Data Sheet DS/FEP500-EN Rev. D

ProcessMaster FEP500
Electromagnetic Flowmeter

The process industry's first choice

Measurement made easy



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

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

Extended diagnostic functions
- Electrode coating detection
- Gas bubble detection
- Partial filling detection
- Conductivity monitoring
- Sensor temperature monitoring
- Trend analysis

Batch functionality
- Presetting counter, overrun correction, external start/stop, batch end contact

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

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

Approvals for explosion protection
- In accordance with ATEX, IECEx
- In accordance with FM, cFM

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

EUROTEC
TECNOLOGIE IMPIANTISTICHE - AUTOMAZIONE - TELECONTROLLO

The company

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 process industry standard

ProcessMaster is designed specifically to meet the increased requirements for modern 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 plant availability and reduce downtimes.

ScanMaster – the diagnostic tool

Can I rely on the measured values?
How can I determine the technical condition of my device?
ScanMaster can answer these frequently asked questions.
ScanMaster provides an easy way of checking that the device is functioning correctly
using the infrared service port or the HART protocol.



Extended 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. If these limit values are exceeded, an alarm is triggered.
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 NAMUR requirements.
In the event of an error, a diagnostic-dependent help text shown on the display considerably simplifies and accelerates the troubleshooting procedure. This ensures maximum safety for the process.

Superior and reliable new sensor design

The ProcessMaster flowmeter has an especially short response time due to the sensor's high excitation frequency.
Modern filtering methods separate the interference signal from the measuring signal, enabling a highly precise measurement even under difficult conditions (maximum measuring error of 0.2 % of the measured value).
Self-cleaning, double-sealed polished measuring electrodes enhance the device's reliability and measuring performance.

Quick, easy commissioning

Advanced memory technology inside the sensor eliminates the need to check that the sensor and transmitter match. The built-in SensorMemory feature enables the transmitter to automatically detect the sensor. Once the power supply has been powered up, the transmitter self-configuration function runs. The sensor data and parameters specific to the measuring point are loaded automatically. This eliminates errors and results in faster, more reliable commissioning.

Intuitive, user-friendly operation

The factory-set parameters can be modified quickly and easily via the user-friendly display and contactless buttons without the need to open the housing.
The "commissioning" function guides less experienced users through the menu step by step.
Intuitive programming via a keypad ensures that operation is as easy as using a cellphone. During configuration, the permissible range is shown on the display for each individual parameter, and unacceptable values are rejected.

Universal transmitter – efficient and flexible

The backlit display can be rotated easily without the need for tools. The contrast can be adjusted, while the display itself offers a wide range of configuration options.

The character size, number of lines and display resolution (number of decimal places) can be set as required. In multiplex operation, a number of different display options can be pre-configured and called up one after the other.

The intelligent modular design of the transmitter unit makes it easy to disassemble the device without the need to disconnect cables or connectors.

The universal transmitter always delivers the correct signal, regardless of whether the count pulses, 20 mA signals or status output are active or passive.

The HART communication protocol is used by default. The transmitter can also communicate via PROFIBUS PA or FOUNDATION Fieldbus if required.

The universal transmitter cuts down the number of spare parts that need to be kept in stock and reduces stockholding costs.

Guaranteed quality

ProcessMaster was designed and produced in accordance with international quality standards (ISO 9001); all flowmeters are calibrated using country-specific calibration devices in order to guarantee flowmeter quality and performance for the user.



ProcessMaster – always the first choice

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

Overview of the ProcessMaster series

Two ProcessMaster series are available. ProcessMaster 300 devices offer basic functionality, while ProcessMaster 500 devices have advanced functions and options.

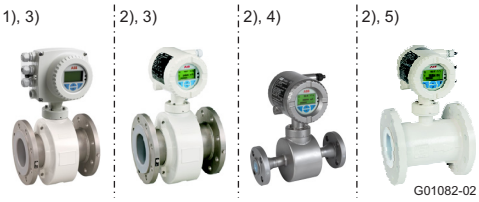
The table below provides an overview.

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

This data sheet describes ProcessMaster 500.
For ProcessMaster 300, refer to data sheet DS/FEP300.

Overview – models

Integral mount design

FEP511 (without explosion protection)	FEP515 (Zone 2 / Division 2)	FEP515 (Zone 1 / Division 1)
1), 3) 2), 3) 2), 4) 2), 5)  G01082-02	1), 3) 2), 3) 2), 4)  G00487-02	2), 3) 2), 4)  G00886-02

Measured error	Standard: 0.3 % of measured value, 0.2 % of measured value
Nominal diameter range	DN 3 ... 2000 (1/10 " ... 80 ")
Process connection[6)]	Flange in accordance with DIN 2501 / EN 1092-1, ASME B16.5 / B16.47, JIS 10K
Nominal pressure	PN 10 … 100, ASME CL 150, 300, 600, 900, 1500, 2500
Liner	Hard rubber (DN 15 ... 2000), soft rubber (DN 50 ... 2000), PTFE (DN 10 ... 600), PFA (DN 3 ... 200), ETFE (DN 25 ... 600), ceramic carbide (DN 25 ... 1000)
Conductivity	> 5 µS/cm (20 µS/cm for demineralized water)
Electrodes	Stainless steel, Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium, double layer, tungsten carbide
Process connection material	Steel, stainless steel
IP rating	IP 65, IP 67
Measuring medium temperature	-25 ... 180 °C (-13 ... 356 °F)
Power supply	AC 100 ... 230 V (-15 / +10 %), AC 24 V (-30 / +10 %), DC 24 V (-30 / +30 %)
current output	4 ... 20 mA, active or passive
Pulse output	Can be configured locally as active or passive using software
Switch output	Optoelectronic coupler, programmable function
Contact input	Optoelectronic coupler, programmable function
Display	Graphical display, configurable
Housing	Integral mount design: choice of single-compartment housing or dual-compartment housing.
Communication	HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus (option)
Explosion protection approvals	• ATEX / IECEx zone 1, 2, 21, 22 • NEPSI zone 1, 2 • FM / cFM Cl 1 Div 1 (≤ DN 300), Cl 1 Div 2 • GOST zone 1, 2
Pressure Equipment Directive 97/23/EC	Conformity assessment in accordance with category III, fluid group 1
CRN (Canadian Reg.Number)	On request

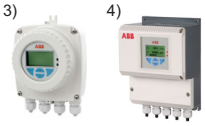
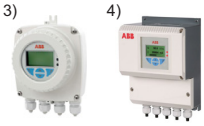
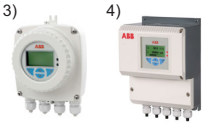
1) Single-compartment housing.
2) Dual-compartment housing.
3) Design level "B" sensor.
4) Design level "B" sensor, all versions made from stainless steel.
5) Design level "C" sensor, DN 25 … 600.
6) For information on flange thicknesses, see the chapters entitled "Dimensions for sensor design level „B"" on page 39 and "Dimensions for sensor design level „C"" on page 45.

