions (SM/FEX300/FEX500/ATEX/IECEX) or (SM/FEX300/FEX500/FM/CSA) must be observed.

Models FEP311, FEP315 (standard temperature version)

Lining	Flange material	Ambient temperature		Fluid temperature	
		Minimum temperature	Max. temperature	Minimum temperature	Max. temperature
Hard rubber	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	90 °C (194 °F) 80 °C (176 °F) ⁴⁾
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	90 °C (194 °F) 80 °C (176 °F) ⁴⁾
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) ⁵⁾	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
PFA ¹⁾	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 ¹⁾	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
Thick PTFE ²⁾	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 ²⁾	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
ETFE ³⁾	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 ³⁾	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F) 45 °C (113 °F)	-25 °C (-13 °F)	90 °C (194 °F) 130 °C (266 °F)
Elastomer	Steel	-10 °C (14 °F)	60 °C (140 °F) 45 °C (113 °F)	-10 °C (14°F)	130 °C (266 °F)
Elastomer	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F) 45 °C (113 °F)	-20 °C (-4 °F)	130 °C (266 °F)

Models FEP311, FEP315 (high-temperature version)

Lining	Flange material	Ambient temperature		Fluid temperature	
		Minimum temperature	Max. temperature	Minimum temperature	Max. temperature
PFA ¹⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	180 °C (356 °F)
PFA ¹⁾	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-20 °C (-13 °F)	180 °C (356 °F)
Thick PTFE ²⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	180 °C (356 °F)
Thick PTFE ²⁾	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-20 °C (-13 °F)	180 °C (356 °F)
ETFE ³⁾	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14°F)	130 °C (266 °F)
ETFE ³⁾	Stainless steel	-20 °C (-4 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-20 °C (-13 °F)	130 °C (266 °F)

- 1) PFA (high-temperature version) can be obtained for nominal sizes \geq DN 10
- 2) Thick PTFE can be obtained for nominal sizes \geq DN 25
- 3) ETFE can be obtained for nominal sizes \geq DN 25
- 4) Only China production site
- 5) For (optional) low-temperature version, only

**Important**

When using the device in explosion hazardous areas, the additional temperature specifications in the section titled "Ex relevant specifications" on the data sheet or in the the separate Ex safety instructions (SM/FEX300/FEX500/ATEX/IECEX) or (SM/FEX300/FEX500/FM/CSA) must be observed.

Models FEP321, FEP325 (standard temperature version)

Lining	Flange material	Ambient temperature		Fluid temperature	
		Minimum temperature	Max. temperature	Minimum temperature	Max. temperature
Hard rubber	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	90 °C (194 °F) 80 °C (176 °F) ⁴⁾
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	90 °C (194 °F) 80 °C (176 °F) ⁴⁾
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) ⁵⁾	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
PFA ¹⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	130 °C (266 °F)
PFA ¹⁾	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
Thick PTFE ²⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	130 °C (266 °F)
Thick PTFE ²⁾	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
ETFE ³⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	130 °C (266 °F)
ETFE ³⁾	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
Elastomer	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14°F)	130 °C (266 °F)
Elastomer	Stainless steel	-20 °C (-4 °F)	60 °C (140 °F)	-20 °C (-4 °F)	130 °C (266 °F)

Models FEP321, FEP325 (high-temperature version)

Lining	Flange material	Ambient temperature		Fluid temperature	
		Minimum temperature	Max. temperature	Minimum temperature	Max. temperature
PFA ¹⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	180 °C (356 °F)
PFA ¹⁾	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-25 °C (-13 °F)	180 °C (356 °F)
Thick PTFE ²⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	180 °C (356 °F)
Thick PTFE ²⁾	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-25 °C (-13 °F)	180 °C (356 °F)
ETFE ³⁾	Steel	-10 °C (14°F)	60 °C (140 °F)	-10 °C (14°F)	130 °C (266 °F)
ETFE ³⁾	Stainless steel	-25 °C (-13 °F) -40 °C (-40 °F) ⁵⁾	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)

- 1) PFA (high-temperature version) can be obtained for nominal sizes \geq DN 10
- 2) Thick PTFE can be obtained for nominal sizes \geq DN 25
- 3) ETFE can be obtained for nominal sizes \geq DN 25
- 4) Only China production site
- 5) For (optional) low-temperature version, only

3.1.6 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).

DIN flange stainless steel to DN 600 (24")

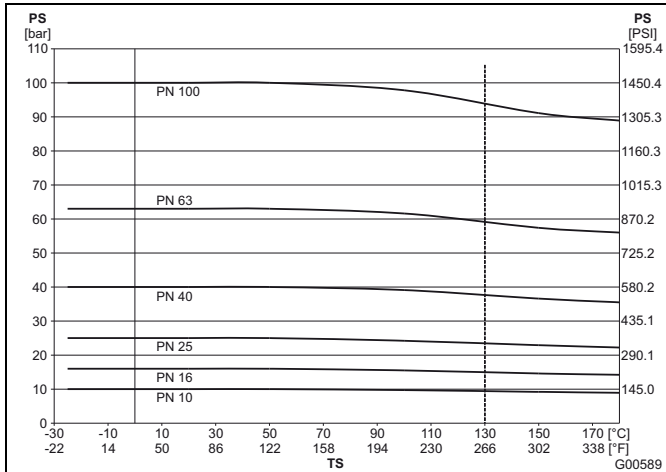


Fig. 2

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

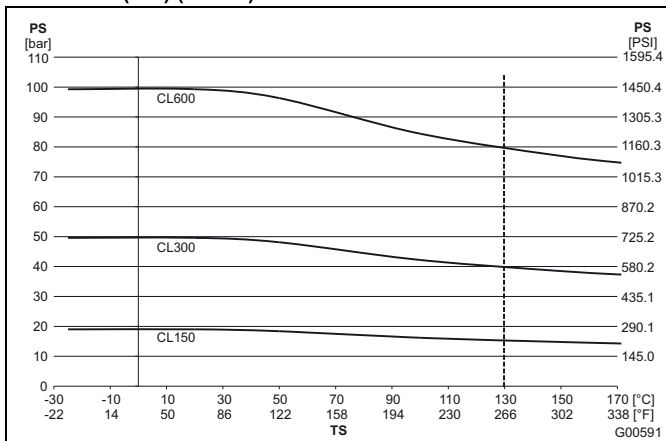


Fig. 3

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

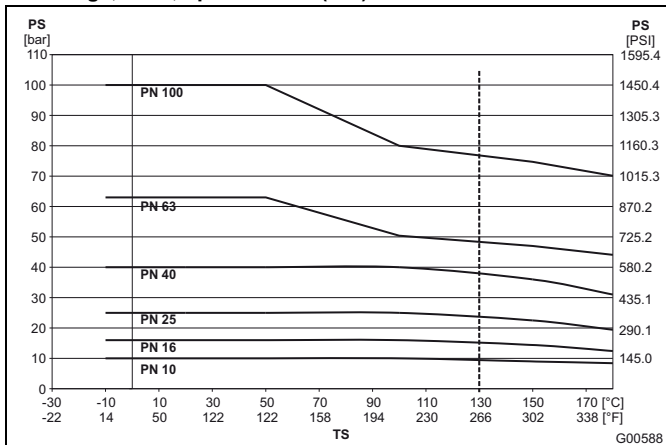


Fig. 4

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

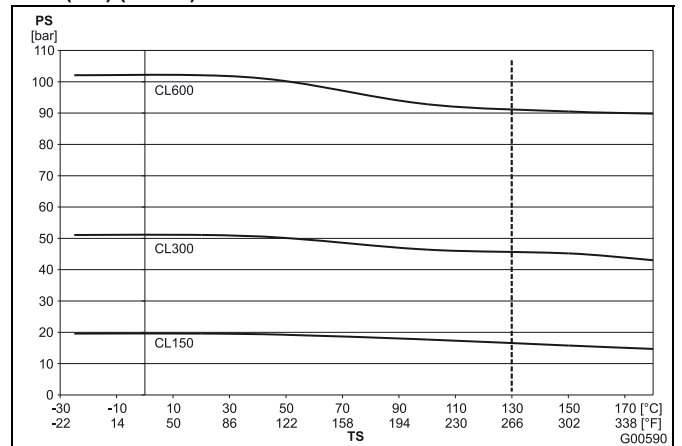


Fig. 5

JIS 10K-B2210 flange

Nominal diameter	Material	PN	TS	PS
32 ... 100 (1 1/4 ... 4")	Stainless steel	10	-25 ... 180 °C (-13 ... 356 °F)	10 bar (145 psi)
32 ... 100 (1 1/4 ... 4")	Steel	10	-25 ... 180 °C (-13 ... 356 °F)	10 bar (145 psi)

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

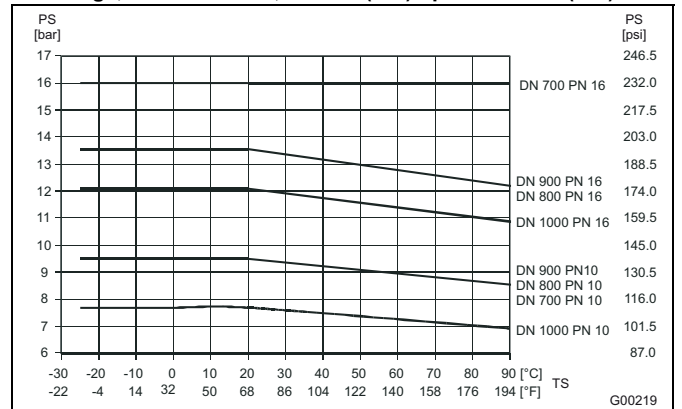


Fig. 6

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

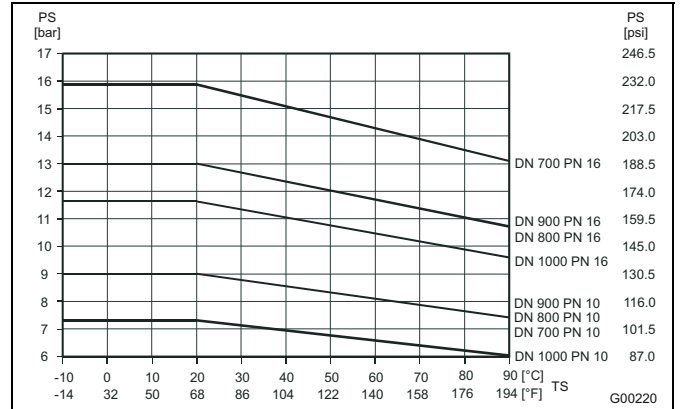


Fig. 7

3.1.7 Flowmeter sensor

Parts that come into contact with fluid

Part	Standard	Option
Lining	PTFE, PFA, ETFE, hard rubber, soft rubber	Elastomer
Measurement and grounding electrode for:		
- Hard rubber	CrNi steel 1.4571 (AISI 316Ti)	Hastelloy B-3 (2.4600), Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium, 1.4539 (AISI 904L)
- Soft rubber		
- PTFE, PFA, ETFE	CrNi steel 1.4539 (AISI 904L)	CrNi 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

Parts that do not come into contact with fluid (process connection)

	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⁾	-

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

Flowmeter sensor housing

	Standard
Housing	
DN 3 ... 400 (1/10 ... 16")	Dual-shell casing, cast aluminum, painted, paint coat, $\geq 80 \mu\text{m}$ thick, RAL 9002
DN 450 ... 2000 (18 ... 80")	Welded steel design, painted, paint coat, $\geq 80 \mu\text{m}$ thick, RAL 9002
Terminal box	Aluminum alloy, painted, $\geq 80 \mu\text{m}$ thick, light gray, RAL 9002
Meter tube	Stainless steel
cable gland used	Polyamide, stainless steel (version for ambient temperature $-40 \text{ }^\circ\text{C}$ ($40 \text{ }^\circ\text{F}$))

3.2 Electrical connection

3.2.1 Model FEP311, FEP321, FEP321 with HART protocol

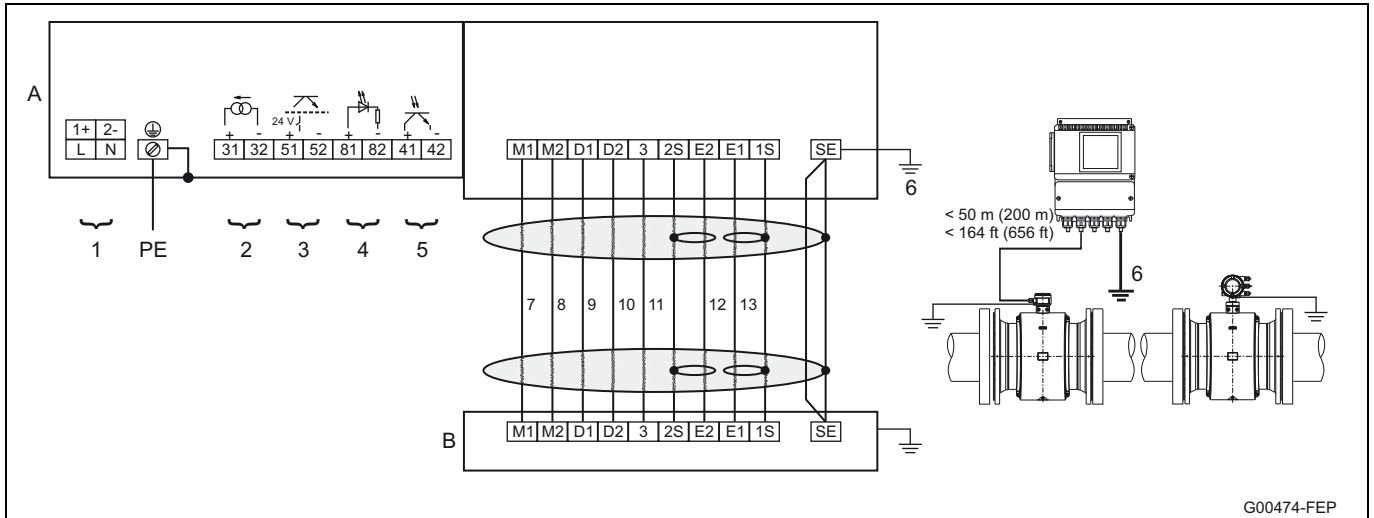


Fig. 8

- A Transmitter
- B Flowmeter sensor

1 Supply power
See name plate

2 Current output (terminals 31/32)

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

- Active: 4 ... 20 mA, HART protocol (standard), load: $250\ \Omega \leq R \leq 650\ \Omega$
 - Passive: 4 ... 20 mA, HART protocol (standard), load: $250\ \Omega \leq R \leq 650\ \Omega$
- Supply voltage for the current output: minimum 11 V, maximum 30 V at terminals 31/32.

3 Digital output DO1 (terminals 51/52) (pulse output or digital output)

Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Pulse Output". The output can be configured as an "active" or "passive" output.

Configuration is performed using software.

- Configuration as pulse output.
Max. pulse frequency: 5250 Hz.
Pulse width: 0.1 ... 2,000 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
- Configuration as "active" output
 $U = 19 \dots 21\text{ V}$, $I_{\text{max}} = 220\text{ mA}$, $f_{\text{max}} \leq 5,250\text{ Hz}$
- Configuration as "passive" output
 $U_{\text{max}} = 30\text{ V}$, $I_{\text{max}} = 220\text{ mA}$, $f_{\text{max}} \leq 5250\text{ Hz}$

4 Digital input (terminals 81/82) (contact input)

Function can be configured locally using software:

External output switch-off, external totalizer reset, external totalizer stop, other

Data for the optocoupler: $16\text{ V} \leq U \leq 30\text{ V}$, $R_i = 2\text{ k}\Omega$

5 Digital output DO2 (terminals 41/42) (pulse output or digital output)

Function can be configured locally as "Pulse Output" or "Digital Output" using software.

Factory setting is "Digital Output", flow direction signaling.

The output is always a "passive" output (optocoupler).

Data for the optocoupler: $U_{\text{max}} = 30\text{ V}$, $I_{\text{max}} = 220\text{ mA}$, $f_{\text{max}} \leq 5250\text{ Hz}$

- 6 Functional ground
- 7 Brown
- 8 Red
- 9 Orange
- 10 Yellow
- 11 Green
- 12 Blue
- 13 Violet

3.2.2 Model FEP311, FEP321, FEP321 with PROFIBUS PA, FOUNDATION Fieldbus

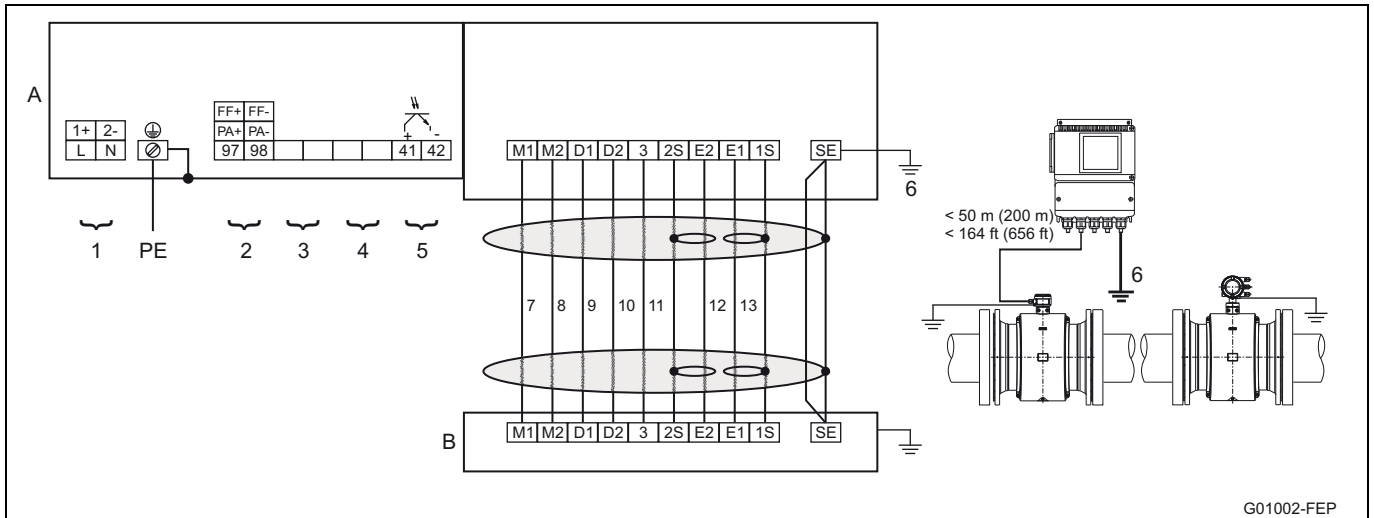


Fig. 9

- A Transmitter
- B Flowmeter sensor

1 Supply power
See name plate

2 Digital communication (terminal 97 / 98)

- PROFIBUS PA in acc. with IEC 61158-2 (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, the transmitter display or the fieldbus.

or

- FOUNDATION Fieldbus in acc. with IEC 61158-2 (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

3 Not assigned

4 Not assigned

5 Digital output DO2 (terminals 41/42) (pulse output or digital output)
Function can be configured locally as "Pulse Output" or "Digital Output" using software.
Factory setting is "Digital Output", flow direction signaling.
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{max} = 30\text{ V}$, $I_{max} = 220\text{ mA}$, $f_{max} \leq 5250\text{ Hz}$

6 Functional ground

- 7 Brown
- 8 Red
- 9 Orange
- 10 Yellow
- 11 Green
- 12 Blue
- 13 Violet

3.2.3 Connection examples for the peripherals

Current output

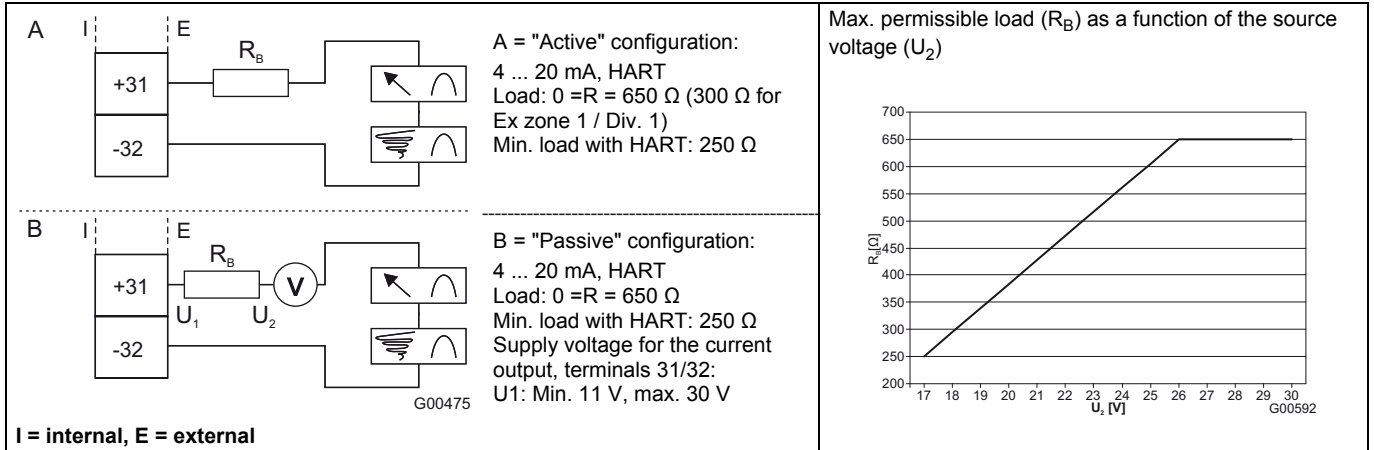


Fig. 10

Digital output DO1

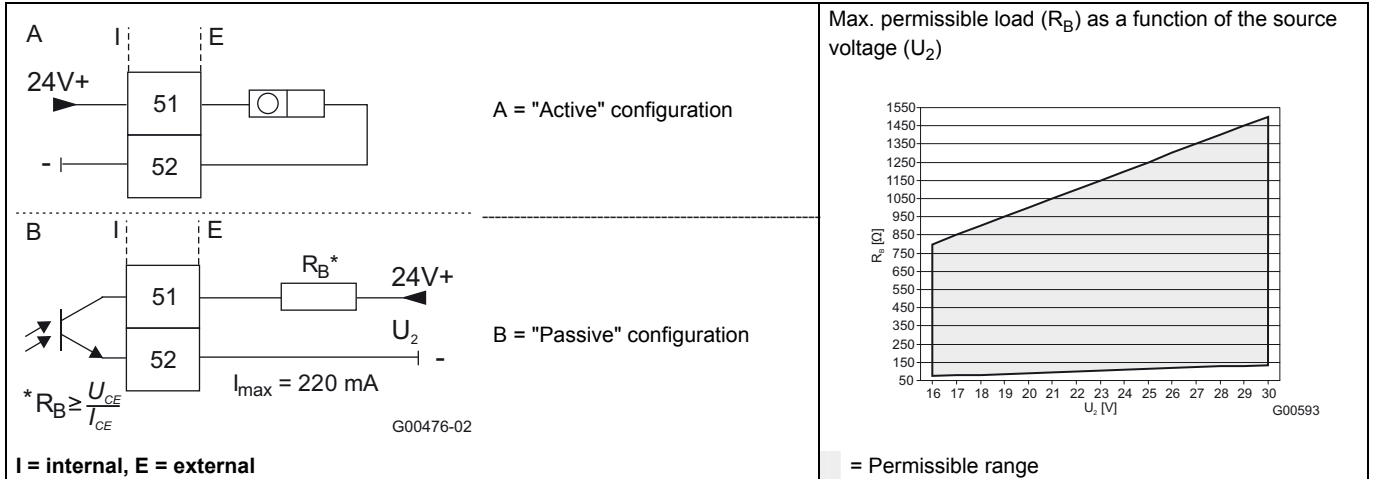


Fig. 11

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)

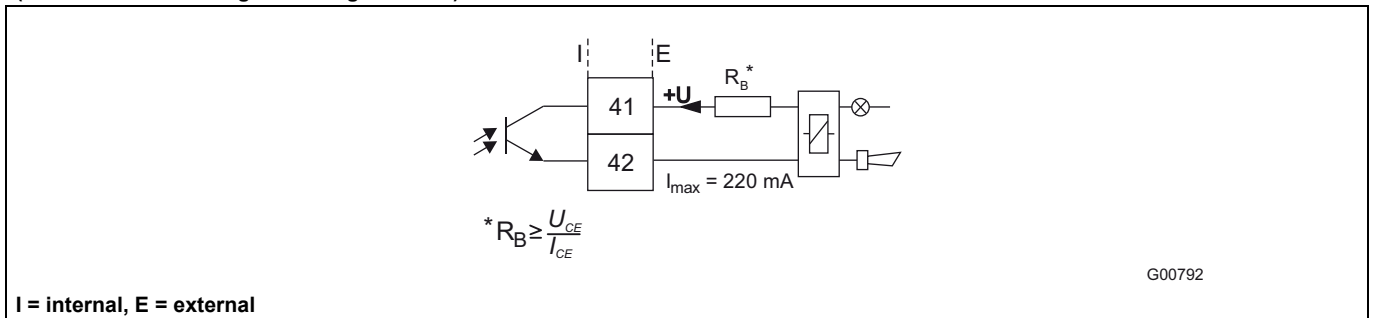


Fig. 12

Digital outputs DO1 and DO2, separate forward and reverse pulses

Digital outputs DO1 and DO2, separate forward and reverse pulses (alternative connection)

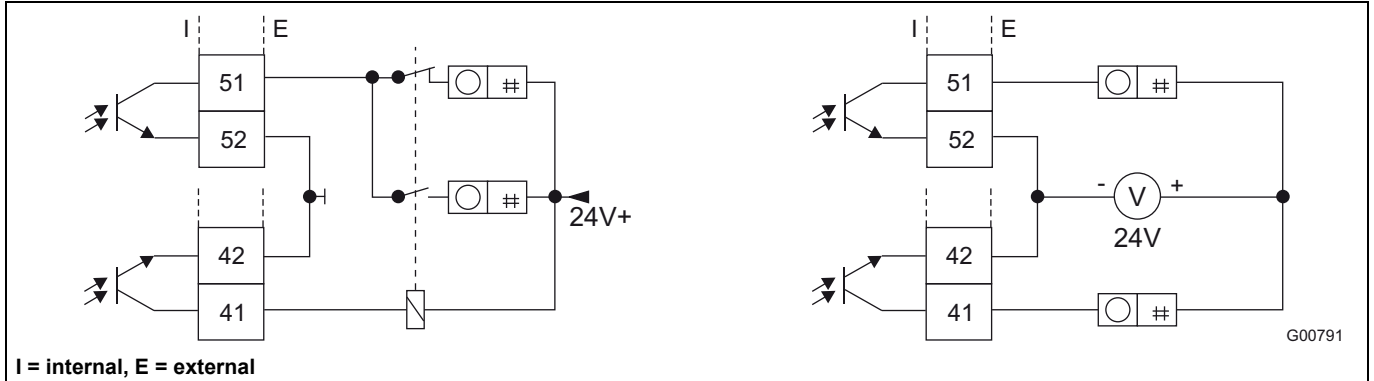


Fig. 13

Digital input for external output switch-off or external totalizer reset

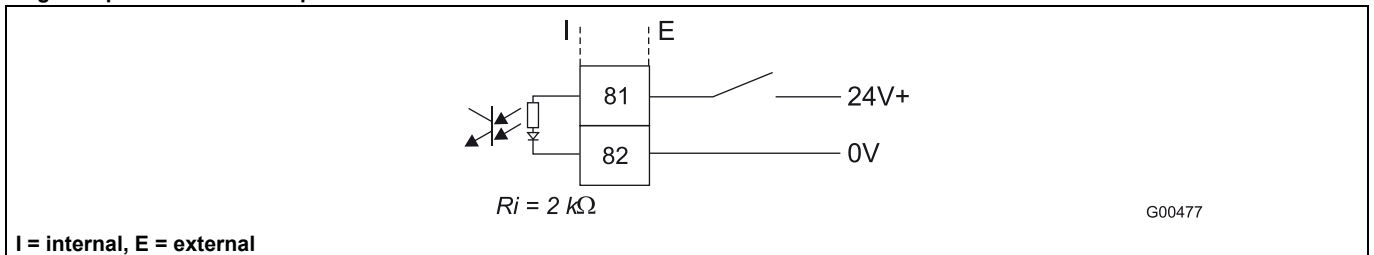
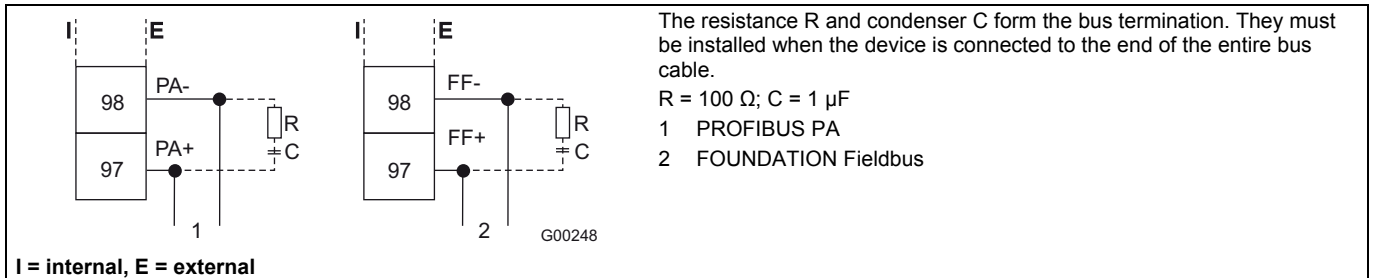


Fig. 14

PROFIBUS PA and FOUNDATION Fieldbus



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

- 1 PROFIBUS PA
- 2 FOUNDATION Fieldbus

Fig. 15

Connection via M12 plug (only for PROFIBUS PA in non-hazardous areas)

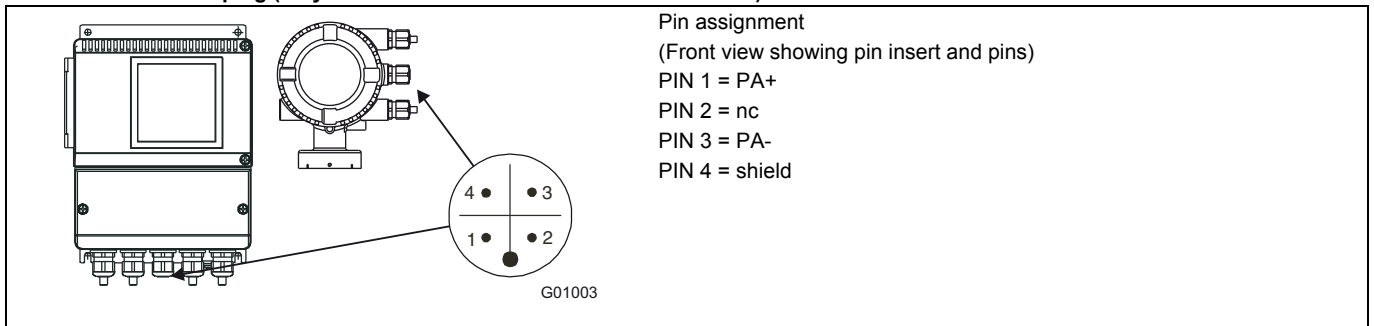


Fig. 16

Digital communication

The transmitter has the following options for digital communication:

HART protocol

The unit is registered with the HART Communication Foundation.

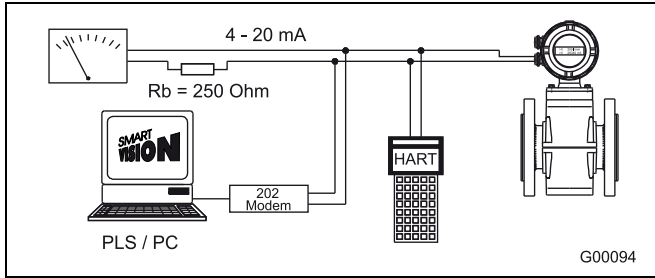


Fig. 17

HART protocol	
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: 1200 Hz Log. 0: 2200 Hz

For additional information, see the separate interface description.

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 protocol

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

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)

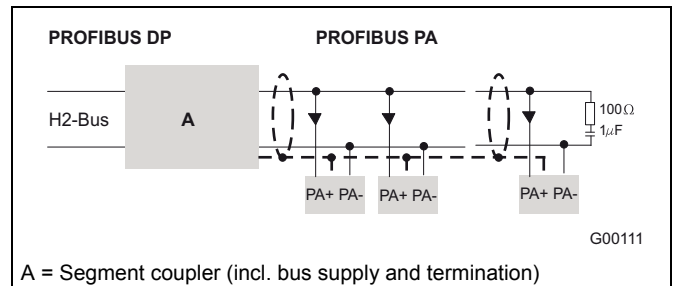


Fig. 18: Example for PROFIBUS PA interface connection

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 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 the separate interface description.

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 interface description appears on the CD included in the scope of supply.

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

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

FOUNDATION Fieldbus (FF)

Interoperability test campaign no.	ITK 5.20
Manufacturer ID	0x000320
Device ID	0x0124
Configuration	<ul style="list-style-type: none"> • Directly on the device • Via services integrated in the system • National configurator
Transmission signal	Acc. to IEC 61158-2

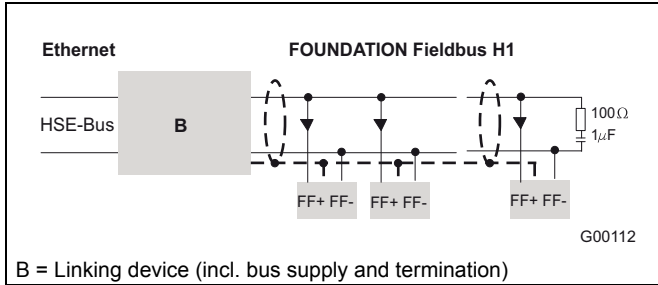


Fig. 19: Example for FOUNDATION Fieldbus interface connection

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 interface description appears on the CD included in the scope of supply.

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

The files required for operation can also be downloaded from <http://www.fieldbus.org>.

4 Ex-relevant specifications for operation in zones 1, 21, 22 / Div. 1

4.1 General

Devices with model names FEP315 and FEP325 are approved for operation in the following potentially explosive areas:

- ATEX/IECEX Zone 1, 21, 22
- FM Div.1
- cFM Div.1
- NEPSI Zone 1
- GOST Zone 1



Important

For detailed information on the individual approvals, refer to Section 1, "ProcessMaster 300 - Overview of technology".



Important

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).

4.2 Electrical connection

4.2.1 Models FEP315, FEP325 and FET325 in Zone 1 / Div. 1 with HART protocol

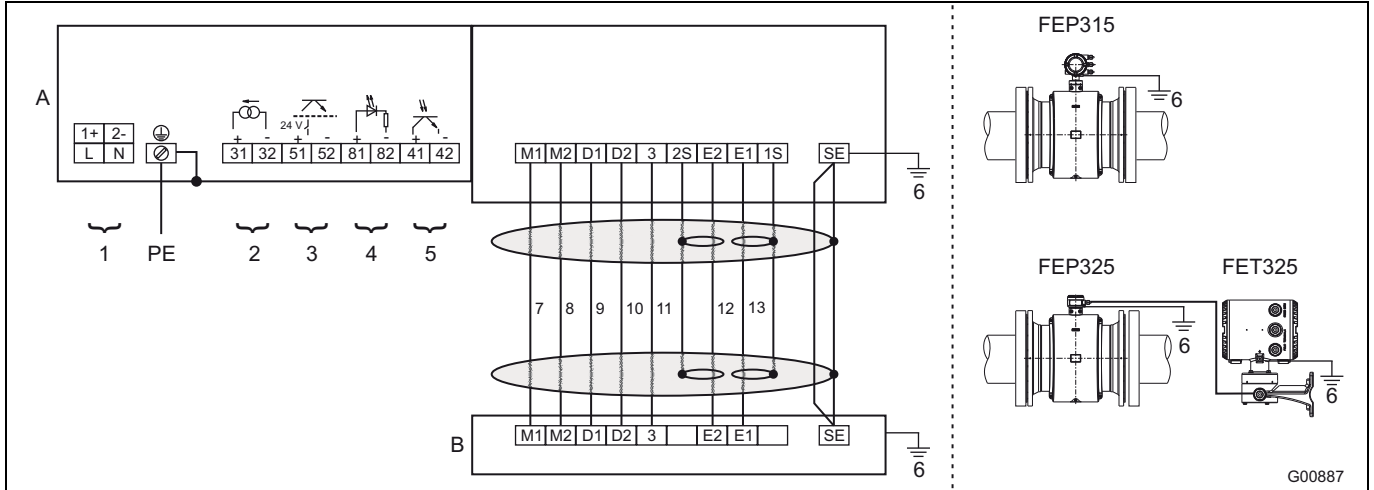


Fig. 20

- A **Transmitter**
- B **Flowmeter sensor**
- 1 **Supply power:**
See name plate
- 2 **Current output (terminals 31/32)**
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.
 - Active: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 300 \Omega$
 - Passive: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 650 \Omega$,
Supply voltage for the current output: minimum 11 V, maximum 30 V at terminals 31/32.
- 3 **Digital output DO1 (terminal 51/52)**
The output is always a "passive" output (optocoupler).
 - Data for the optocoupler: $U_{max} = 30 \text{ V}$, $I_{max} = 220 \text{ mA}$,
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Pulse Output".
 - Configuration as pulse output. Maximum pulse frequency: 5,250 Hz, pulse width: 0.1 ... 2,000 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
- 4 **Digital input: (terminal 81/82)**
Only available in conjunction with "passive" current output.
Function can be configured locally using software: External output switch-off, external totalizer reset, external totalizer stop, other
Data for the optocoupler: $16 \text{ V} \leq U \leq 30 \text{ V}$, $R_i = 2 \text{ k}\Omega$
- 5 **Digital output DO2 (terminal 41/42)**
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{max} = 30 \text{ V}$, $I_{max} = 220 \text{ mA}$
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Digital Output", flow direction signaling.
- 6 **Equipotential bonding**
- 7 **Brown**
- 8 **Red**
- 9 **Orange**
- 10 **Yellow**
- 11 **Green**
- 12 **Blue**
- 13 **Violet**

All inputs and outputs are electrically isolated from each other and from the supply power.
The electrical specifications given are operating values.