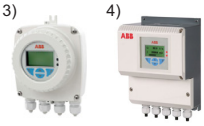
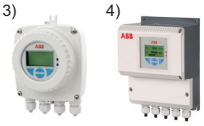
Remote mount design

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(without explosion protection)
1) 2)

G01083-02</td>
<td colspan="2">FEP525
Zone 2, Div 2
1)

G00489-01</td>
<td colspan="2">FEP525
Zone 1, Div 1
1)

G00489-01</td>
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<tr><th colspan="6">Transmitters</th></tr>
<tr>
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(without explosion protection)
3) 4)

G01084-02</td>
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(Zone 2, Div 2)
3) 4)

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3) 4)

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(without explosion protection)
3) 4)

G01084-02</td>
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</table>

Sensor	
Measured error	Standard: 0.3 % of measured value, 0.2 % of measured value
Nominal diameter range	DN 3 ... 2000 (1/10 " ... 80 ")
Process connection[5)]	Flange in accordance with DIN 2501 / EN 1092-1, ASME B16.5 / B16.47, JIS 10K
Nominal pressure	PN 10 … 100, ASME CL 150, 300, 600, 900, 1500, 2500
Liner	Hard rubber (DN 15 ... 2000), soft rubber (DN 50 ... 2000), PTFE (DN 10 ... 600), PFA (DN 3 ... 200), ETFE (DN 25 ... 600), ceramic carbide (DN 25 ... 1000)
Conductivity	> 5 µS/cm (20 µS/cm for demineralized water)
Electrodes	Stainless steel, Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium, double layer, tungsten carbide
Process connection material	Steel, stainless steel
IP rating	IP 65, IP 67
Measuring medium temperature	-25 ... 180 °C (-13 ... 356 °F)
Transmitters	
Power supply	100 ... 230 V AC (-15 / +10 %), 24 V AC (-30 / +10 %), 24 V DC (-30 / +30 %)
current output	4 ... 20 mA, active or passive
Pulse output	Can be configured locally as active or passive using software
Switch output / switch input	Optoelectronic coupler, programmable function
Display	Graphical display, configurable
Housing	Field mount housing: choice of single-compartment housing or dual-compartment housing
Communication	HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus (option)
Approvals	
Explosion protection approvals	• ATEX / IECEx zone 1, 2, 21, 22 • FM / cFM Cl 1 Div 1 (≤ DN 300), Cl 1 Div 2 • NEPSI zone 1, 2 • GOST zone 1, 2
Pressure Equipment Directive 97/23/EC	Conformity assessment in accordance with category III, fluid group 1
CRN (Canadian Reg.Number)	On request

1) Design level "B" sensor.
2) Design level "C" sensor, DN 25 … 600.
3) Single-compartment housing.
4) Dual-compartment housing.
5) For information on flange thicknesses, see the chapters entitled "Dimensions for sensor design level „B"" on page 39 and "Dimensions for sensor design level „C"" on page 45.

Specification - general

Reference conditions

According to EN 29104

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

Maximum measuring error

Impulse output

- Standard calibration:
  ± 0.3 % of measured value, ± 0.02 % $Qmax_{DN}$
  (DN 3 … 600, 800)
  ± 0,4 % of measured value, ± 0,02 % $Qmax_{DN}$
  (DN 700, DN 900 … 2000)
- Optional calibration:
  ± 0.2 % of measured value, ± 0.02 % $Qmax_{DN}$
  (DN 10 … 600, 800)

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

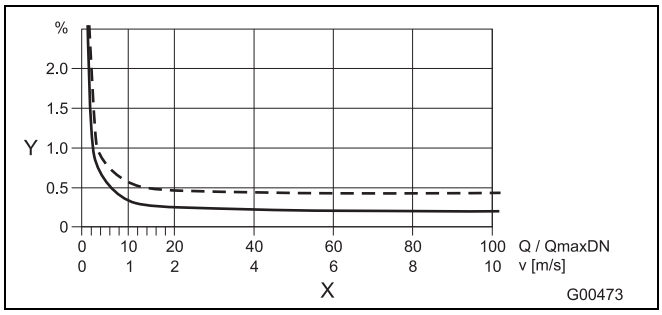


Fig. 1

Y Accuracy ± of measured value in [%]
X Flow velocity v in [m/s], Q / QmaxDN [%]

Analog output effects

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

Reproducibility, response time

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

Flowmeter sizes, flow range

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

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

Extended diagnostic functions

General

NOTE

- When using the extended diagnostic functions the external flowmeter sensor must not be provided with a preamplifier.

Detection of partial filling

Optionally, a measuring electrode (TFE electrode) is available for detecting a partially filled flowmeter sensor. The alarm for partial filling is output via the programmable digital output.

Conditions for using the function:

- Nominal diameter from DN 50 (2“) with sensor design level B
- Max. signal cable length for version with external transmitter 200 m (656 ft).
- Conductivity of the measuring medium: 20 µS/cm ... 20,000 µS/cm
- The function is only available for ProcessMaster 300 / 500 without explosion protection or with explosion protection for Zone 2 / Div 2.

Additional installation conditions:

- The flowmeter sensor must be installed horizontally with the terminal box pointing upward.

Detection of gas bubbles

Gas bubbles in the fluid are detected by using an adjustable maximum limit value. When this limit value is exceeded, an alarm is tripped via the programmable digital output, depending on the configuration.