4.2.2 Models FEP315, FEP325 and FET325 in Zone 1 / Div. 1 with PROFIBUS PA or FOUNDATION Fieldbus

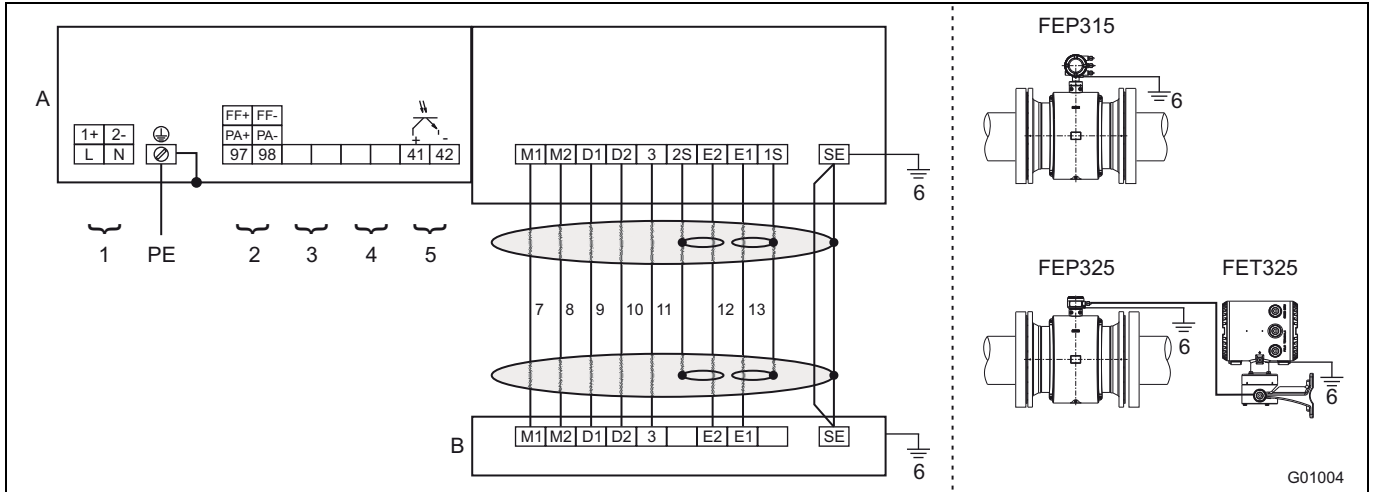


Fig. 21

- A **Transmitter**
- B **Flowmeter sensor**
- 1 **Supply power:**
See name plate
- 2 **Digital communication (terminal 97 / 98)**
 - **PROFIBUS PA in acc. with IEC 61158-2 (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, the transmitter display or the fieldbus.
 - or
 - **FOUNDATION Fieldbus in acc. with IEC 61158-2 (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
- 3 **Not assigned**
- 4 **Not assigned**
- 5 **Digital output DO2 (terminal 41/42)**
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{max} = 30\text{ V}$, $I_{max} = 220\text{ mA}$
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Digital Output", flow direction signaling.
- 6 **Equipotential bonding**
- 7 **Brown**
- 8 **Red**
- 9 **Orange**
- 10 **Yellow**
- 11 **Green**
- 12 **Blue**
- 13 **Violet**

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

The electrical specifications given are operating values.

For devices with PROFIBUS PA or FOUNDATION Fieldbus the bus termination must conform to the FISCO model or the explosion protection regulations, respectively.

4.2.3 Model FEP325 in Zone 1 / Div. 1 and FET325 transmitter in Zone 2 / Div. 2 or FET321 outside the hazardous area with HART protocol

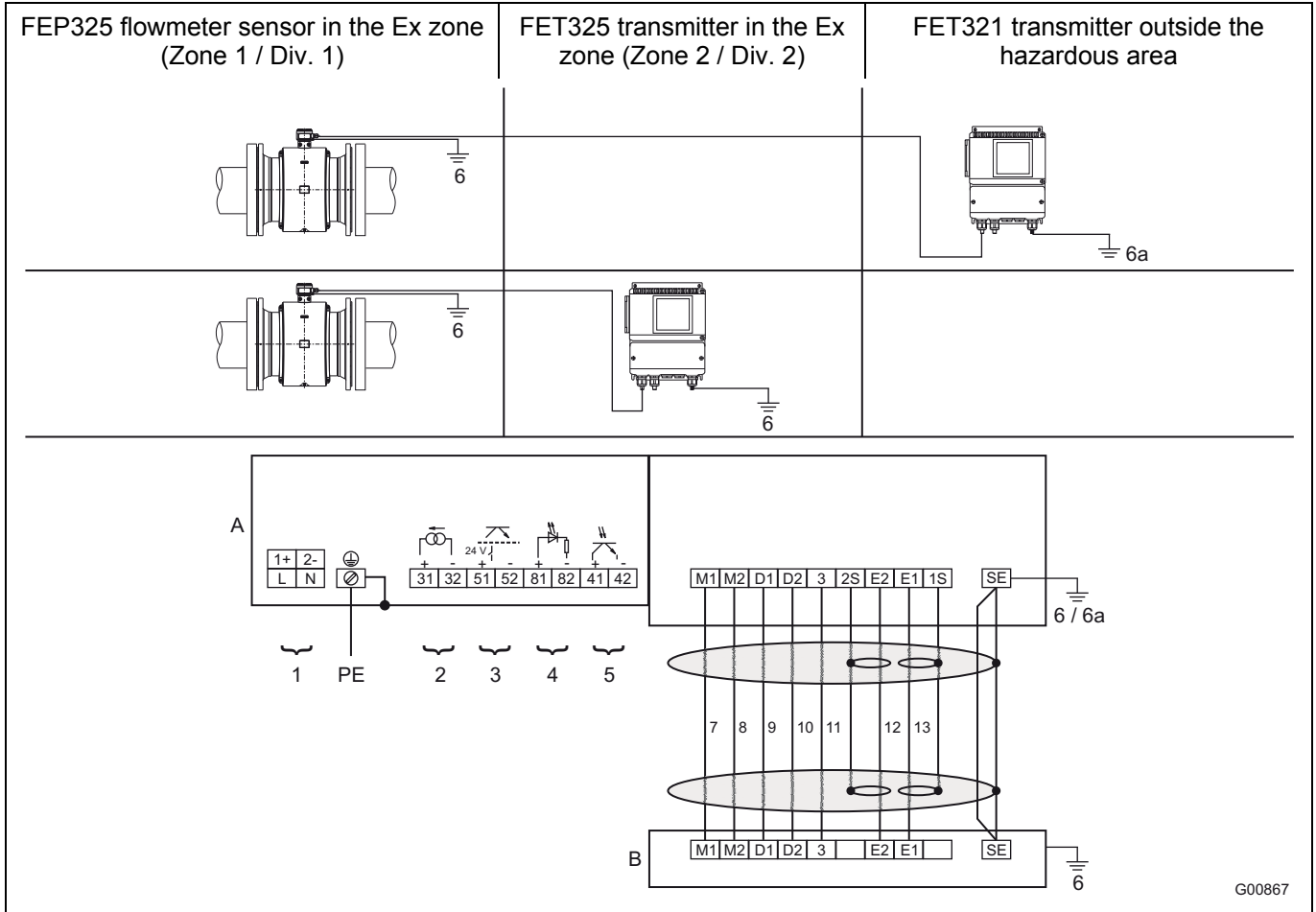


Fig. 22

- A Transmitter**
- B Flowmeter sensor**
- 1 Supply power:**
See name plate
- 2 Current output (terminals 31/32)**
The current output can be configured locally as an "active" or "passive" output.
 - Active: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 650 \Omega$
 - Passive: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 650 \Omega$, Supply voltage for the current output: minimum 11 V, maximum 30 V at terminals 31/32.
- 3 Digital output DO1 (terminal 51/52)**
The digital output can be configured locally as an "active" or "passive" output.
 - Active: $U = 19 \dots 21 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
 - Passive: $U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
 Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Pulse Output".
 - Configuration as pulse output. Maximum pulse frequency: 5,250 Hz, pulse width: 0.1 ... 2,000 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
- 4 Digital input: (terminal 81/82)**
Function can be configured locally using software: External output switch-off, external totalizer reset, external totalizer stop, other
Data for the optocoupler: $16 \text{ V} \leq U \leq 30 \text{ V}$, $R_i = 2 \text{ k}\Omega$
- 5 Digital output DO2 (terminal 41/42)**
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$,
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Digital Output", flow direction signaling.
- 6 Equipotential bonding**
- 6a Functional ground (only with flowmeter sensor FET321 outside the hazardous area)**
- 7 Brown**
- 8 red**
- 9 Orange**
- 10 yellow**
- 11 Green**
- 12 blue**
- 13 Violet**

All inputs and outputs are electrically isolated from each other and from the supply power. The electrical specifications given are operating values.

4.2.4 Model FEP325 in Zone 1 / Div. 1 and FET325 transmitter in Zone 2 / Div. 2 or FET321 outside the hazardous area with PROFIBUS PA or FOUNDATION Fieldbus

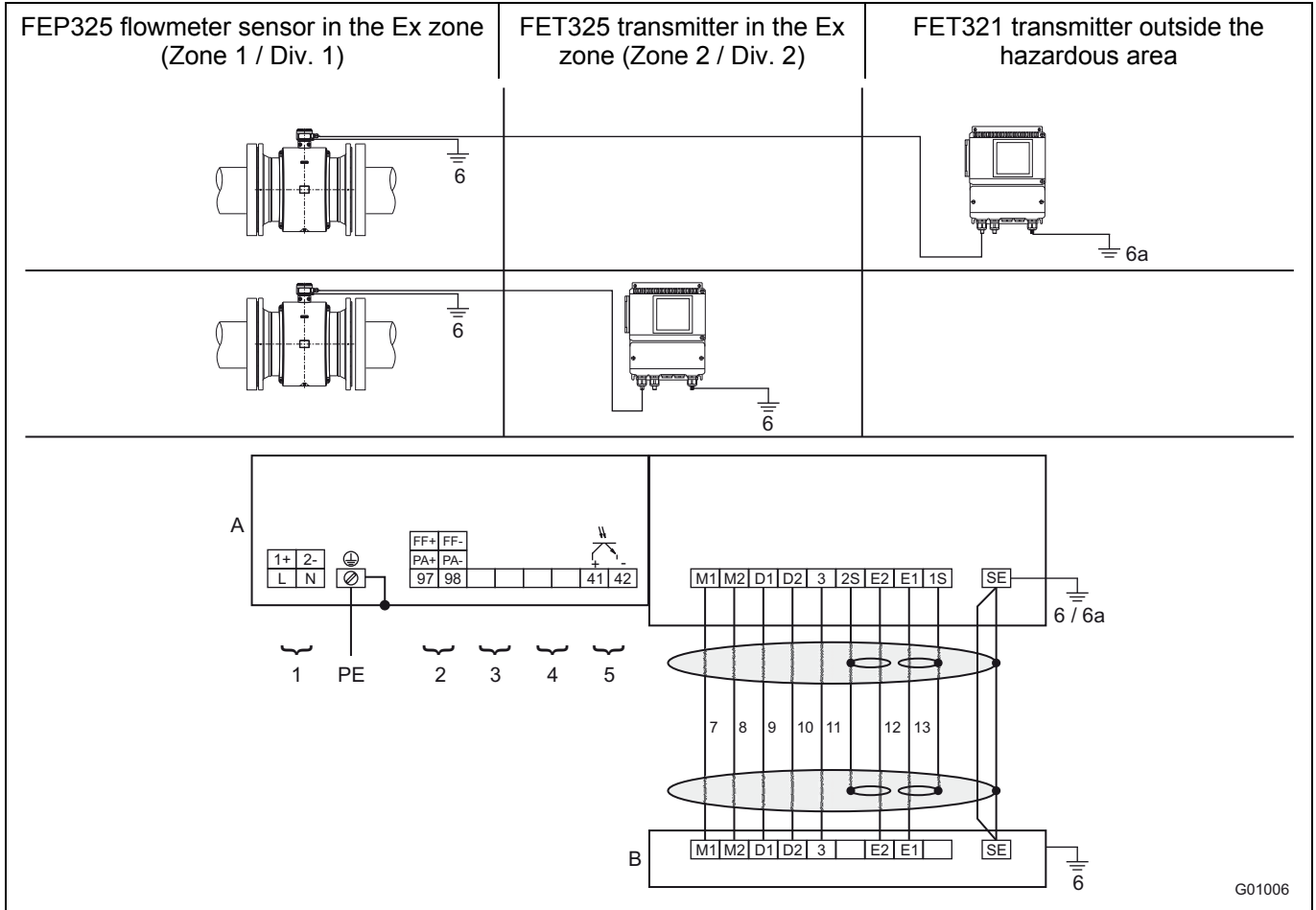


Fig. 23

- A **Transmitter**
- B **Flowmeter sensor**
- 1 **Supply power:**
See name plate
- 2 **Digital communication (terminal 97 / 98)**
 - **PROFIBUS PA in acc. with IEC 61158-2 (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, the transmitter display or the fieldbus.
 - or
 - **FOUNDATION Fieldbus in acc. with IEC 61158-2 (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
- 3 **Not assigned**
- 4 **Not assigned**
- 5 **Digital output DO2 (terminal 41/42)**
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{max} = 30 \text{ V}$, $I_{max} = 220 \text{ mA}$,
 $f_{max} \leq 5250 \text{ Hz}$,
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Digital Output", flow direction signaling.
- 6 **Equipotential bonding**
- 6a **Functional ground** (only with flowmeter sensor FET321 outside the hazardous area)
- 7 Brown
- 8 red
- 9 Orange
- 10 yellow
- 11 Green
- 12 blue
- 13 Violet

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

The electrical specifications given are operating values.

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

4.3 Electrical data for operation in Zone 1 / Div. 1

4.3.1 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.

Model: FEP315 or FET325

Inputs and outputs	Operating values		Ex data Explosion protection type Ex i, IS					
	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 output Terminal 31/32	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 output Terminal 31/32	30	30	U_I [V]	I_I [mA]	P_I [mW]	C_I [nF]	C_{IPA} [nF]	L_I [mH]
			60	500 ⁴⁾	2000 ⁴⁾	8,4	24	170
Passive digital output DO2 Terminal 41/42	30	220	U_I [V]	I_I [mA]	P_I [mW]	C_I [nF]	C_{IPA} [nF]	L_I [mH]
			60	425 ^{1) 4)} 500 ^{2) 4)}	2000 ⁴⁾	3,6	3,6	170
Passive digital output DO1 Terminal 51/52	30	220	60	425 ^{1) 4)} 500 ^{2) 4)}	2000 ⁴⁾	3,6	3,6	170
Passive digital input DI ³⁾ Terminal 81/82	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 supply power.

Special connection conditions:

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. On intrinsically safe circuits, equipotential bonding must be in place along the entire length of the cable used for the current outputs.

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.

4.3.2 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.

Model: FEP315 or FET325

The fieldbus (terminal 97 / 98) and the digital output (terminal 41 / 42) 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

Inputs and outputs	Operating values		Ex data					
	U_N [V]	I_N [mA]	Explosion protection type Ex i, IS and FISCO					
			U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Passive digital output DO2 Terminal 41/42	30	220	60	200 ¹⁾	5000 ¹⁾	3,6	3,6	0,17
Fieldbus Terminal 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

Inputs and outputs	Operating values		Ex data					
	U_N [V]	I_N [mA]	Explosion protection type Ex i, IS					
			U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Passive digital output DO2 Terminal 41/42	30	220	60	200 ¹⁾	5000 ¹⁾	3,6	3,6	0,17
Fieldbus Terminal 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)

Inputs and outputs	Operating values		Ex data					
	U_N [V]	I_N [mA]	Explosion protection type Ex n, NI and FNICO					
			U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_{iPA} [nF]	L_i [μH]
Passive digital output DO2 Terminal 41/42	30	220	-	-	-	-	-	-
Fieldbus Terminal 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.

Special connection conditions:

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. On intrinsically safe circuits, equipotential bonding must be in place along the entire length of the cable used for the signal outputs.

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 given.

4.4 Temperature values

Model name	Surface temperature
FEP315	70 °C (158 °F)
FEP325	85 °C (185 °F)
FET325	70 °C (158 °F)

The surface temperature depends on the fluid temperature.

With increasing fluid temperature > 70 °C (158 °F) or > 85 °C (185 °F) the surface temperature also increases to the level of the fluid temperature.



Important

The maximum permissible fluid temperature depends on the lining and flange material, and is limited by the operating values in Table 1 and the explosion protection specifications in Tables 2 ... n.

Table 1: Fluid temperature as a function of lining and flange material

Models FEP315/FEP325

Materials		Fluid temperature (operating values)	
Lining	Flange	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	90 °C (194 °F) 80 °C (176 °F) ¹⁾
Hard rubber	Stainless steel	-15 °C (5 °F)	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 (under preparation)

Table 2: Fluid temperature (Ex data) for ProcessMaster 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			
	HT		180 °C				120 °C				20 °C			
	NT	T2	130 °C				90 °C				30 °C			
	HT		180 °C				120 °C				20 °C			
	NT	T3	130 °C				90 °C				30 °C			
	HT		180 °C				120 °C				20 °C			
	NT	T4	120 °C				90 °C				30 °C			
	HT		120 °C				120 °C				20 °C			
	NT	T5	85 °C				70 °C				30 °C			
	HT		85 °C				85 °C				20 °C			
	NT	T6	70 °C				70 °C				30 °C			
	HT		70 °C				70 °C				20 °C			
DN 125 ... DN 2000	NT	T1	130 °C				90 °C				30 °C			
	HT		180 °C				120 °C				20 °C			
	NT	T2	130 °C				90 °C				30 °C			
	HT		180 °C				120 °C				20 °C			
	NT	T3	130 °C				90 °C				30 °C			
	HT		180 °C				120 °C				20 °C			
	NT	T4	125 °C				90 °C				30 °C			
	HT		125 °C				120 °C				20 °C			
	NT	T5	90 °C				90 °C				30 °C			
	HT		90 °C				90 °C				20 °C			
	NT	T6	75 °C				75 °C				30 °C			
	HT		75 °C				75 °C				20 °C			

1) Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, 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.

i

Important

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.

Table 3: Fluid temperature (Ex data) for ProcessMaster 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			
	HT		180 °C				160 °C				150 °C			
	NT	T2	130 °C				110 °C				110 °C			
	HT		180 °C				160 °C				150 °C			
	NT	T3	130 °C				110 °C				110 °C			
	HT		180 °C				160 °C				150 °C			
	NT	T4	120 °C				110 °C				110 °C			
	HT		120 °C				120 °C				120 °C			
	NT	T5	85 °C				85 °C				85 °C			
	HT		85 °C				85 °C				85 °C			
	NT	T6	70 °C				70 °C				70 °C			
	HT		70 °C				70 °C				70 °C			
DN 125 ... DN 2000	NT	T1	130 °C				110 °C				110 °C			
	HT		180 °C				160 °C				150 °C			
	NT	T2	130 °C				110 °C				110 °C			
	HT		180 °C				160 °C				150 °C			
	NT	T3	130 °C				110 °C				110 °C			
	HT		180 °C				160 °C				150 °C			
	NT	T4	125 °C				110 °C				110 °C			
	HT		125 °C				125 °C				125 °C			
	NT	T5	90 °C				90 °C				90 °C			
	HT		90 °C				90 °C				90 °C			
	NT	T6	75 °C				75 °C				75 °C			
	HT		75 °C				75 °C				75 °C			

1) Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F).

HT high temperature version, 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.

i

Important

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.

4.5 Special features of version designed for operation in Ex zone 1 / Div. 1

4.5.1 Configuring the current output

For devices designed for use in Ex Zone 1 / Div.1, the current output cannot be reconfigured subsequently.

The configuration required for the current output (active/passive) must be specified when the order is placed.

For the correct current output design (active/passive), see the marking contained in the device's terminal box.

4.5.2 Configuration of the digital outputs

For version designed for operation in Ex zone 1 / Div. 1, the digital outputs DO1 (51/52) and DO2 (41/42) can be configured on a NAMUR switching amplifier. On leaving the factory, the device is configured with the standard wiring (non-NAMUR).

Devices with PROFIBUS PA or FOUNDATION Fieldbus only have the digital output DO2 (41 / 42).



Important

The outputs' type of protection remains unaffected by this. The devices connected to these outputs must conform to the applicable regulations for explosion protection.

The jumpers are located on the backplane in the transmitter housing.

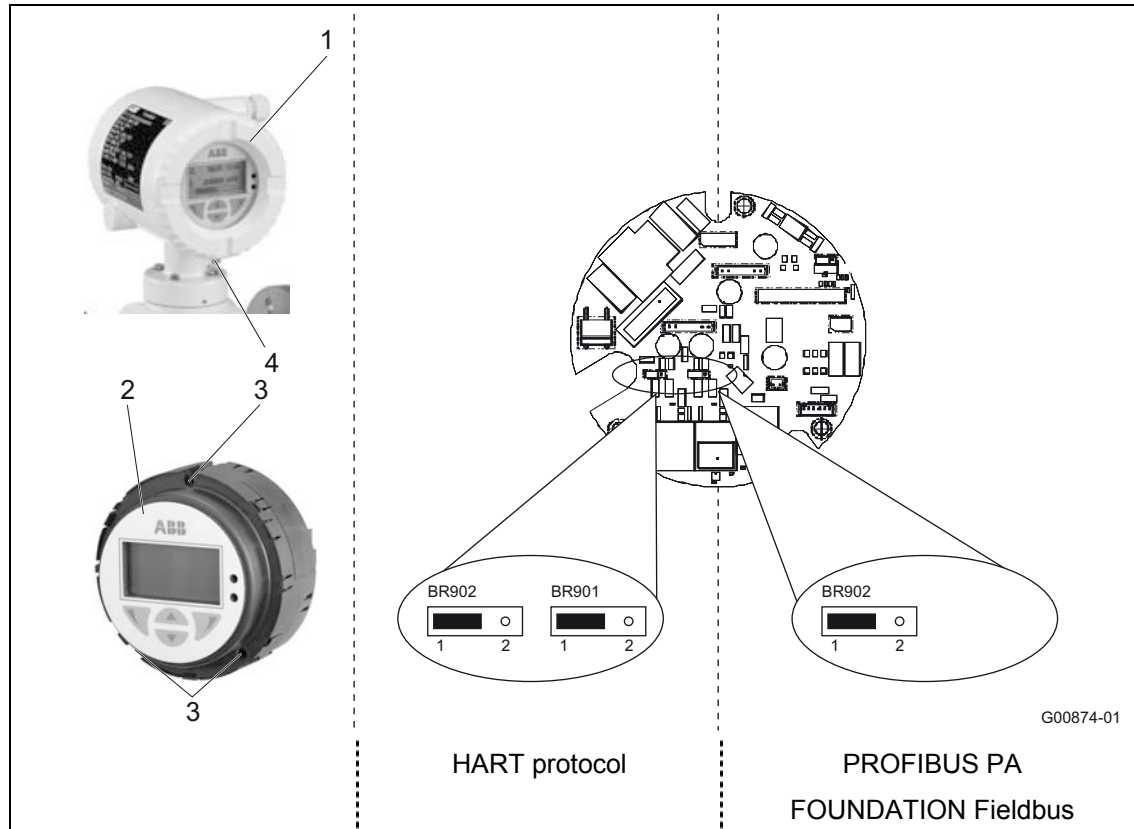


Fig. 24

BR902 for digital output DO1	BR901 for digital output DO2
BR902 in position 1: Standard (non-NAMUR) BR902 in position 2: NAMUR	BR901 in position 1: Standard (non-NAMUR) BR901 in position 2: NAMUR

Configure the digital outputs as described:

1. Switch off the supply power and wait at least 20 minutes before the next step.
2. Open the cover safety device (4) and housing cover (1).
3. Loosen screws (3) and pull out transmitter plug-in (2).
4. Insert the jumpers in the required positions.
5. Put the transmitter plug-in (2) back into the housing and retighten the screws (3).
6. Close the housing cover (1) and lock the cover by unscrewing the screw (4).

5 Ex-relevant specifications for operation in zones 2, 21, 22 / Div. 2

5.1 General

Devices with model names FEP315 and FEP325 are approved for operation in the following potentially explosive areas:

- ATEX/IECEX Zone 2, 21, 22
- FM Div.2
- cFM Div.2
- NEPSI Zone 2
- GOST Zone 2



Important

For detailed information on the individual approvals, refer to Section 1, "ProcessMaster 300 - Overview of technology".

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).

5.2 Electrical connection

5.2.1 Model FEP315, FET325 in Zone 2 / Div. 2, FET321 outside the hazardous area with HART protocol

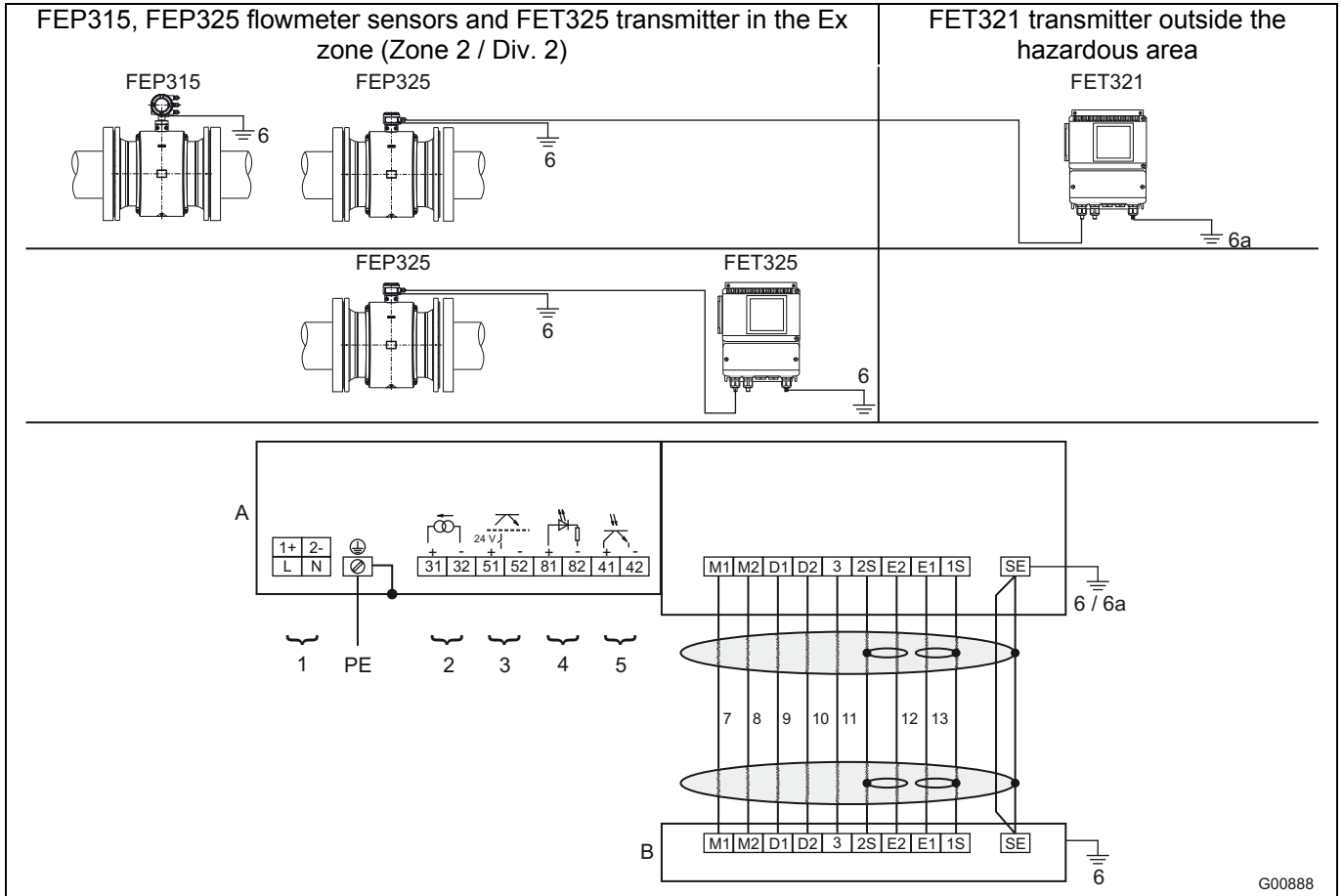


Fig. 25

- A **Transmitter**
- B **Flowmeter sensor**
- 1 **Supply power:**
See name plate
- 2 **Current output (terminals 31/32)**
The current output can be configured locally as an "active" or "passive" output.
 - Active: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 650 \Omega$
 - Passive: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 650 \Omega$
Supply voltage for the current output: minimum 11 V, maximum 30 V at terminals 31/32.
- 3 **Digital output DO1 (terminal 51/52)**
The digital output can be configured locally as an "active" or "passive" output.
 - Active: $U = 19 \dots 21 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
 - Passive: $U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
 Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Pulse Output".
 - Configuration as pulse output. Maximum pulse frequency: 5,250 Hz, pulse width: 0.1 ... 2,000 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
- 4 **Digital input: (terminal 81/82)**
Function can be configured locally using software: External output switch-off, external totalizer reset, external totalizer stop, other
Data for the optocoupler: $16 \text{ V} \leq U \leq 30 \text{ V}$, $R_i = 2 \text{ k}\Omega$
- 5 **Digital output DO2 (terminal 41/42)**
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5250 \text{ Hz}$
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Digital Output", flow direction signaling.
- 6 **Equipotential bonding**
- 6a **Functional ground** (only with transmitter FET321 outside the hazardous area)
- 7 Brown
- 8 red
- 9 Orange
- 10 yellow
- 11 Green
- 12 blue
- 13 Violet

All inputs and outputs are electrically isolated from each other and from the supply power. The electrical specifications given are operating values.

5.2.2 Model FEP315, FET325 in Zone 2 / Div. 2, FET321 outside the hazardous area with PROFIBUS PA or FOUNDATION Fieldbus

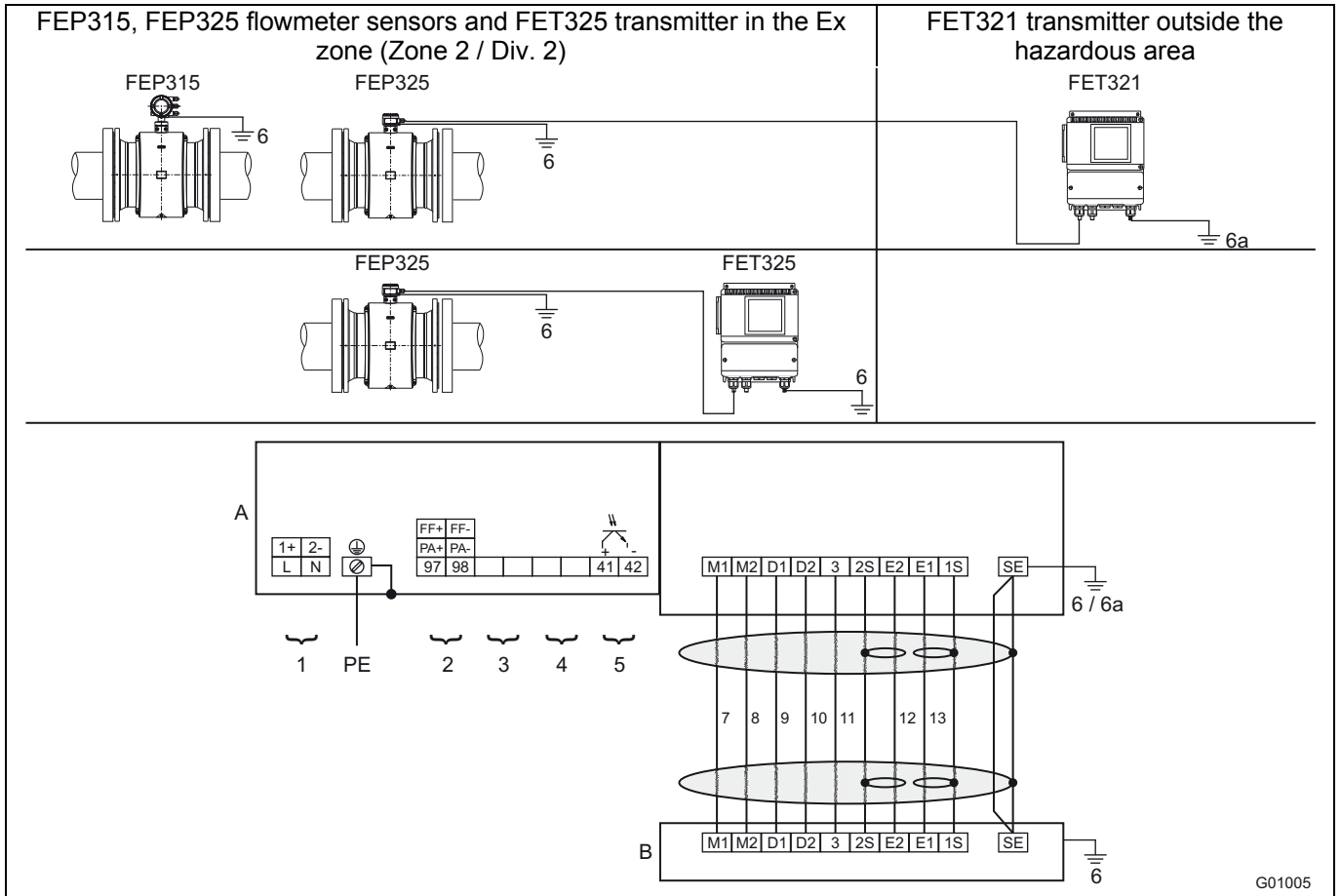


Fig. 26

- A Transmitter**
- B Flowmeter sensor**
- 1 Supply power:**
See name plate
- 2 Digital communication (terminal 97 / 98)**
 - **PROFIBUS PA in acc. with IEC 61158-2 (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, the transmitter display or the fieldbus.
 - or
 - **FOUNDATION Fieldbus in acc. with IEC 61158-2 (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
- 3 Not assigned**
- 4 Not assigned**
- 5 Digital output DO2 (terminal 41/42)**
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{max} = 30\text{ V}$, $I_{max} = 220\text{ mA}$,
 $f_{max} \leq 5250\text{ Hz}$,
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Digital Output", flow direction signaling.
- 6 Equipotential bonding**
- 6a Functional ground (only with flowmeter sensor FET321 outside the hazardous area)**
- 7 Brown**
- 8 red**
- 9 Orange**
- 10 yellow**
- 11 Green**
- 12 blue**
- 13 Violet**

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

The electrical specifications given are operating values.

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

5.3 Electrical data for operation in Zone 2 / Div. 2

5.3.1 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.

Model: FEP315 or FET325

Signal inputs and outputs	Ex data		Operating values	
	Ex n/NI		U _i [V]	I _i [mA]
	U _i [V]	I _i [mA]		
Current output Active/passive Terminal 31/32	30	30	30	30
Digital output DO1 Active/passive Terminal 51/52	30	220	30	220
Digital output DO2 passive Terminal 41/42	30	220	30	220
Digital input DI Terminal 81/82	30	10	30	10

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

5.3.2 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.

Model: FEP315 or FET325

Inputs and outputs	Operating values		Ex data					
			Explosion protection type Ex n, NI and FNICO					
	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 Terminal 41/42	30	220	-	-	-	-	-	-
Fieldbus Terminal 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.

5.4 Temperature values

Model name	Surface temperature
FEP315	70 °C (158 °F)
FEP325	85 °C (185 °F)
FET325	70 °C (158 °F)

The surface temperature depends on the fluid temperature.

With increasing fluid temperature > 70 °C (> 158 °F) or > 85 °C (> 185 °F) the surface temperature also increases to the level of the fluid temperature.

Table 1: Fluid temperature as a function of lining and flange material
Models FEP315/FEP325

Materials		Fluid temperature (operating values)	
Lining	Flange	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	90 °C (194 °F) 80 °C (176 °F) ¹⁾
Hard rubber	Stainless steel	-15 °C (5 °F)	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 (under preparation)

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

Table 2: Fluid temperature (Ex data) for ProcessMaster 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	---	---			
			180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C	40 °C		
	HT	T2	130 °C	130 °C	---	---	130 °C	100 °C ²⁾ 110 °C ³⁾	---	---	80 °C	40 °C	---	---			
			180 °C	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	---	---			
			180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C	40 °C		
	HT	T4	130 °C	130 °C	---	---	130 °C	100 °C ²⁾ 110 °C ³⁾	---	---	80 °C	40 °C	---	---			
			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 version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, 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.

i

Important

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.

Table 3: Fluid temperature (Ex data) for ProcessMaster 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⁾	110 °C	---	---
			180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C
	HT	T2	130 °C	130 °C	---	---	130 °C	130 °C	---	---	110 °C ²⁾	110 °C	---	---
			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⁾	110 °C	---	---
			180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C
	HT	T4	130 °C	130 °C	---	---	130 °C	130 °C	---	---	110 °C ²⁾	110 °C	---	---
			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	T5	95 °C	95 °C	---	---	95 °C	95 °C	---	---	95 °C	95 °C	---	---
			95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C	95 °C
	HT	T6	80 °C	80 °C	---	---	80 °C	80 °C	---	---	80 °C	80 °C	---	---
			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 version, T_{medium} maximum 130 °C (266 °F)HT high-temperature version, 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.

i

Important

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.

6 Explosion protection specifications for operation in areas with combustible dust

6.1 Information about using the device in areas with combustible dust

The device is approved for use in potentially explosive areas (gas and dust).