Conditions for using the function:

- This function is available in the nominal diameter range [1)] of DN 10 … 300 (3/8 “ ... 12 “).
- The signal cable length of the remote transmitter must not exceed a maximum value of 50 m (164 ft) .
- For this function, the conductivity of the measuring medium must be in the range 20 µS/cm ... 20,000 µS/cm.

Additional installation conditions:

- The flowmeter sensor can be installed either horizontally or vertically. Vertical installation is preferred.

1) The specified nominal diameter range is valid for ProcessMaster, only. The nominal diameter range valid for HygienicMaster is DN 10 … 100 (3/8 “ ... 4 “).

Electrode coating detection

This function provides the opportunity to detect coatings on the measuring electrodes by using an adjustable maximum limit value.

When the set limit value is exceeded, an alarm is tripped via the programmable digital output, depending on the configuration.

Conditions for using the function:

- This function is available in the nominal diameter range [2)] of DN 10 … 300 (3/8 “ ... 12 “).
- The signal cable length of the remote transmitter must not exceed a maximum value of 50 m (164 ft) .
- For this function, the conductivity of the measuring medium must be in the range 20 µS/cm ... 20,000 µS/cm.

Additional installation conditions:

- When using plastic tubes, install a grounding plate at the front and back of the device.

Conductivity monitoring

The conductivity of the fluid is monitored by using an adjustable minimum / maximum limit value.

When the value falls below or exceeds the set limit value, an alarm is tripped via the programmable digital output, depending on the configuration.

Conditions for using the function:

- This function is available in the nominal diameter range [1)] of DN 10 … 300 (3/8 “ ... 12 “).
- The signal cable length of the remote transmitter must not exceed a maximum value of 50 m (164 ft) .
- For this function, the conductivity of the measuring medium must be in the range 20 µS/cm ... 20,000 µS/cm.

Additional installation conditions:

- When using plastic tubes, install a grounding plate at the front and back of the device.
- There must not be any deposits on the measuring electrodes.

1) The specified nominal diameter range is valid for ProcessMaster, only. The nominal diameter range valid for HygienicMaster is DN 10 … 100 (3/8 “ ... 4 “).

Electrode impedance monitoring

The impedance between the electrode and ground is monitored by using a minimum / maximum limit value. This enables the transmitter to detect an electrode fine short or leakage.

When the value falls below or exceeds the set limit value, an alarm is tripped via the programmable digital output, depending on the configuration.

Conditions for using the function:

- This function is available in the nominal diameter range [1)] of DN 10 … 300 (3/8 “ ... 12 “).
- The signal cable length of the remote transmitter must not exceed a maximum value of 50 m (164 ft) .
- For this function, the conductivity of the measuring medium must be in the range 20 µS/cm ... 20,000 µS/cm.

Additional installation conditions:

- When using plastic tubes, install a grounding plate at the front and back of the device.
- There must not be any deposits on the measuring electrodes.
- The measuring tube must always be completely full, and the fluid must feature only minor conductivity variations.

Sensor measurements

This function includes the monitoring of the sensor temperature and the monitoring of the resistance of the flowmeter sensor's coils.

Sensor temperature monitoring

The temperature of the coils in the flowmeter sensor can be monitored by using adjustable minimum / maximum limit values. When a set limit value is exceeded, an alarm is tripped via the programmable digital output, depending on the configuration.

The coil temperature is a factor of the ambient and fluid temperatures. The measurement can, e.g., be used to monitor overtemperature due to the fluid. The coil temperature is measured indirectly via the coil DC resistance.

Monitoring of the sensor coil resistance

The coils in the flowmeter sensor can be monitored by using adjustable minimum / maximum limit values for the coil resistance. When a set limit value is exceeded, an alarm is tripped via the programmable digital output, depending on the configuration.

1) The specified nominal diameter range is valid for ProcessMaster, only. The nominal diameter range valid for HygienicMaster is DN 10 … 100 (3/8 “ ... 4 “).

Trend

The device has an internal memory where the measured value for the electrode deposits and the conductivity are cyclically stored as a data set with an adjustable time (1 min ... 45000 min). A maximum of 12 data sets is stored. When the thirteenth record is stored, the oldest data set is overwritten automatically.

The data sets can be read out or analyzed as a trend using the external diagnostic tool (ScanMaster).

Fingerprint

The “fingerprint” database integrated in the transmitter allows you to compare the values at the time of factory calibration or commissioning with the currently recorded values.

Checking the grounding

This function allows you to check the electrical grounding of the device.

While the check is in progress, no flow measurement can take place.

Conditions for using the function:

- The measuring tube must be completely full.
- No flow must occur in the flowmeter sensor.

Additional installation conditions:

- The flowmeter sensor must not be provided with a preamplifier.

Specifications - sensor

IP rating

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

Pipe vibration

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

Installation length

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

Signal cable

For remote mount design only
A 5 m (16.4 ft) cable is included in the scope of delivery.
If more than 5 m (16.4 ft) is required, the cable can be ordered separately (for ordering information, see the table below or the chapter entitled "Accessories" on page 73).

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

✕ Application not permitted
✔ Application permitted
Supplied as standard

On the transmitter design for use in Zone 1, Division 1 (model FET525), 10 m (32.8 ft) of signal cable is permanently connected to the transmitter.

Signal cable length and preamplifier

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

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

Temperature Data

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

Storage temperature

-40 ... 70 °C (-40 ... 158 °F)

Minimum permissible pressure depending on measuring medium temperature

Design level "B" sensor			
Liner	**Nominal Diameter**	**$P_{Operating}$ at mbar abs.**	**T_{medium} 1)**
Hard rubber	15 ... 2000 (1/2 ... 80")	0	< 90 °C (194 °F) < 80 °C (176 °F) 2)
Soft rubber	50 ... 2000 (2 ... 80")	0	< 60 °C (140 °F)
PTFE	10 ... 600 (3/8 ... 24")	270 400 500	< 20 °C (68 °F) < 100 °C (212 °F) < 130 °C (266 °F)
Thick PTFE, high-temp. design	25 … 80 100 … 250 300	0 67 27	< 180 °C (356 °F) < 180 °C (356 °F) < 180 °C (356 °F)
PFA	3 ... 200 (1/10 ... 8")	0	< 180 °C (356 °F)
ETFE	25 ... 600 (1 ... 24")	100	< 130 °C (266 °F)
Linatex 2)	50 .. 600 (2 … 24“)	0	< 70 °C (158 °F)
Ceramic Carbide	25 ... 1000 (1 ... 40"	0	< 80 °C (176 °F)

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

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

Liner approvals on request; please contact ABB.