The Ex certification is provided on the name plate.



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).

6.1.1 Maximum Allowable Surface Temperature

Model name	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.

6.1.2 Min. signal cable length

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

7 Installation requirements

7.1 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.

7.2 Mounting

The following points must be observed for the installation:

- The meter tube must always be completely full.
- The flow direction must correspond to the identification if present.
- The maximum torque for all flange connections must be complied with. The max torque depends on the temperature, pressure, material of the flange bolts and gaskets and has to be chosen accordingly.
- The devices must be installed without mechanical tension (torsion, bending).
- Flowmeters with coplanar counter flanges may only be installed with suitable seals.
- Use flange seals made from a compatible material for the fluid and fluid temperatures.
- Seals must not extend into the flow area since possible turbulence could influence the device accuracy.
- The pipeline may not exert any unallowable forces and torques on the device.
- Do not remove the plugs in the cable connectors until you are ready to install the electrical cable.
- Install the separate converter at a largely vibration-free location.
- Do not expose the converter to direct sunlight or provide for appropriate sun protection where necessary.

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

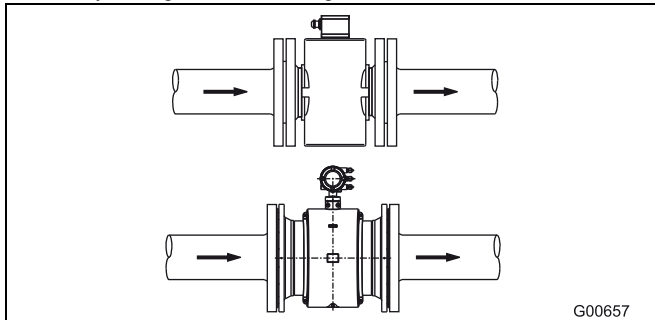


Fig. 27

7.2.1 Electrode axis

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

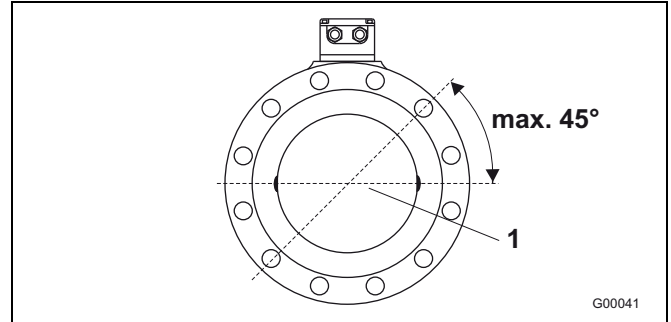


Fig. 28

7.2.2 In- and outlet pipe sections

Straight inlet section	Straight outlet section
≥ 3 x DN	≥ 2 x DN

DN = Flowmeter sensor size

- Do not install fittings, manifolds, valves etc. directly in front of the meter tube (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).
- For compliance with the measuring accuracy, observe the inlet and outlet pipe sections.

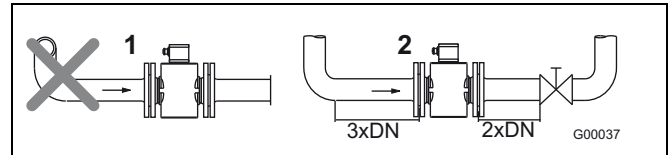


Fig. 29

7.2.3 Vertical connections

- Vertical installation for measurement of abrasive fluids, flow preferably from below to above.

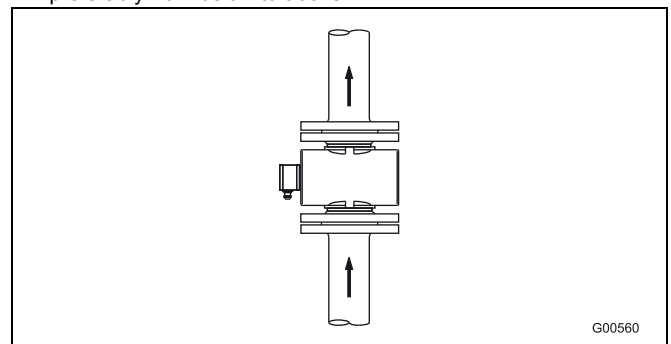


Fig. 30

7.2.4 Horizontal connections

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

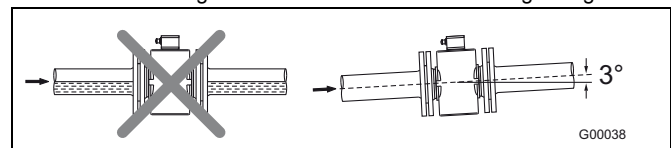


Fig. 31

7.2.5 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).

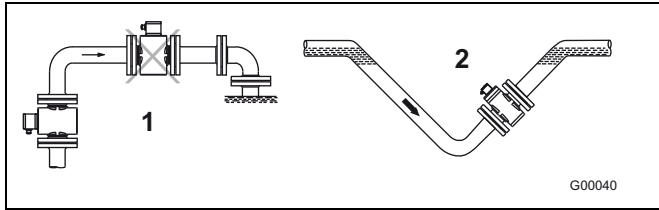


Fig. 32

7.2.6 Strongly contaminated fluids

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

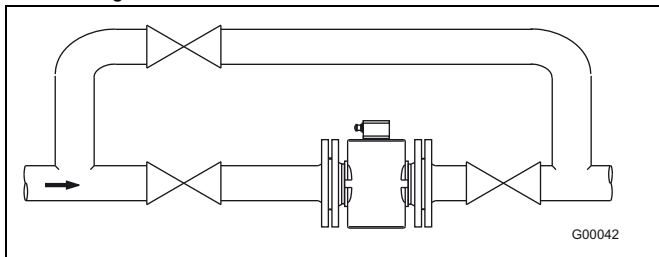


Fig. 33

7.2.7 Installation in the vicinity of pumps

- For flowmeter primaries which are to be installed in the vicinity of pumps or other vibration generating equipment, the utilization of mechanical snubbers is advantageous.

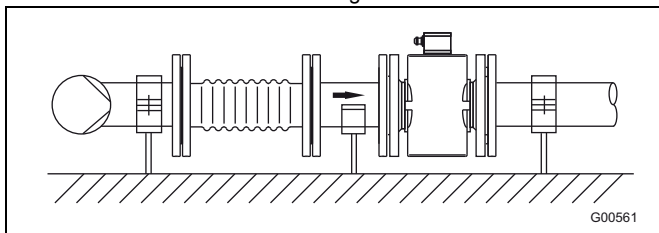


Fig. 34

7.2.8 Installing 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.

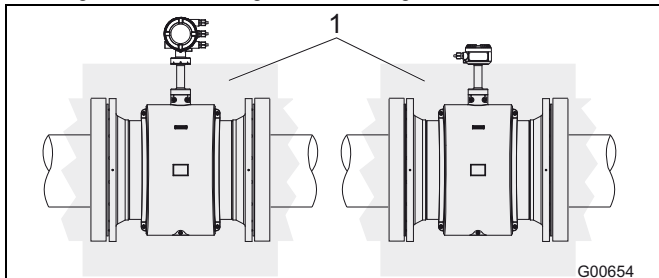


Fig. 35

1 Insulation

7.2.9 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.

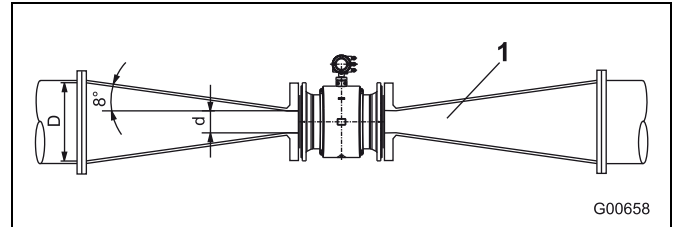


Fig. 36

- 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 $\alpha/2 = 8^\circ$

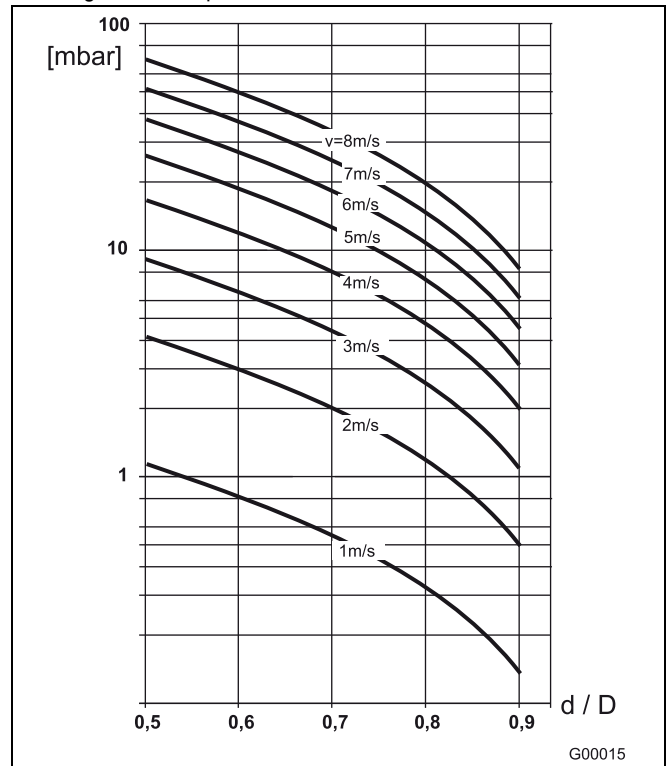


Fig. 37

8 Dimensions

8.1 Flange, DN 3 ... 125 (1/10 ... 5")

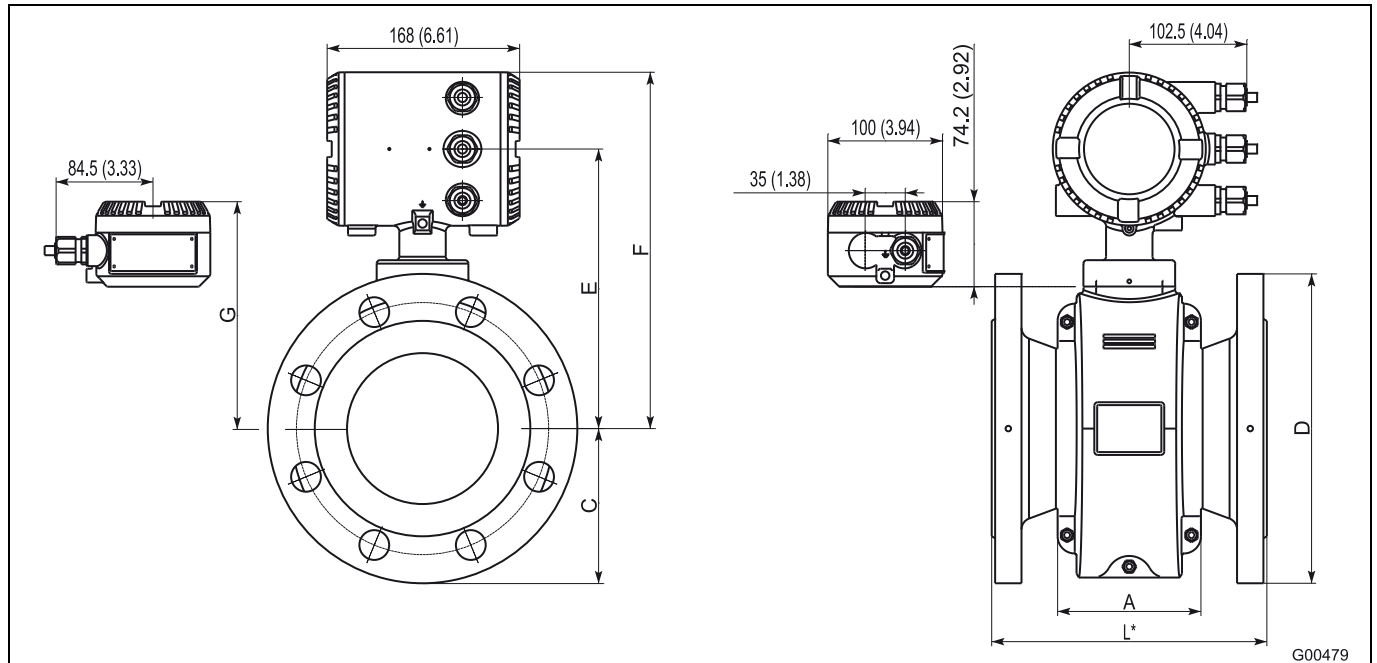


Fig. 38: Dimensions in mm (inch)

Flange in acc. with DIN/EN 1092-1 7)

DN	PN 1)	Dimensions [mm]						Approx. weight [kg]	
		D	L 2) 3)	F 4)	C	E 4)	G 4)	Integral mount design	Remote mount design
3 ... 8 5)	10 ... 40	90	200	255	82	188	143	7	5
10	10 ... 40	90	200	255	82	188	143	7	5
15	10 ... 40	95	200	255	82	188	143	8	6
20	10 ... 40	105	200	255	82	188	143	8	6
25	10 ... 40	115	200	255	82	188	143	9	7
32	10 ... 40	140	200	262	92	195	150	10	8
40	10 ... 40	150	200	262	92	195	150	11	9
50	10 ... 40	165	200	268	97	201	156	12	10
65	10 ... 40	185	200	279	108	212	167	15	13
80	10 ... 40	200	200	279	108	212	167	17	15
100	10 ... 16	220	250	301	122	234	189	19	17
	25 ... 40	235	250	301	122	234	189	23	21
125	10 ... 16	250	250	311	130	244	199	22	20
	25 ... 40	270	250	311	130	244	199	29	27

Tolerance L: +0 / -3 mm

DN (inch)	PN 1)	Dimensions [inch]						Approx. weight [lb]	
		D	L 2) 3)	F 4)	C	E 4)	G 4)	Integral mount design	Remote mount design
3 ... 8 5) (1/8 ... 5/16)	10 ... 40	3.54	7.87	10.04	3.23	7.40	5.63	15.4	11
10 (3/8)	10 ... 40	3.54	7.87	10.04	3.23	7.40	5.63	15.4	11
15 (1/2)	10 ... 40	3.74	7.87	10.04	3.23	7.40	5.63	17.6	13.2
20 (3/4)	10 ... 40	4.13	7.87	10.04	3.23	7.40	5.63	17.6	13.2
25 (1)	10 ... 40	4.53	7.87	10.04	3.23	7.40	5.63	19.8	15.4
32 (1 1/4)	10 ... 40	5.51	7.87	10.31	3.62	7.68	5.91	22	17.6
40 (1 1/2)	10 ... 40	5.91	7.87	10.31	3.62	7.68	5.91	24.3	19.8
50 (2)	10 ... 40	6.50	7.87	10.55	3.82	7.91	6.14	26.5	22
65 (2 1/2)	10 ... 40	7.28	7.87	10.98	4.25	8.35	6.57	33.1	28.7
80 (3)	10 ... 40	7.87	7.87	10.98	4.25	8.35	6.57	37.5	33.1
100 (4)	10 ... 16	8.66	9.84	11.85	4.80	9.21	7.44	41.9	37.5
	25 ... 40	9.25	9.84	11.85	4.80	9.21	7.44	50.7	46.3
125 (5)	10 ... 16	9.84	9.84	12.24	5.12	9.61	7.83	48.5	44.1
	25 ... 40	10.63	9.84	12.24	5.12	9.61	7.83	63.9	59.5

Tolerance L: +0 / -0.018 inch

Flange in acc. with ASME B16.5

Dimensions [mm]											Approx. weight [kg]		
		CL150			CL300							Integral mount design	Remote mount design
DN	Inch	D	ISO 133359	US installation length	D	ISO 133359	US installation length	F 4)	C	E 4)	G 4)		
			L 2) 3) 9)	L 2) 3)		L 2) 3) 9)	L 2) 3)						
3 ... 8	1/8 ... 5/16 6)	89	200	-	96	200	-	255	82	188	143	7	5
10	3/8 6)	89	200	-	96	200	-	255	82	188	143	7	5
15	1/2	89	200	200	96	200	229	255	82	188	143	8	6
20	3/4	98	200	-	118	200	-	255	82	188	143	8	6
25	1	108	200	200	124	200	229	255	82	188	143	9	7
32	1 1/4	118	200	-	134	200	-	262	92	195	150	10	8
40	1 1/2	127	200	200	156	200	229	262	92	195	150	11	9
50	2	153	200	200	165	200	254	268	97	201	156	12	10
65	2 1/2	178	200	-	191	200	-	279	108	212	167	13 / 15 8)	11 / 13 8)
80	3	191	200	200	210	200	229	279	108	212	167	17 / 19 8)	15 / 17 8)
100	4	229	250	250	254	250	280	301	122	234	189	21 / 30 8)	19 / 28 8)
125	5	254	250	-	280	250	-	311	130	244	199	22 / 35 8)	20 / 33 8)

Tolerance L: +0 / -3 mm

Dimensions [inch]											Approx. weight [lb]		
		CL150			CL300							Integral mount design	Remote mount design
DN	Inch	D	ISO 133359	US installation length	D	ISO 133359	US installation length	F 4)	C	E 4)	G 4)		
			L 2) 3) 9)	L 2) 3)		L 2) 3) 9)	L 2) 3)						
3 ... 8	1/8 ... 5/16 6)	3.5	7.87	-	3.78	7.87	-	10.04	3.23	7.4	5.63	15	11
10	3/8 6)	3.5	7.87	-	3.78	7.87	-	10.04	3.23	7.4	5.63	15	11
15	1/2	3.5	7.87	7.87	3.78	7.87	9.02	10.04	3.23	7.4	5.63	18	13
20	3/4	3.86	7.87	-	4.65	7.87	-	10.04	3.23	7.4	5.63	18	13
25	1	4.25	7.87	7.87	4.88	7.87	9.02	10.04	3.23	7.4	5.63	20	15
32	1 1/4	4.65	7.87	-	5.28	7.87	-	10.31	3.62	7.68	5.91	22	18
40	1 1/2	5	7.87	7.87	6.14	7.87	9.02	10.31	3.62	7.68	5.91	24	20
50	2	6.02	7.87	7.87	6.5	7.87	10	10.55	3.82	7.91	6.14	16	22
65	2 1/2	7.01	7.87	-	7.52	7.87	-	10.98	4.25	8.35	6.57	29 / 33 8)	24 / 29 8)
80	3	7.52	7.87	7.87	8.27	7.87	9.02	10.98	4.25	8.35	6.57	38 / 42 8)	33 / 38 8)
100	4	9.02	9.84	9.84	10	9.84	11.02	11.85	4.8	9.21	7.44	46 / 66 8)	42 / 62 8)
125	5	10	9.84	-	11.02	9.84	-	12.24	5.12	9.61	199	49 / 77 8)	44 / 73 8)

Tolerance L: +0 / -0.118 inch

- 1) Other pressure ratings upon request.
- 2) 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).
- 3) 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).
- 4) Depending on the device design, the dimensions change according to the following table.