Maximum permissible cleaning temperature

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

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

Maximum ambient temperature depending on measuring medium temperature

Note

When using the device in potentially explosive atmospheres, note the additional temperature data in the chapter entitled "Ex relevant specifications" on page 23.

Integral mount design (standard sensor design)

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

Integral mount design (high-temperature sensor design) 3)

Liner	Flange material	Ambient temperature		Measuring medium 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) 2)	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) 2)	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) 2)	60 °C (140 °F)	-20 °C (-13 °F)	130 °C (266 °F)

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

Note
When using the device in potentially explosive atmospheres, note the additional temperature data in the chapter entitled "Ex relevant specifications" on page 23.

Remote mount design (standard sensor design)

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

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

Liner	Flange material	Ambient temperature		Measuring medium 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) 2)	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) 2)	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) 2)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)

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

Materials for sensors

Wetted parts

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

Non-wetted parts (process connection)

Design level "B" sensor


G01340

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

Design level "B" sensor


G01342

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

Design level "C" sensor


G01341

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

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

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

Sensor housing

Design level "B" sensor


G01340

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

Design level "B" sensor


G01342

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

Design level "C" sensor


G01341

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

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

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

Overview sensor design level "C"

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

Material load

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

Flowmeter sensor design level "B"

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

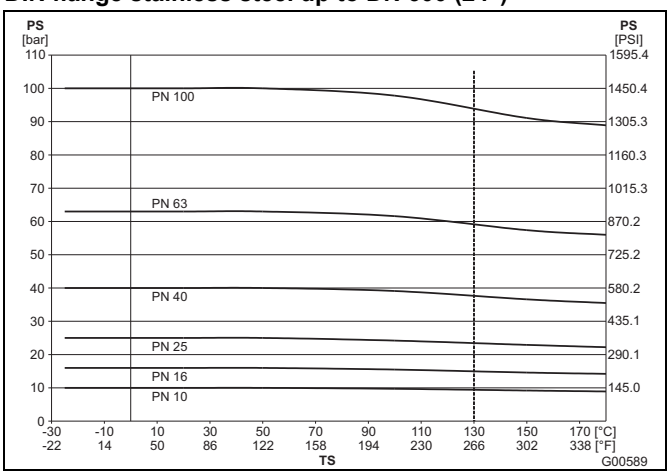


Fig. 2

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

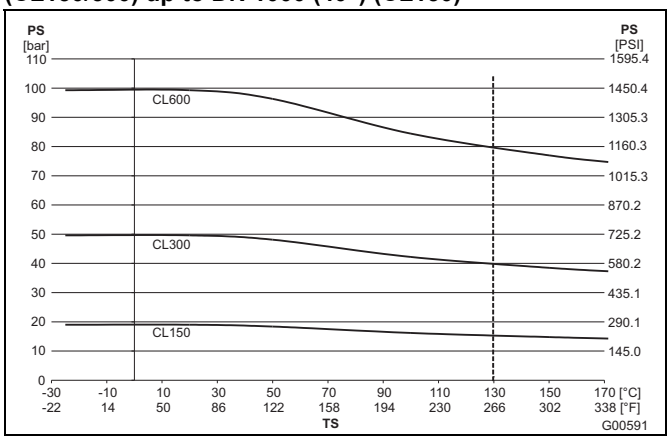


Fig. 3

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

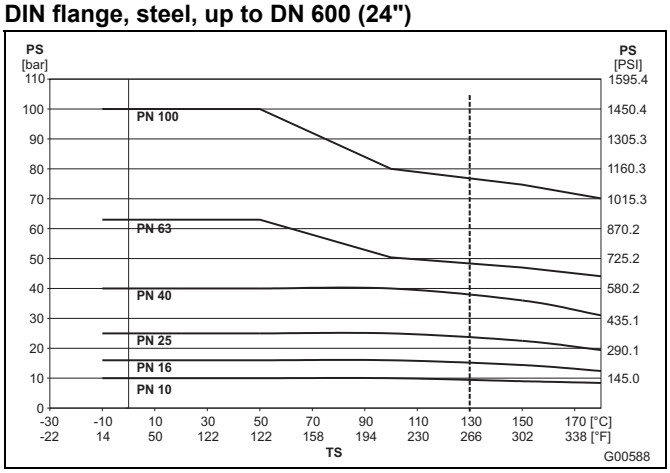


Fig. 4

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

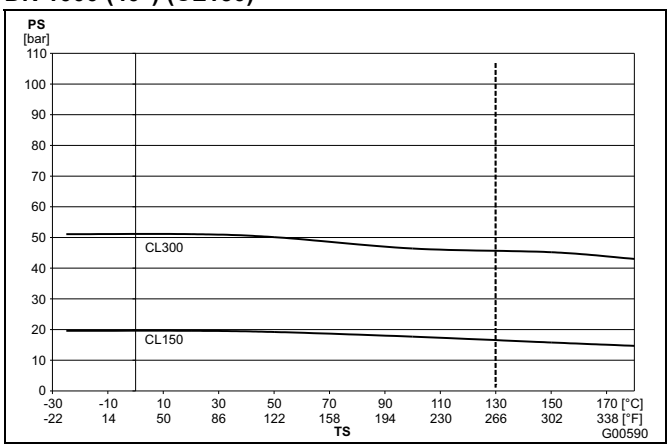


Fig. 5

JIS 10K-B2210 flange

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

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

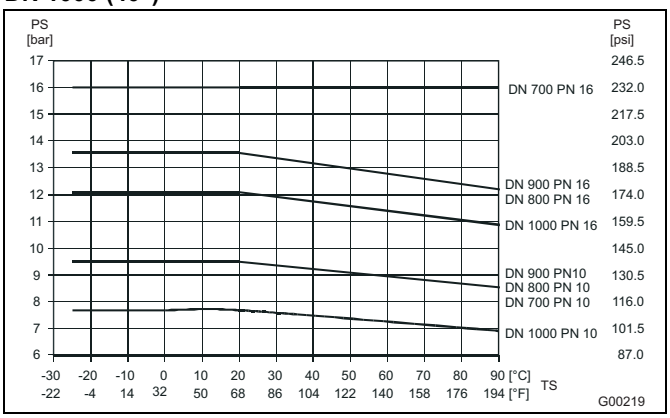


Fig. 6

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

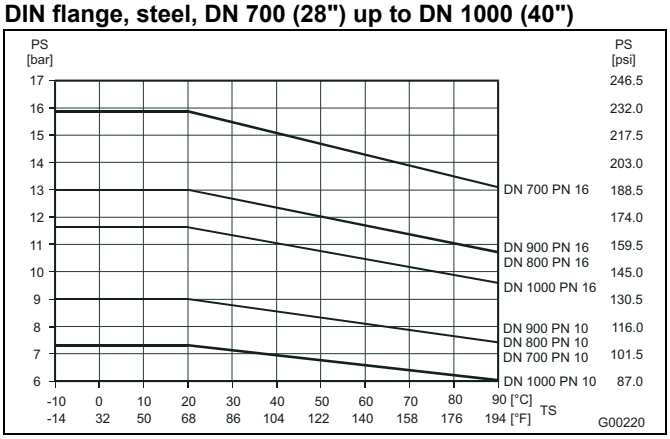


Fig. 7

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

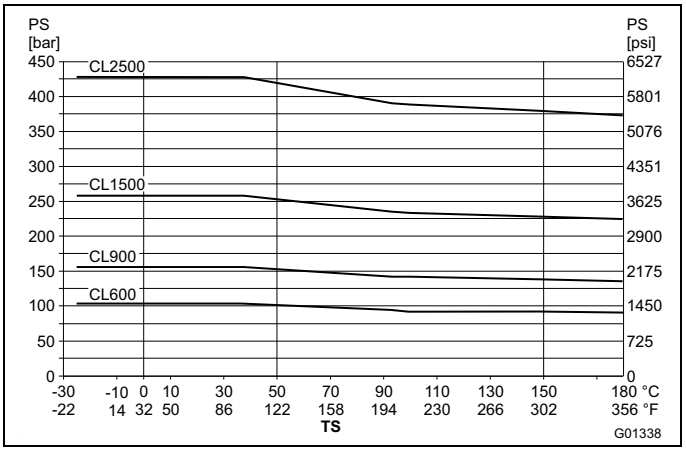


Fig. 8

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

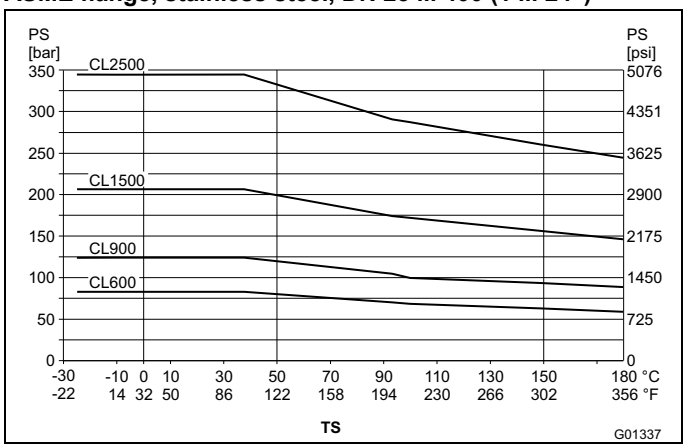


Fig. 9

Flowmeter sensor design level “C”