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

- 5) Connection flange DN 10
- 6) Connection flange 1/2"
- 7) Connecting dimensions in acc. with EN 1092-1. For DN 65, PN 16 in acc. with EN 1092-1, please order PN 40.
- 8) Weights for CL150 / CL300.
- 9) For devices with ordering code "Installation length JN" (China production site) the installation length corresponds to the ISO installation length.

8.2 Flange DN 150 ... 400 (6 ... 16")

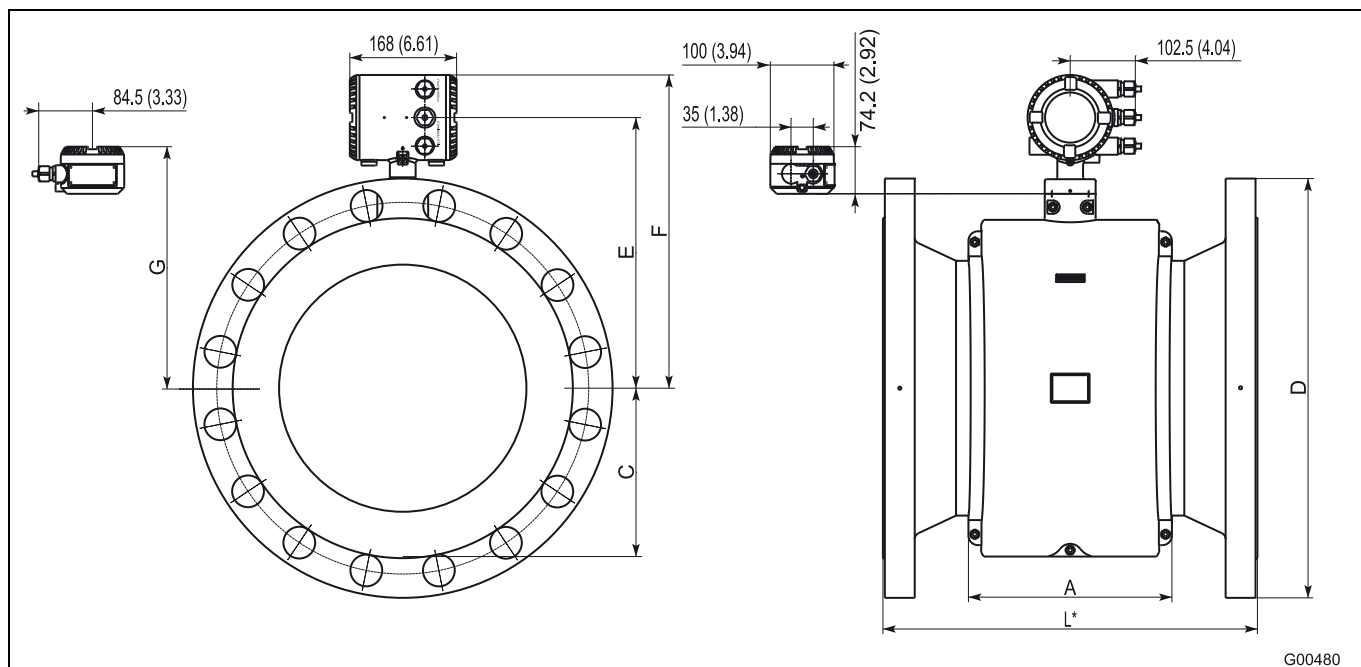


Fig. 39: Dimensions in mm (inch)

Flange in acc. with DIN/EN 1092-1

Dimensions [mm]								Approx. weight [kg]	
DN	PN ¹⁾	D	L ^{2) 3)}	F ⁴⁾	C	E ⁴⁾	G ⁴⁾	Integral mount design	Remote mount design
150	10 ... 16	285	300	358	146	291	246	33	31
	25 ... 40	300	300	358	146	291	246	39	37
200	10	340	350	399	170	331	286	41	39
	16	340	350	399	170	331	286	43	41
250	10	395	450	413	198	346	301	61	59
	16	405	450	413	198	346	301	65	63
300	10	445	500	436	228	369	324	74	72
	16	460	500	436	228	369	324	80	78
350	10	505	550	451	265	384	339	95	93
	16	520	550	451	265	384	339	110	108
400	10	565	600	493	265	426	381	103	101
	16	580	600	493	265	426	381	126	124

Tolerance L: DN 150 ... 200 +0 / -3 mm, DN 250 ... 400 +0 / -5 mm

Dimensions [inch]								Approx. weight [lb]	
DN (inch)	PN ¹⁾	D	L ^{2) 3)}	F ⁴⁾	C	E ⁴⁾	G ⁴⁾	Integral mount design	Remote mount design
150 (6)	10 ... 16	11.22	11.81	14.09	5.75	11.46	9.69	73	68
	25 ... 40	11.81	11.81	14.09	5.75	11.46	9.69	86	82
200 (8)	10	13.39	13.78	15.71	6.69	13.03	11.26	90	86
	16	13.39	13.78	15.71	6.69	13.03	11.26	95	90
250 (10)	10	15.55	17.72	16.26	7.80	13.62	11.85	135	130
	16	15.94	17.72	16.26	7.80	13.62	11.85	143	139
300 (12)	10	17.52	19.68	17.17	8.98	14.53	12.76	163	159
	16	18.11	19.68	17.17	8.98	14.53	12.76	176	172
350 (14)	10	19.88	21.65	17.76	10.43	15.12	13.35	209	203
	16	20.47	21.65	17.76	10.43	15.12	13.35	243	238
400 (16)	10	22.24	23.62	19.41	10.43	16.77	15.00	227	223
	16	22.83	23.62	19.41	10.43	16.77	15.00	278	273

Tolerance L: DN 150 ... 200 +0 / -0.118 inch, DN 250 ... 400 +0 / -0.197 inch

Flange in acc. with ASME B16.5

Dimensions [mm]												Approx. weight [kg]	
		CL150			CL300							Integral mount design	Remote mount design
		D	ISO 13359 L 2) 3) 6)	US installation length L 2) 3)	D	ISO 13359 L 2) 3) 6)	US installation length L 2) 3)						
DN	Inch							F 4)	C	E 4)	G 4)		
150	6	280	300	300	318	300	300	358	146	291	246	33 / 47 ⁵⁾	31 / 45 ⁵⁾
200	8	343	350	350	381	350	350	399	170	331	286	50 / 72 ⁵⁾	48 / 70 ⁵⁾
250	10	407	450	450	445	450	450	413	198	346	301	70 / 105 ⁵⁾	68 / 103 ⁵⁾
300	12	483	500	500	521	500	500	436	228	369	324	105 / 150 ⁵⁾	103 / 148 ⁵⁾
350	14	533	550	533	584	550	533	451	265	384	339	105 / 140 ⁵⁾	103 / 138 ⁵⁾
400	16	597	600	610	647	600	610	493	265	426	381	175 / 265 ⁵⁾	173 / 263 ⁵⁾

Tolerance L: DN 150 ... 200 +0 / -3 mm, DN 250 ... 400 +0 / -5 mm

Dimensions [inch]												Approx. weight [lb]	
		CL150			CL300							Integral mount design	Remote mount design
		D	ISO 13359 L 2) 3) 6)	US installation length L 2) 3)	D	ISO 13359 L 2) 3) 6)	US installation length L 2) 3)						
DN	Inch							F 4)	C	E 4)	G 4)		
150	6	11.02	11.81	11.81	12.52	11.81	11.81	14.09	5.75	11.46	9.69	73 / 104 ⁵⁾	68 / 99 ⁵⁾
200	8	13.5	13.78	13.78	15	13.78	13.78	15.71	6.69	13.03	11.26	110 / 158 ⁵⁾	106 / 154 ⁵⁾
250	10	16.02	17.72	17.72	17.52	17.72	17.72	16.26	7.8	13.62	11.85	154 / 232 ⁵⁾	150 / 227 ⁵⁾
300	12	19.02	19.69	19.69	20.51	19.69	19.69	17.17	8.98	14.53	12.76	232 / 150 ⁵⁾	227 / 326 ⁵⁾
350	14	20.98	21.65	20.98	22.99	21.65	20.98	17.76	10.43	15.12	13.35	232 / 140 ⁵⁾	227 / 304 ⁵⁾
400	16	23.5	23.62	24.02	25.47	23.62	24.02	19.41	10.43	16.77	15	386 / 584 ⁵⁾	381 / 580 ⁵⁾

Tolerance L: DN 150 ... 200 +0 / -0.118 inch, DN 250 ... 400 +0 / -0.197 inch

- 1) Other pressure ratings upon request.
- 2) If a grounding plate is installed (attached to one side of the flange), this increases dimension L by 5 mm (0.197 inch).
- 3) If protection plates are installed (attached to both sides of the flange), this increases dimension L by 10 mm (0.394 inch).
- 4) Depending on the device design, the dimensions change according to the following table.

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

- 5) Weights for CL150 / CL300.
- 6) For devices with ordering code "Installation length JN" (China production site) the installation length corresponds to the ISO installation length.

8.3 Flange DN 450 ... 2000 (18 ... 80")

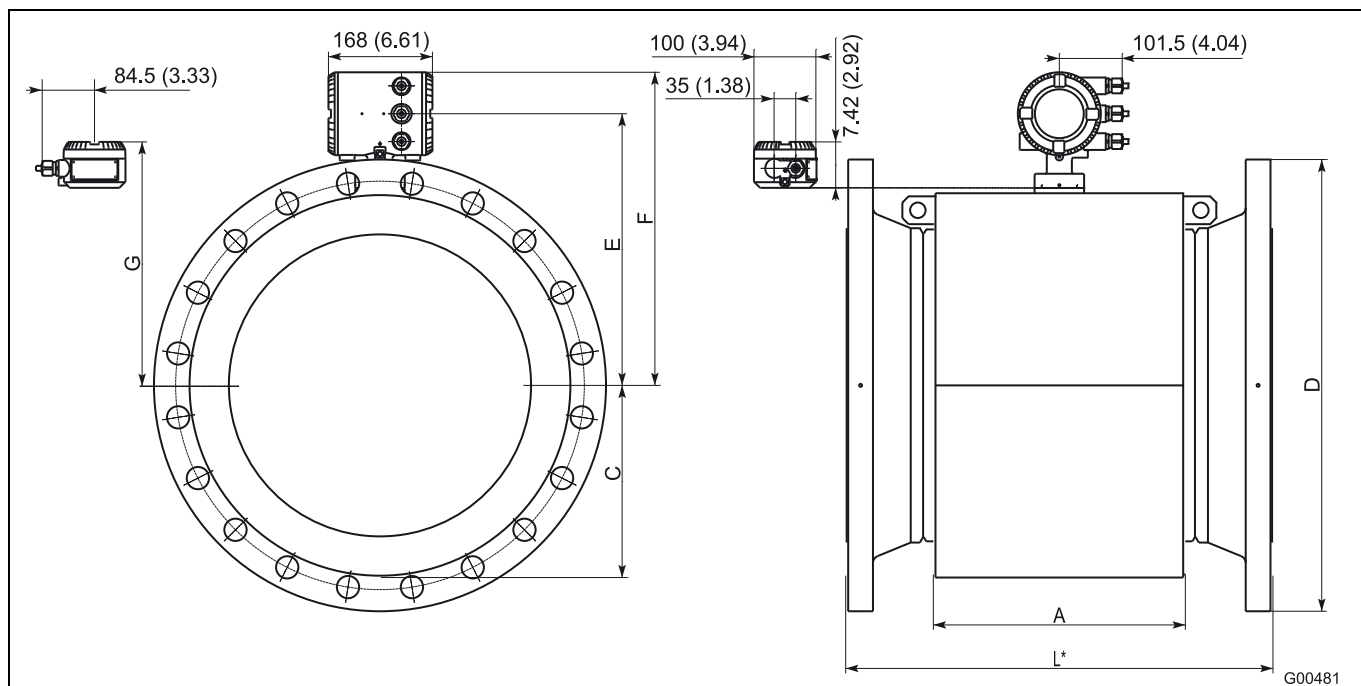


Fig. 40: Dimensions in mm (inch)

Flange in acc. with DIN/EN 1092-1

DN	PN 1)	Dimensions [mm]						Approx. weight [kg]	
		D	L 2) 3)	F 4)	C	E 4)	G 4)	Integral mount design	Remote mount design
500	10	670	650	501	310	434	389	190	188
	16	715	650	501	310	434	389	240	238
600	10	780	780	552	361	485	440	246	244
	16	840	780	552	361	485	440	318	316
700	10	895	910	596	405	529	484	320	318
	16	910	910	596	405	529	484	440	438
800	10	1015	1040	646	455	579	534	420	418
	16	1025	1040	646	455	579	534	490	488
900	10	1115	1170	696	505	629	584	505	503
	16	1125	1170	696	505	629	584	590	588
1000	10	1230	1300	746	555	679	634	690	688
	16	1255	1300	746	555	679	634	850	848
1200	6	1405	1560	856	660	789	742	700	698
	10	1455	1560	856	660	789	742	930	928
1400	6	1630	1820	950	755	884	838	810	808
	10	1675	1820	950	755	884	838	1210	1208
1600	6	1830	2080	1060	865	994	948	1180	1178
	10	1915	2080	1060	865	994	948	1630	1628
1800	6	2045	2340	1176	980	1109	1062	1490	1488
	10	2115	2340	1176	980	1109	1062	2230	2228
2000	6	2265	2600	1286	1090	1219	1172	1880	1878
	10	2325	2600	1286	1090	1219	1172	2650	2648

Tolerance L: DN 450 ... 500 +0 / -5 mm, DN 600 ... 2000 +0 / -10 mm

Dimensions [inch]								Approx. weight [lb]	
DN (inch)	PN 1)	D	L 2) 3)	F 4)	C	E 4)	G 4)	Integral mount design	Remote mount design
500 (20)	10	26.38	25.59	19.72	12.20	17.09	15.31	432	428
	16	28.15	25.59	19.72	12.2	17.09	15.31	529	525
600 (24)	10	30.71	30.71	21.73	14.21	19.09	17.32	608	604
	16	33.07	30.71	21.73	14.21	19.09	17.32	701	697
700 (28)	10	35.24	35.83	23.46	15.94	20.83	19.06	703	699
	16	35.83	35.83	23.46	15.94	20.83	19.06	970	966
800 (32)	10	39.96	40.94	25.43	17.91	22.80	21.02	902	897
	16	40.35	40.94	25.43	17.91	22.8	21.02	1080	1076
900 (36)	10	43.90	46.06	27.40	19.88	24.76	22.99	1073	1069
	16	44.29	46.06	27.4	19.88	24.76	22.99	1300	1296
1000 (40)	10	48.43	51.18	29.37	21.85	26.73	24.96	1276	1272
	16	49.41	51.18	29.37	21.85	26.73	24.96	1874	1869
1200 (48)	6	55.31	61.42	33.7	25.98	31.06	29.21	1543	1538
	10	57.28	61.42	33.7	25.98	31.06	29.21	2050	2046
1400 (54)	6	64.17	71.65	37.4	29.72	34.8	32.99	1786	1781
	10	65.94	71.65	37.4	29.72	34.8	32.99	2668	2663
1600 (66)	6	72.05	81.89	41.73	34.06	39.13	37.32	2602	2597
	10	75.39	81.89	41.73	34.06	39.13	37.32	3593	3589
1800 (72)	6	80.51	92.13	46.3	38.58	43.66	41.81	3285	3280
	10	83.27	92.13	46.3	38.58	43.66	41.81	4916	4912
2000 (80)	6	89.17	102.36	50.63	42.91	47.99	46.14	4145	4140
	10	91.54	102.36	50.63	42.91	47.99	46.14	5842	5838

Tolerance L: DN 500 +0 / -0.197 inch, DN 600 ... 2000 +0 / -0.394 inch

Flange up to DN 600 (24") in acc. with ASME B16.5, flange DN 700 ... 1000 (28 ... 40") in acc. with ASME B16.47, Series B

Dimensions [mm]									Approx. weight [kg]	
									Integral mount design	Remote mount design
									CL150	CL150
DN	Inch	CL150 D	ISO installation length L 2) 3) 5)	US installation length L 2) 3)	F 4)	C	E 4)	G 4)	Approx. kg	Approx. kg
450	18	635	686	686	501	310	434	389	260	258
500	20	699	762	762	501	310	434	389	300	298
600	24	813	914	914	552	361	485	440	425	423
700	28	837	910	-	596	405	529	484	350	348
800	32	942	1040	-	646	455	579	534	500	498
900	36	1057	1170	-	696	505	629	584	680	678
1000	40	1380	1300	-	746	555	679	634	880	878

Tolerance L: DN 450 ... 500 +0 / -5 mm, DN 600 ... 2000 +0 / -10 mm

Dimensions [inch]									Approx. weight [lb]	
									Integral mount design	Remote mount design
									CL150	CL150
DN	Inch	CL150 D	ISO installation length L 2) 3) 5)	US installation length L 2) 3)	F 4)	C	E 4)	G 4)	Approx. lb	Approx. lb
450	18	25.0	27.01	27.01	19.72	12.20	17.09	15.31	573	569
500	20	27.52	30	30	19.72	12.20	17.09	15.31	661	657
600	24	32.01	35.98	35.98	21.73	14.21	19.09	17.32	937	933
700	28	32.95	35.83	-	23.46	15.94	20.83	19.06	772	767
800	32	37.09	40.94	-	25.43	17.91	22.80	21.02	1102	1098
900	36	41.61	46.06	-	27.40	19.88	24.76	22.99	1499	1495
1000	40	54.33	51.18	-	29.37	21.85	26.73	24.96	1940	1936

Tolerance L: DN 450 ... 500 +0 / -0.197 inch, DN 600 ... 2000 +0 / -0.394 inch

- 1) Other pressure ratings available on request.
- 2) If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 400 ... 600 by 5 mm (0.197 inch).
- 3) If protection plates are installed (attached to both sides of the flange), this increases dimension L as follows: DN 400 ... 600 by 10 mm (0.394 inch).
- 4) Depending on the device design, the dimensions change according to the following table.

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

5) For devices with ordering code "Installation length JN" (China production site) the installation length corresponds to the ISO installation length.