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

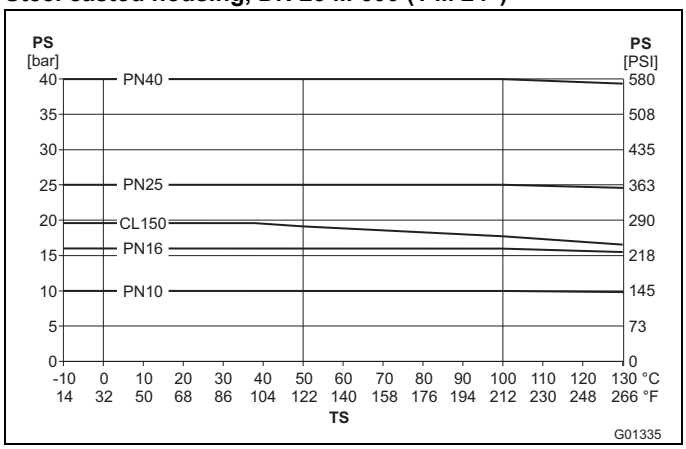


Fig. 10

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

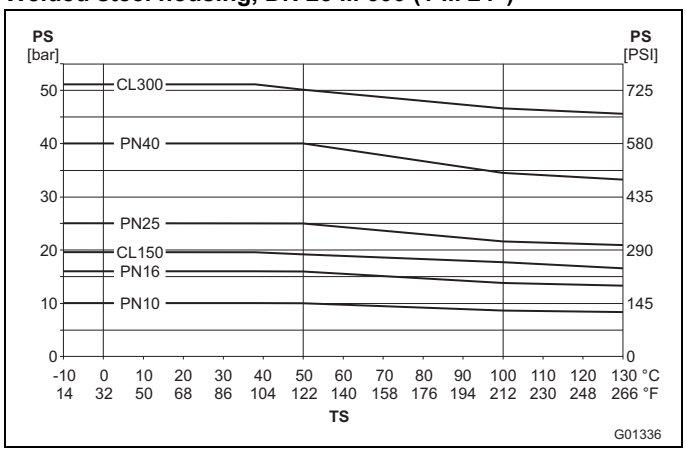


Fig. 11

Specifications - transmitter

IP rating

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

Vibration

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

1) Peak load

Temperature Data

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

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

Electrical data and options

Power supply

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

Isolation of inputs / outputs

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

Empty conduit detection

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

Mechanical properties

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

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

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

Electrical connections

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

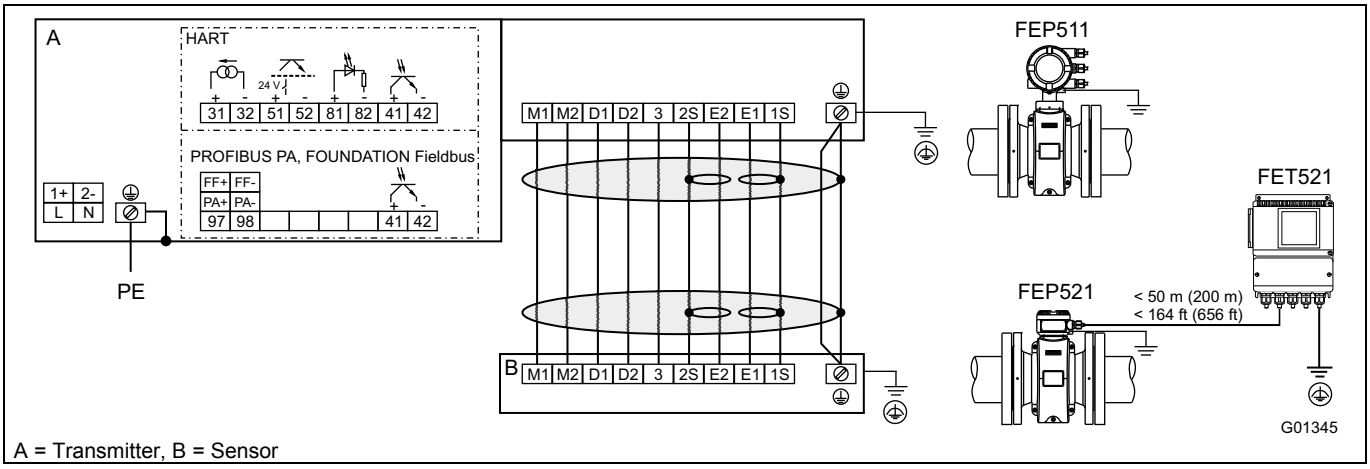


Fig. 12: HART-, PROFIBUS PA- and FOUNDATION Fieldbus protocol

Power supply connections

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

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

Sensor cable terminal connections

Only on remote mount design.

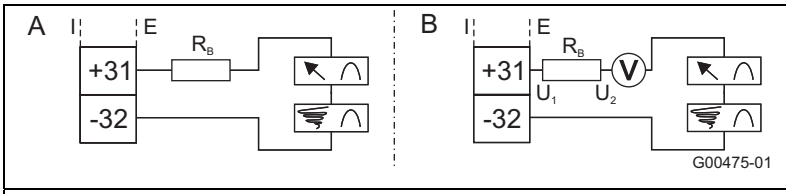
Terminal	Function / Notes	Wire color
M1	Magnet coil	Brown
M2	Magnet coil	Red
D1	Data line	Orange
D2	Data line	Yellow
⏚ / SE	Shield	-
E1	Signal line	Violet
1S	Schield for E1	-
E2	Signal line	Blue
2S	Schield for E2	-
3	Measurement potential	Green

Output connections

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

Electrical data

Current / HART output

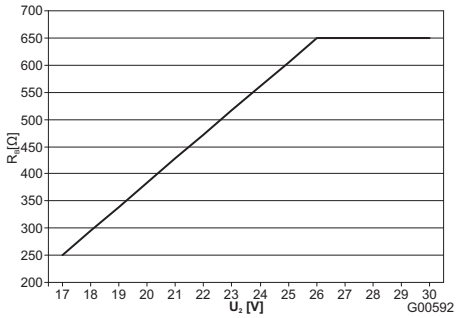


The current / HART output can be operated in "active" or "passive" mode.

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

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

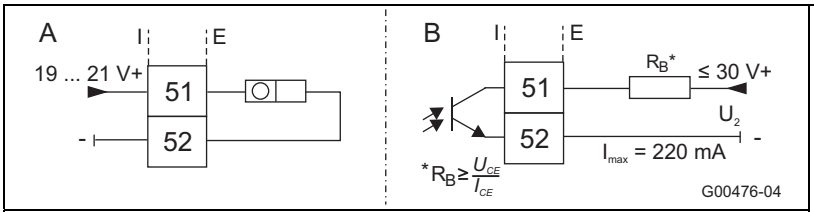
For Ex zone 1 / Div. 1 the maximum load is 300 Ω.



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

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

Digital output DO1



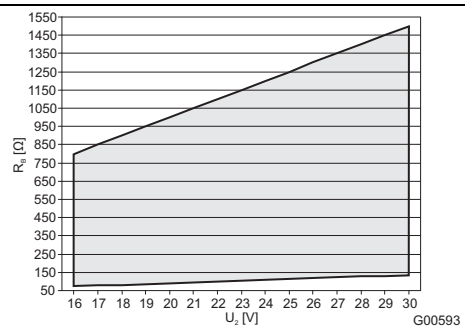
The output can be configured as an "active (A)" or "passive (B)" output (in the case of the transmitter with the dual-compartment housing, the output is configured using the software; in the case of the transmitter with the single-compartment housing, it is configured by means of jumpers on the transmitter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

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

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

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

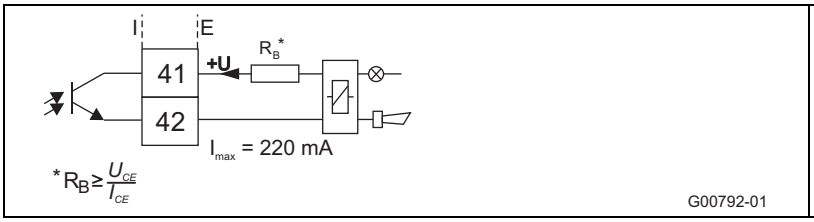
Configuration as contact output:
- Function: System alarm, empty pipe alarm, max. / min. alarm, flow direction signaling, other