8.4 Flange DN 15 ... 200 (1/2 ... 8"), high-pressure versions PN 63 and PN 100

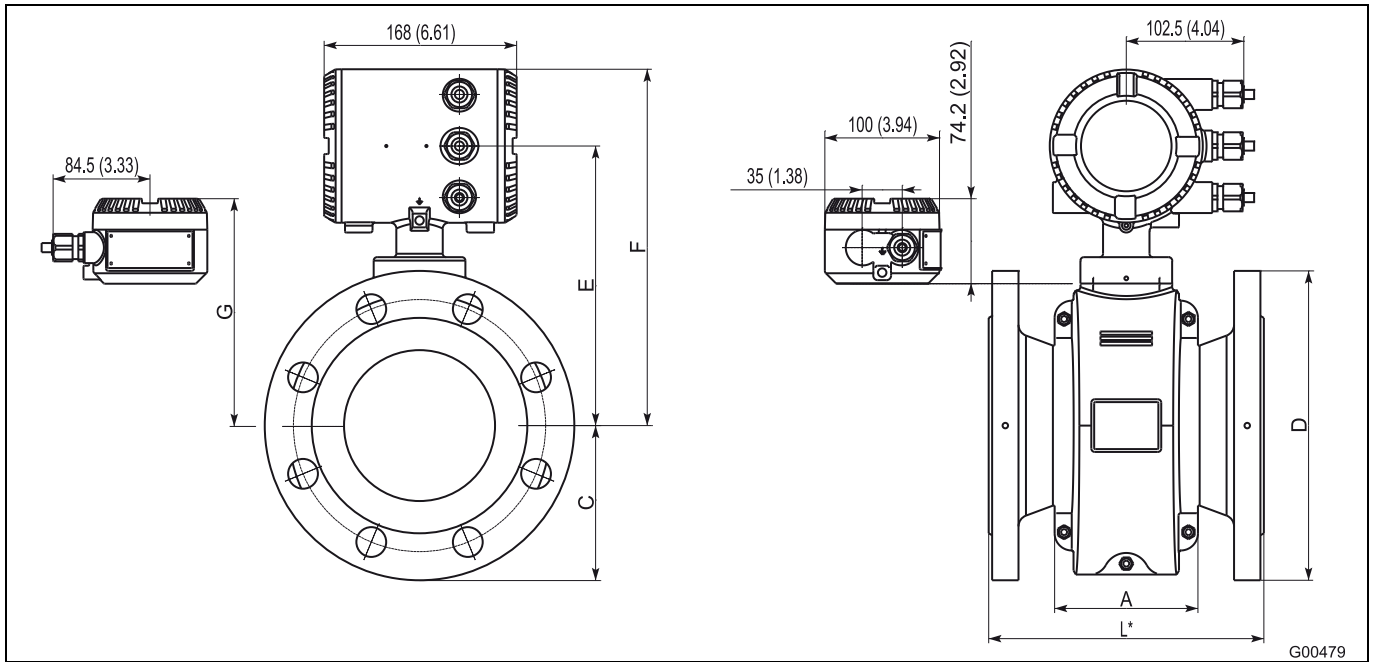


Fig. 41: Dimensions in mm (inch)

Flange in acc. with DIN 2636 (PN 63) and DIN 2637 (PN 100)

Dimensions [mm (inch)]								Approx. weight [kg (lb)]	
DN (inch)	PN	D	L ^{1) 2)}	F ⁴⁾	C	E ³⁾	G ³⁾	Integral mount design	Remote mount design
15 (1/2)	63 ... 100	105	270	255	82	188	143	10	8
		(4.13)	(10.63)	(10.04)	(3.23)	(7.4)	(5.63)	(22)	(18)
25 (1)	63 ... 100	140	270	255	82	188	143	12	10
		(5.51)	(10.63)	(10.04)	(3.23)	(7.4)	(5.63)	(27)	(22)
40 (1 1/2)	63 ... 100	170	280	262	92	195	150	13 / 14	11 / 12
		(6.69)	(11.02)	(10.31)	(3.62)	(7.68)	(5.91)	(29 / 31)	(24 / 27)
50 (2)	63	180	280	268	97	201	156	15	13
		(7.09)	(11.02)	(10.55)	(3.82)	(7.91)	(6.14)	(33)	(29)
	100	195	280	268	97	201	156	18	16
		(7.68)	(11.02)	(10.55)	(3.82)	(7.91)	(6.14)	(40)	(35)
65 (2 1/2)	63	205	330	279	108	212	167	18	16
		(8.07)	(12.99)	(10.98)	(4.25)	(8.35)	(6.57)	(40)	(35)
	100	220	330	279	108	212	167	23	21
		(8.66)	(12.99)	(10.98)	(4.25)	(8.35)	(6.57)	(51)	(46)
80 (3)	63	215	340	279	108	212	167	22	20
		(8.46)	(13.39)	(10.98)	(4.25)	(8.35)	(6.57)	(49)	(44)
	100	230	340	279	108	212	167	26	24
		(9.06)	(13.39)	(10.98)	(4.25)	(8.35)	(6.57)	(57)	(53)
100 (4)	63	250	400	301	122	234	189	29	27
		(9.84)	(15.75)	(11.85)	(4.8)	(9.21)	(7.44)	(64)	(60)
	100	265	400	301	122	234	189	38	26
		(10.43)	(15.75)	(11.85)	(4.8)	(9.21)	(7.44)	(84)	(57)

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Dimensions [mm (inch)]								Approx. weight [kg (lb)]	
DN	PN	D	L ^{1) 2)}	F ⁴⁾	C	E ³⁾	G ³⁾	Integral mount design	Remote mount design
125 (5)	63	295 (11.61)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)	On request	On request
	100	315 (12.4)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)		
150 (6)	63	345 (13.58)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)		
	100	355 (13.98)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)		
200 (8)	63	415 (16.34)	500 (19.69)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)		
	100	430 (16.93)	500 (19.69)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)		

Tolerance L: +0 / -3 mm (+0 / -0,018 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 temperature design	0	0
	High temperature version	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Div. 1	Standard temperature design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High temperature version	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Div. 2	Standard temperature design	0	0
	High temperature version	+127 mm (+5 inch)	+127 mm (+5 inch)

8.5 Flange DN 15 ... 200 (1/2 ... 8"), high-pressure version CL 600

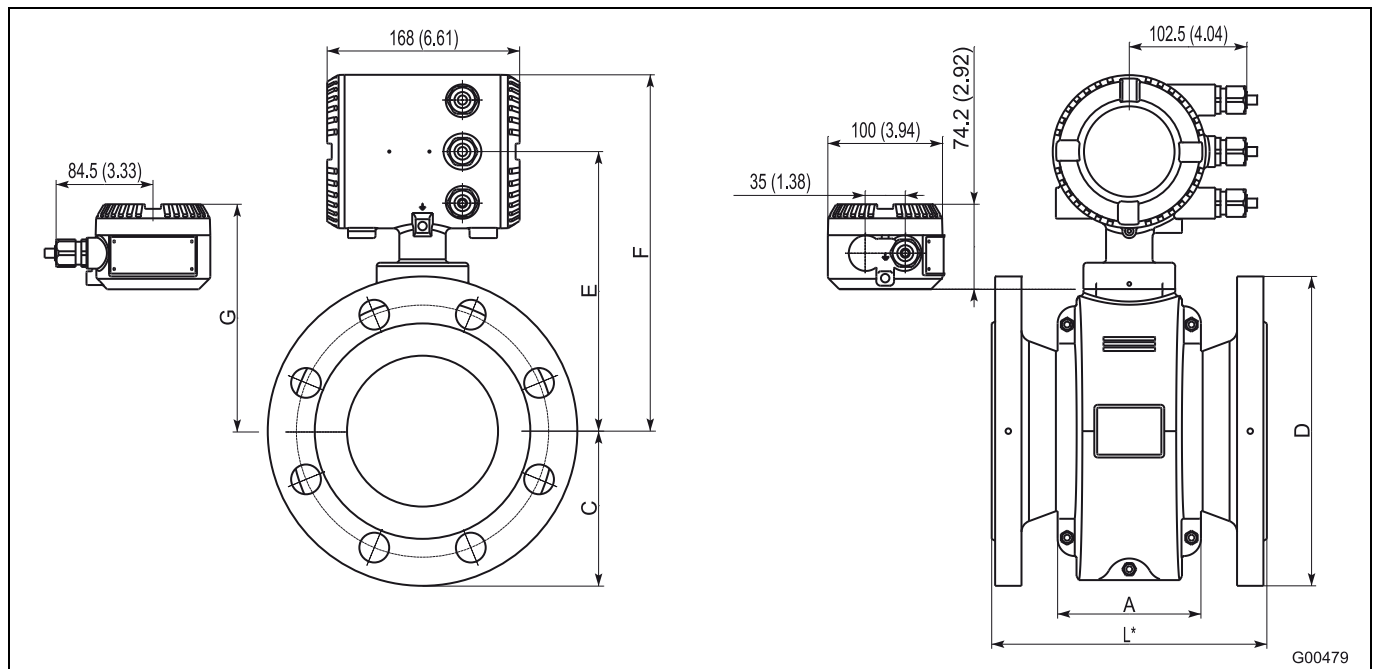


Fig. 42: Dimensions in mm (inch)

Flange in acc. with ASME B16.5, CL 600

Dimensions [mm (inch)]								Approx. weight [kg (lb)]	
DN	PN 1)	D	L 1) 2)	F 4)	C	E 3)	G 3)	Integral mount design	Remote mount design
15	CL 600	95 (3.74)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	12 (26)	10 (22)
25	CL 600	124 (4.88)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)	12 (26)	10 (22)
40	CL 600	156 (6.14)	280 (11.02)	262 (10.31)	92 (3.62)	195 (7.68)	150 (5.91)	13 (29)	11 (24)
50	CL 600	165 (6.5)	280 (11.02)	268 (10.55)	97 (3.82)	201 (7.91)	156 (6.14)	15 (33)	13 (29)
65	CL 600	190 (7.48)	330 (12.99)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)	20 (44)	18 (40)
80	CL 600	210 (8.27)	340 (13.39)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)	25 (55)	23 (51)
100	CL 600	273 (10.75)	400 (15.75)	301 (11.85)	122 (4.8)	234 (9.21)	189 (7.44)	46 (101)	44 (97)
125	CL 600	330 (12.99)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)	On request	On request
150	CL 600	355 (13.98)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)		
200	CL 600	420 (16.54)	500 (19.69)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)		

Tolerance L: +0 / -3 mm (+0 / -0,018 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 temperature design	0	0
	High temperature version	+127 mm (+5 inch)	+127 mm (+5 inch)
Explosion protection Zone 1, Div. 1	Standard temperature design	+74 mm (+2.91 inch)	+47 mm (+1.85 inch)
	High temperature version	+127 mm (+5 inch)	+174 mm (+6.85 inch)
Explosion protection Zone 2, Div. 2	Standard temperature design	0	0
	High temperature version	+127 mm (+5 inch)	+127 mm (+5 inch)

8.6 Flowmeter sensor model FET321 and FET325 zone 2, Div 2

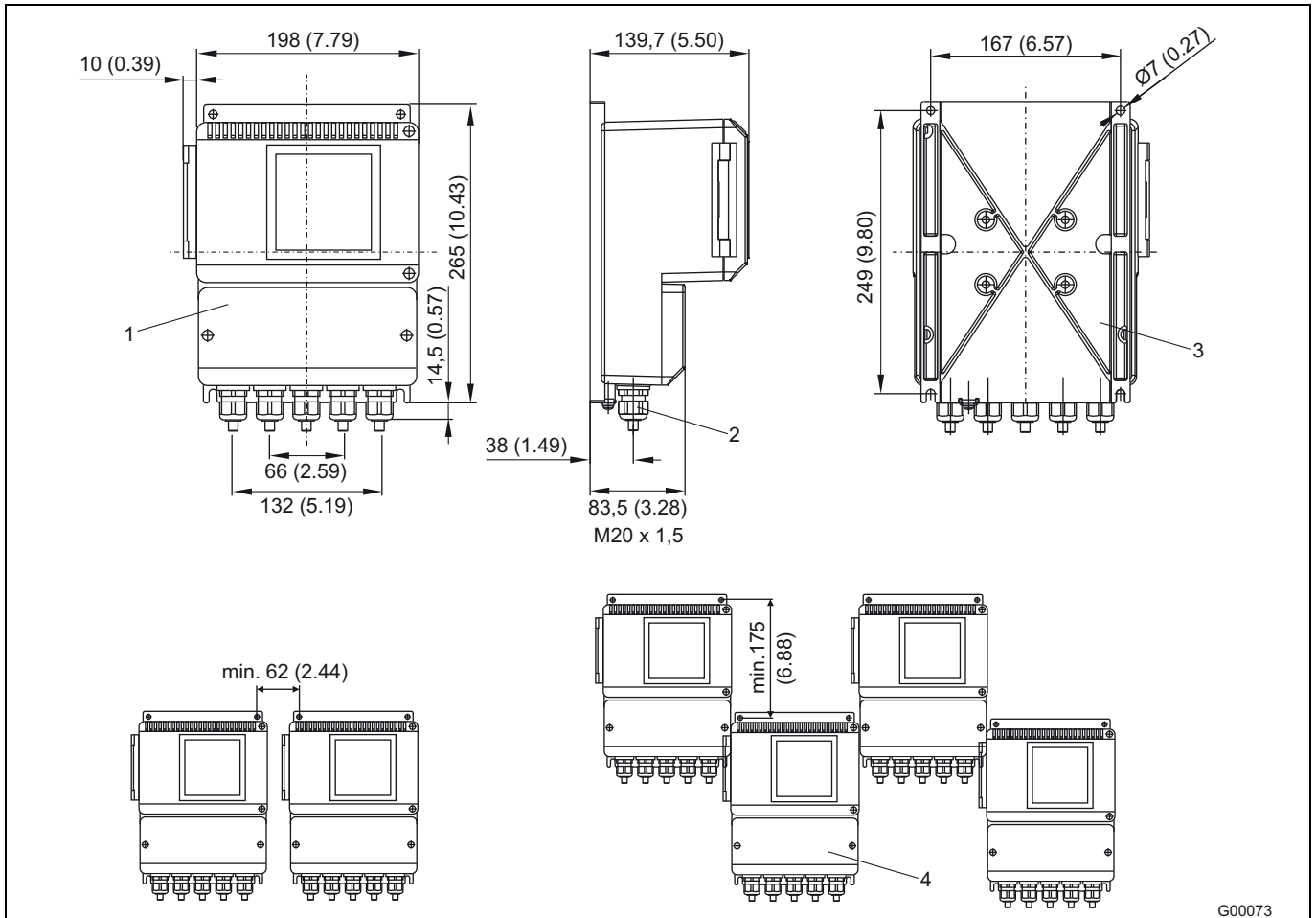


Fig. 43: Dimensions in mm (inch)

- 1 Field-mount housing with window
- 2 Cable gland M20 x 1.5
- 3 Installation holes for pipe mounting set, for 2" pipe installation; mounting set available on request (order no. 3KXF081100L0001)
- 4 Protection class IP 67

8.7 Transmitter housing for model FET325 for Ex zone 1 / Div. 1

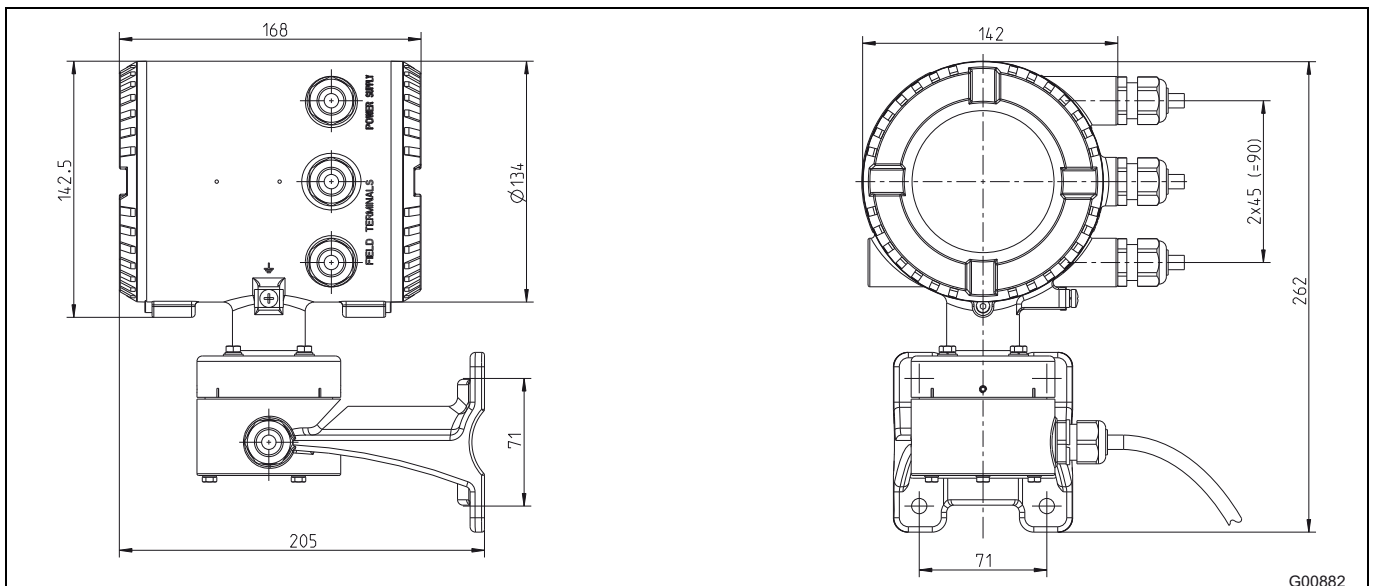


Fig. 44: Dimensions in mm (inch)

9 Ordering information

9.1 ProcessMaster FEP311, FEP315 electromagnetic flowmeter, compact design

Version number	Main order number																											Additional order no.	
	1 - 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27							
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	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	X	X	X	XX		
Bore 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 600 (24 in.)		6	0	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 1200 (48 in.)		2	0	1																									
DN 1400 (54 in.)		4	0	1																									
DN 1600 (66 in.)		6	0	1																									
DN 1800 (72 in.)		8	0	1																									
DN 2000 (80 in.)		0	0	2																									
Liner Material																													
PTFE																													A
ETFE																													E
Thick PTFE																													F
Hard rubber																													H
Elastomer (Feeder factory: USA only)					1)																							M	
PFA																													P
Soft rubber																													S
Electrode Design																													
Standard																													1
Standard + full pipe detection electrode (TFE)						2)																							2
Pointed head																													5
Pointed head + full pipe detection electrode (TFE)						2)																							6
Measuring Electrodes Material																													
Stainless steel 904 (1.4539)																													A
Hastelloy C-4 (2.4610)																													D
Titanium																													F
Tantalum																													G
Hastelloy B-3 (2.4600)																													H
Platinum-Iridium																													J
Stainless steel 316Ti (1.4571)																													S

Continued on next page

- 1) Only for US production site, model FEP315, FEP325 (approval certificates: without PED approval, process connection: Flange ASME CI 150 / 300, length: US installation length)
- 2) TFE electrode for detecting partially filled tubes, available from DN 50 (2 in.). Not available for Zone 1 / Div 1

Continued

Version number	Main order number																											Additional order no.
	1-6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27						
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	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	X	X	XX		
Grounding Accessories																												
Standard								1																				
Grounding electrodes, material same as measuring electrodes material								2																				
Grounding plate, stainless steel, mounted onto one side							3)	3																				
Grounding plates, stainless steel, mounted onto both sides							3)	4																				
Process Connection Type																												
Flanges DIN PN 6								4)	D	0																		
Flanges DIN PN 10									D	1																		
Flanges DIN PN 16									D	2																		
Flanges DIN PN 25									D	3																		
Flanges DIN PN 40									D	4																		
Flanges DIN PN 64								5)	D	5																		
Flanges DIN PN 100								5)	D	6																		
Flanges ANSI / ASME B16.5 / 16.47 series B Class 150									A	1																		
Flanges ANSI / ASME B16.5 / 16.47 series B Class 300									A	3																		
Flanges ANSI / ASME B16.5 / 16.47 series B Class 600								5)	A	6																		
Flange, JIS 10K									J	1																		
Process Connection Material																												
Carbon steel flanges									B																			
Stainless steel flanges								6)	D																			
Usage Certifications																												
Meter tube with PED certificate (Pressure Equipment Directive)										0																		
Meter tube without PED certificate ('Feeder Factory China and USA only. Lay Length J1, J3 or JN to be specified)										1																		
Material monitoring with inspection certificate 3.1 acc. EN 10204										2																		
Pressure test acc. AD2000										3																		
Material monitoring with inspection certificate 3.1 acc. EN 10204 and pressure test acc. AD2000										4																		
Calibration Type																												
Standard factory calibration - Without ScanMaster								7)		A																		
High accuracy factory calibration - Without ScanMaster								8)		B																		
Standard factory calibration - With ScanMaster								7)		K																		
High accuracy factory calibration - With ScanMaster								8)		L																		
Witnessed factory calibration										M																		
5-point calibration acc. DKD								9)		T																		
Temperature Range of Installation / Ambient Temperature Range																												
Standard design / -20 ... 60 °C (-4 ... 140 °F)									10)	1																		
Standard design / -40 ... 60 °C (-40 ... 140 °F)									10)	2																		
High temperature design / -20 ... 60 °C (-4 ... 140 °F)									11)	3																		
High temperature design / -40 ... 60 °C (-40 ... 140 °F)									11)	4																		
Name Plate																												
Adhesive label																										A		
Stainless steel																										B		
Stainless steel and TAG plate (stainless steel)																										C		

Continued on next page

- 3) Can only be used for sensors ≤ DN 600 (24 in) and PTFE/thick PTFE/ETFE/PFA linings. Material: See data sheet
- 4) Available from DN 1000 (40 in.)
- 5) DN 15 ... DN 200 (1/2 ... 8 in.) Hard rubber.
- 6) Material: See data sheet.
- 7) 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".
- 8) 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.)
- 9) Available for nominal diameters DN 50 (2 in.) ... 600 (24 in.), DN 800 (32 in.).
- 10) Maximum fluid temperature for standard sensor design: 130 °C with PTFE, PFA, ETFE, thick PTFE / 90 °C with hard rubber / 60 °C with soft rubber.
- 11) 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.