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

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

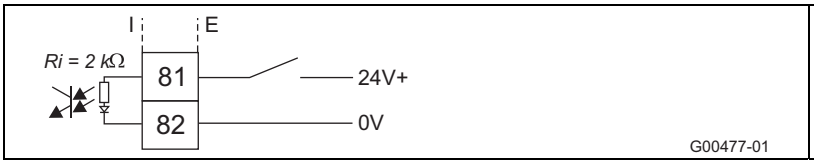
Digital output DO2



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

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

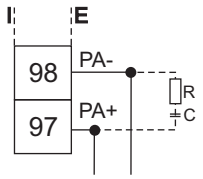
Digital input DI



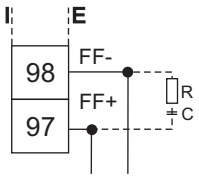
Data for the optocoupler:
16 V ≤ U ≤ 30 V, Ri = 2 kΩ

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

Digital communication



PROFIBUS PA (PA+ / PA-)
U = 9 ... 32 v, I = 10 mA (normal operation), I = 13 mA (in the event of an error / FDE)
Bus connection with integrated protection against polarity reversal. The bus address can be set via the DIP switches in the device (with dual-compartment transmitter housing only), the transmitter display or the fieldbus.



G00248-01

FOUNDATION Fieldbus (FF+ / FF-)
U = 9 ... 32 v, I = 10 mA (normal operation), I = 13 mA (in the event of an error / FDE)
Bus connection with integrated protection against polarity reversal

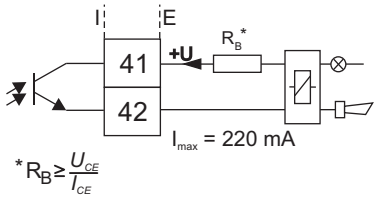
The resistance R and condenser C form the bus termination. They must be installed when the device is connected to the end of the entire bus cable. R = 100 Ω; C = 1 µF

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

Connection examples

Digital output DO2

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

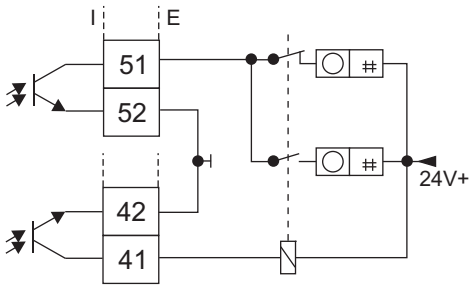


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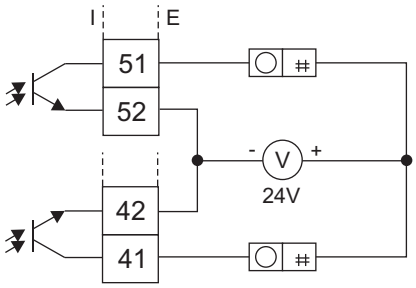
Fig. 18: (I = internal, E = external)

Digital outputs DO1 and DO2

Separate forward and reverse pulses



Separate forward and reverse pulses (alternative connection)

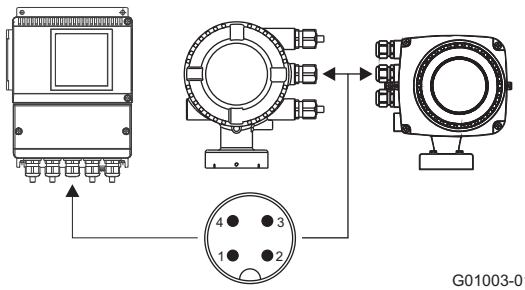


G00791

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

PROFIBUS PA - Connection via M12 plug

Only in non-hazardous areas



G01003-01

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

Fig. 20

Digital communication

HART protocol

The unit is registered with the HART Communication Foundation.

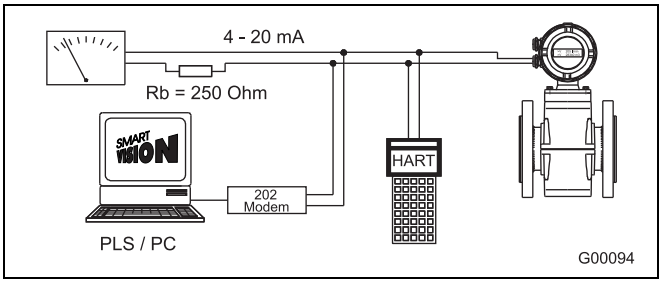


Fig. 21

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

For additional information, see separate interface documentation.

System integration

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

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

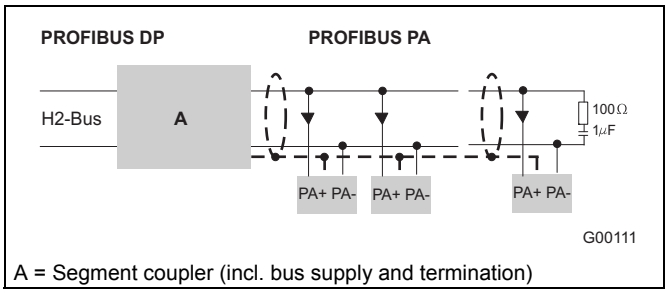
A free of charge version of the DAT200 Asset Vision Basic framework application for HART® or PROFIBUS is available upon request.

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

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

PROFIBUS PA

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



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

Fig. 22: Example for PROFIBUS PA interface connection

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

Bus topology

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

Voltage / current consumption

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

For additional information, see separate interface documentation.

System integration

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

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

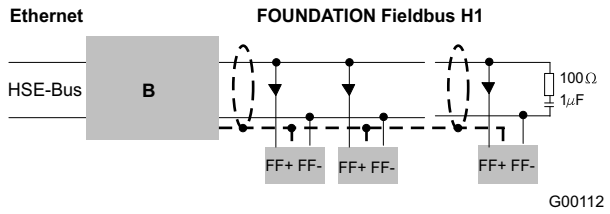
The change-over is done using the “ID-number selector” parameter.