Continued

Version number	Main order number																				Additional order no.				
	1-6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	27		
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	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	XX		
Signal Cable Length and Type																									
Without signal cable																							0		
Explosion Protection Certification																									
Without																							12)	A	
ATEX / IEC Zone 1																								L	
ATEX / IEC Zone 2/21																								M	
usFMc Div 2 Zone 2																								P	
usFMc Div 1																							13)	R	
NEPSI Zone1																							14)	U	
NEPSI Zone2																							14)	V	
Protection Class Transmitter / Protection Class Sensor																									
IP 67 (NEMA 4X) / IP 67 (NEMA 4X)																							1		
Others																							9		
Cable Conduits																									
M20 x 1.5																								A	
1/2 in. NPT																								B	
PF 1/2 in.																								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	
Input and Output Signal Type																									
HART + 20 mA passive + Pulse + Contact I/O																							15)	B	
HART + 20 mA active + Pulse + Contact I/O																							16)	C	
HART + 20 mA active + Pulse + Contact Output																							17)	D	
PROFIBUS PA + contact output																								E	
FOUNDATION Fieldbus + contact output																								F	
Configuration Type / Diagnostics Type																									
Parameters set to factory defaults / Standard diagnostic functions activated																								1	
Parameters set customer specific / Standard diagnostic functions activated																								3	
Accessories																									
Without																									AY
Lay Length																									
Flanges ASME Class 150 (North American Lay Length) (Feeder factory USA only (Certificate: without PED))																									J1
Flanges ASME Class 300 (North American Lay Length) (Feeder factory USA only (Certificate: without PED))																									J3
Flanges ASME Class 150 (ISO Lay Length)																									JA
Flanges ASME Class 300 (ISO Lay Length)																									JC
Flanges (Chinese Lay Length) (Feeder factory China only (Certificate: without PED))																									JN
Connector																									
Fieldbus M12 x 1																							18)		U2
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

Continued on next page

- 12) Model FEP311 only.
- 13) Div 1 available up to DN 300 (12 in.).
- 14) Production site: China.
- 15) Choice with design Zone 2 / Div 2 or Zone 1 / Div1.
- 16) Choice with design Zone 2 / Div 2.
- 17) Choice with design Zone 1 / Div 1.
- 18) Only for PROFIBUS PA Not for model FEP315.

Continued

Version number	Main order number																											Additional order no.
	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27						
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	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	X	X	X	X	XX
Other Usage Certifications																											19)	
Russia, Metrological and GOST-R Certificate																												CG1
Kazakhstan, Metrological and GOST-K Certificate																												CG2
Ukraine, Metrological Certificate																												CG3
Belarus, Metrological Certificate																												CG6
Other Explosion Protection, Certifications and Approvals																											19)	
Russia, GOST - Ex and RTN Certificate																												EG7
Kazakhstan, Ex Permission Certificate																												EG3
Ukraine, GOST-Ex and Ex Permission Certificate																												EG5
Belarus, GGTN Certificate																												EG9
Number of Testpoints																												
3 points																												P3
5 points																												P5

19) Not available for PROFIBUS PA or FOUNDATION Fieldbus.

9.2 ProcessMaster FEP321, FEP325 electromagnetic flowmeter, remote mount design

Version number	Main order number																											Additional order no.
	1 - 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	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	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	X	X	XX		
Bore 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 600 (24 in.)		6	0	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 1200 (48 in.)		2	0	1																								
DN 1400 (54 in.)		4	0	1																								
DN 1600 (66 in.)		6	0	1																								
DN 1800 (72 in.)		8	0	1																								
DN 2000 (80 in.)		0	0	2																								
Liner Material																												
PTFE																												A
ETFE																												E
Thick PTFE																												F
Hard rubber																												H
Elastomer (Feeder factory: USA only)					1)																						M	
PFA																												P
Soft rubber																												S
Electrode Design																												
Standard																												1
Standard + full pipe detection electrode (TFE)					2)																							2
Pointed head																												5
Pointed head + full pipe detection electrode (TFE)					2)																							6
Measuring Electrodes Material																												
Stainless steel 904 (1.4539)																												A
Hastelloy C-4 (2.4610)																												D
Titanium																												F
Tantalum																												G
Hastelloy B-3 (2.4600)																												H
Platinum-Iridium																												J
Stainless steel 316Ti (1.4571)																												S

Continued on next page

- 1) Only for US production site, model FEP315, FEP325 (approval certificates: without PED approval, process connection: Flange ASME CI 150 / 300, length: US installation length)
- 2) TFE electrode for detecting partially filled tubes, available from DN 50 (2 in.). Not available for Zone 1 / Div 1

Continued

Version number	Main order number																											Additional order no.
	1-6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	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	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	X	X	X	X	XX
Grounding Accessories																												
Standard								1																				
Grounding electrodes, material same as measuring electrodes material								2																				
Grounding plate, stainless steel, mounted onto one side							3)	3																				
Grounding plates, stainless steel, mounted onto both sides							3)	4																				
Process Connection Type																												
Flanges DIN PN 6								4)	D	0																		
Flanges DIN PN 10									D	1																		
Flanges DIN PN 16									D	2																		
Flanges DIN PN 25									D	3																		
Flanges DIN PN 40									D	4																		
Flanges DIN PN 64								5)	D	5																		
Flanges DIN PN 100								5)	D	6																		
Flanges ANSI / ASME B16.5 / 16.47 series B Class 150									A	1																		
Flanges ANSI / ASME B16.5 / 16.47 series B Class 300									A	3																		
Flanges ANSI / ASME B16.5 / 16.47 series B Class 600								5)	A	6																		
Flanges JIS 10K									J	1																		
Process Connection Material																												
Carbon steel flanges										B																		
Stainless steel flanges								6)	D																			
Usage Certifications																												
Meter tube with PED certificate (Pressure Equipment Directive)										0																		
Meter tube without PED certificate (Feeder Factory China and USA only. Lay Length J1, J3 or JN to be specified)										1																		
Material monitoring with inspection certificate 3.1 acc. EN 10204										2																		
Pressure test acc. AD2000										3																		
Material monitoring with inspection certificate 3.1 acc. EN 10204 and pressure test acc. AD2000										4																		
Calibration Type																												
Standard factory calibration - Without ScanMaster									7)	A																		
High accuracy factory calibration - Without ScanMaster									8)	B																		
Standard factory calibration - With ScanMaster									7)	K																		
High accuracy factory calibration - With ScanMaster									8)	L																		
Witnessed factory calibration										M																		
5-point calibration acc. DKD									9)	T																		
Temperature Range of Installation / Ambient Temperature Range																												
Standard design / -20 ... 60 °C (-4 ... 140 °F)										10)	1																	
Standard design / -40 ... 60 °C (-40 ... 140 °F)										10)	2																	
High temperature design / -20 ... 60 °C (-4 ... 140 °F)										11)	3																	
High temperature design / -40 ... 60 °C (-40 ... 140 °F)										11)	4																	
Name Plate																												
Adhesive label																												A
Stainless steel																												B
Stainless steel and TAG plate (stainless steel)																												C

Continued on next page

- 3) Can only be used for sensors ≤ DN 600 (24 in.) and PTFE/thick PTFE/ETFE/PFA linings. Material: See data sheet
- 4) Available from DN 1000 (40 in.)
- 5) DN 15 ... DN 200 (1/2 ... 8 in.) Hard rubber.
- 6) Material: See data sheet.
- 7) 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".
- 8) 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.)
- 9) Available for nominal diameters DN 50 (2 in.) ... 600 (24 in.), DN 800 (32 in.).
- 10) Maximum fluid temperature for standard sensor design: 130 °C with PTFE, PFA, ETFE, thick PTFE / 90 °C with hard rubber / 60 °C with soft rubber.
- 11) 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.

Continued

Version number	Main order number																				Additional order no.		
	1-6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	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	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	XX
Signal Cable Length and Type																							
Without signal cable																							
5 m (15 ft) standard cable																							0
10 m (30 ft) standard cable																							1
20 m (60 ft) standard cable																							2
30 m (100 ft) standard cable																							3
50 m (165 ft) standard cable																							4
80 m (260 ft) standard cable																							5
100 m (325 ft) standard cable																							6
150 m (490 ft) standard cable																							7
Explosion Protection Certification																							
Without																							13) A
ATEX / IEC Zone 1																							L
ATEX / IEC Zone 2/21																							M
usFMc Div 2 Zone 2																							P
usFMc Div 1																							14) R
NEPSI Zone1																							15) U
NEPSI Zone2																							15) V
Protection Class Transmitter / Protection Class Sensor																							
IP 67 (NEMA 4X) / IP 67 (NEMA 4X)																							1
IP 67 (NEMA 4X) / IP 68 (NEMA 6P), cable not fitted and potted																							16) 2
IP 67 (NEMA 4X) / IP 68 (NEMA 6P), cable fitted and potted																							17) 3
Cable Conduits																							
M20 x 1.5																							A
1/2 in. NPT																							B
PF 1/2 in.																							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
Accessories																							
Without																							
With pre-amplifier installed in sensor terminal box																							18) AY AP
Lay Length																							
Flanges ASME Class 150 (North American Lay Length) (Feeder factory USA only (Certificate: without PED))																							J1
Flanges ASME Class 300 (North American Lay Length) (Feeder factory USA only (Certificate: without PED))																							J3
Flanges ASME Class 150 (ISO Lay Length)																							JA
Flanges ASME Class 300 (ISO Lay Length)																							JC
Flanges (Chinese Lay Length) (Feeder factory China only (Certificate: without PED))																							JN
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

Continued on next page

- 12) 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.
- 13) Model FEP321 only.
- 14) Div 1 available up to DN 300 (12 in.).
- 15) Production site: China.
- 16) Only with external transmitter, sealing compound (optional) D141B038U01.
- 17) Not available with FET325 transmitter in Zone1 / Div1 design.
- 18) Pre-amplifier required if signal cable length is > 50 m (160 ft). Pre-amplifier not available for Zone1 / Div1.

Continued

Version number	Main order number																											Additional order no.
	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	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	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	X	X	X	XX	
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	
Other Usage Certifications																												
Russia, Metrological and GOST-R Certificate																										19)	CG1	
Kazakhstan, Metrological and GOST-K Certificate																											CG2	
Ukraine, Metrological Certificate																											CG3	
Belarus, Metrological Certificate																											CG6	
Other Explosion Protection, Certifications and Approvals																												
Russia, GOST - Ex and RTN Certificate																										19)	EG7	
Kazakhstan, Ex Permission Certificate																											EG3	
Ukraine, GOST-Ex and Ex Permission Certificate																											EG5	
Belarus, GGTN Certificate																											EG9	
Number of Testpoints																												
3 points																											P3	
5 points																											P5	

19) Not available for PROFIBUS PA or FOUNDATION Fieldbus.

9.3 FET321, FET325 external transmitter for ProcessMaster/HygienicMaster

	Main order number															Additional order no.	
	Version number	1 - 6	7	8	9	10	11	12	13	14	15						
Without explosion protection	FET321	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX	
With explosion protection	FET325	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX	
Temperature Range of Installation / Ambient Temperature Range																	
Standard design / -20 ... 60 °C (-4 ... 140 °F)			1														
Standard design / -40 ... 60 °C (-40 ... 140 °F)			2														
High temperature design / -20 ... 60 °C (-4 ... 140 °F)			3														
High temperature design / -40 ... 60 °C (-40 ... 140 °F)			4														
Name Plate																	
Adhesive label					A												
Stainless steel					B												
Stainless steel and TAG plate (stainless steel)					C												
Signal Cable Length and Type																	
Without signal cable			1)	0													
Explosion Protection Certification																	
Without									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)	R												
NEPSI Zone1				2) 3)	U												
NEPSI Zone2				2) 3)	V												
Protection Class Transmitter / Protection Class Sensor																	
IP 67 (NEMA 4X) / IP 67 (NEMA 4X)									1								
Cable Conduits																	
M20 x 1.5										A							
1/2 in. NPT										B							
PF 1/2 in.										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				
Input and Output Signal Type																	
HART + 20 mA passive + Pulse + Contact I/O												4)	B				
HART + 20 mA active + Pulse + Contact I/O												5)	C				
HART + 20 mA active + Pulse + Contact Output												6)	D				
PROFIBUS PA + contact output													E				
FOUNDATION Fieldbus + contact output													F				
Configuration Type / Diagnostics Type																	
Without / standard diagnostic functions													7)	0			
Parameters set to factory defaults / Standard diagnostic functions activated														1			
Parameters set customer specific / Standard diagnostic functions activated														3			
Other Usage Certifications																	
PMO approval (US market only)																	CR
Connector																	
Fieldbus M12 x 1															8)		U2
Other Options																	
With Gore-tex membrane															9)		KG

- 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) Choice with design Zone 2 / Div 2 or Zone 1 / Div1 or Zone 1 / Div1 or without explosion protection.
- 5) Choice with design Zone 2 / Div 2 or without explosion protection.
- 6) Choice with design Zone 1 / Div 1.
- 7) Must be selected if transmitter is being ordered as a spare part or without a sensor.
- 8) Only for Profibus PA, not for model FET325.
- 9) Model FET321 only

Version number	Main order number										Additional order no.	
	1 – 6	7	8	9	10	11	12	13	14	15		
Without explosion protection	FET321	X	X	X	X	X	X	X	X	X	X	XX
With explosion protection	FET325	X	X	X	X	X	X	X	X	X	X	XX
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	
Other Usage Certifications											10)	
Russia, Metrological and GOST-R Certificate											CG1	
Kazakhstan, Metrological and GOST-K Certificate											CG2	
Ukraine, Metrological Certificate											CG3	
Belarus, Metrological Certificate											CG9	
Other Explosion Protection, Certifications and Approvals											10)	
Russia, GOST - Ex and RTN Certificate											EG7	
Kazakhstan, Ex Permission Certificate											EG3	
Ukraine, GOST-Ex and Ex Permission Certificate											EG5	
Belarus, GGTN Certificate											EG9	

10) Not available for PROFIBUS PA or FOUNDATION Fieldbus.

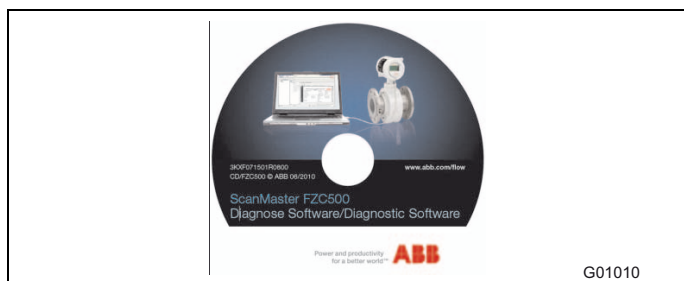
9.4 FET301 transmitter plug-in module for ProcessMaster/HygienicMaster

Version number	Main order number										Additional order no.						
	1-6	7	8	9	10	11	12	13	14	15							
	FET301	X	X	X	X	X	X	X	X	X							XX
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																	
FOUNDADA FOUNDATION Fieldbus + contact output																	
F																	
Configuration Type / Diagnostics Type																	
Without / Standard diagnostic functions																	
0																	
Language of Documentation																	
German																	
English																	
Chinese																	
Russian																	
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																	
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																	
M1																	
M5																	
M6																	
MB																	
MW																	
ME																	

9.5 FXC4000 flowmeter sensor simulator

Version number	Main order 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 board for converter type FET321, FET325, FET521, FET525						
6						
Design level (specified by ABB)						
*						
Name Plate						
German						
1						
English						
2						
French						
3						

9.6 Diagnostic and verification software - ScanMaster FZC500

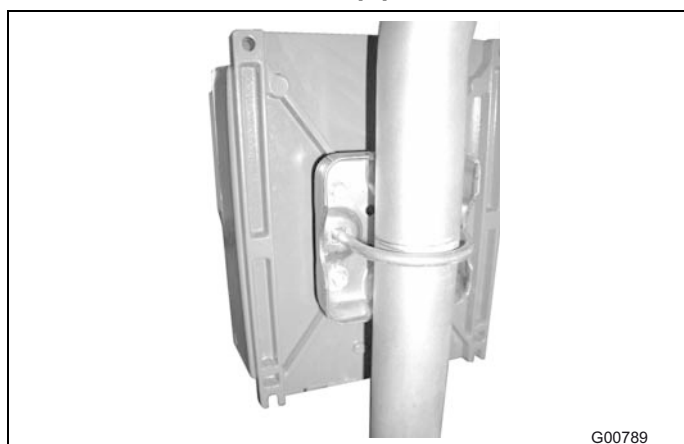


ScanMaster allows you to easily check the installed device for proper functioning. The determined test and verification results are stored in a database and can be printed if required.

9.7 Infrared service port adapter type FZA100



9.8 Installation set for 2" pipe installation in field-mount housing



Part number: 3KXF081100L0001

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