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

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

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

FOUNDATION Fieldbus (FF)



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

Fig. 23: Example for FOUNDATION Fieldbus interface connection

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

Bus topology

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

Voltage / current consumption

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

Bus address

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

System integration

The following are required:

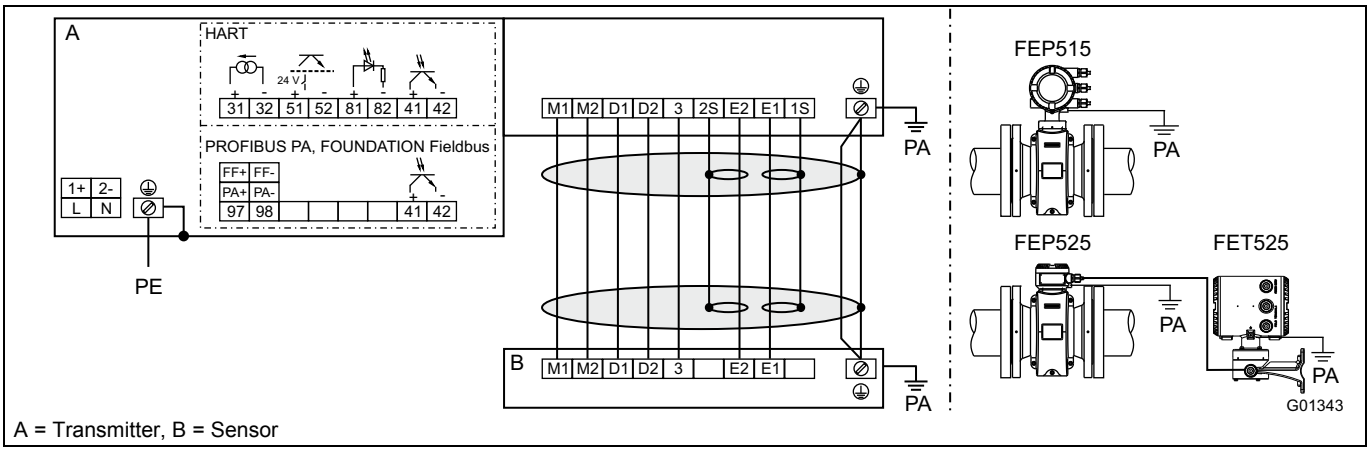
- DD (Device Description) file, which includes the device description.
- The CFF (Common File Format) file is required for engineering the segment. Engineering can be performed online or offline.

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

Ex relevant specifications

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

Flowmeter sensor and transmitter in zone 1 / Div 1



A = Transmitter, B = Sensor

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

Power supply connections

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

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

Sensor cable terminal connections

Only on remote mount design.

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

Output connections

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

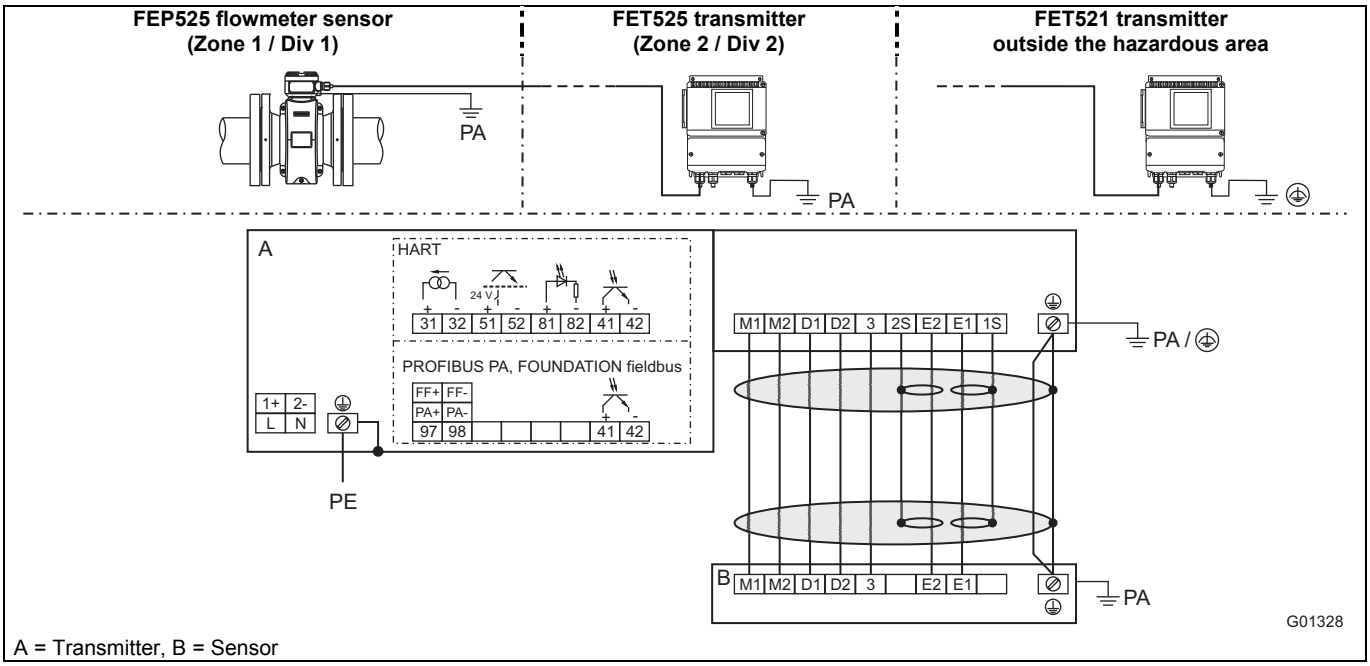
Note

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

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

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

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



A = Transmitter, B = Sensor

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

Power supply connections

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

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

Sensor cable terminal connections

Only on remote mount design.

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

Output connections

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

Note

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

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

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

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

Devices with HART protocol

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

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

Model: FEP515 or FET525

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

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

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

Note

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

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

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

Devices with PROFIBUS PA or FOUNDATION Fieldbus

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

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

Model: FEP515 or FET525

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

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

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

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

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

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

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

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

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

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

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

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

Temperature data

Model name	Surface temperature
FEP515	70 °C (158 °F)
FEP525	85 °C (185 °F)
FET525	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.

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

Table 1: Measuring medium temperature as a function of lining and flange material for models FEP515 / FEP525

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

1) Only China production site

Table 2: Measuring medium temperature for model FEP515

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

1) Low-temperature version (option)

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

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

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

Table 3: Measuring medium temperature for model FEP525

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

1) Low-temperature version (option)

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

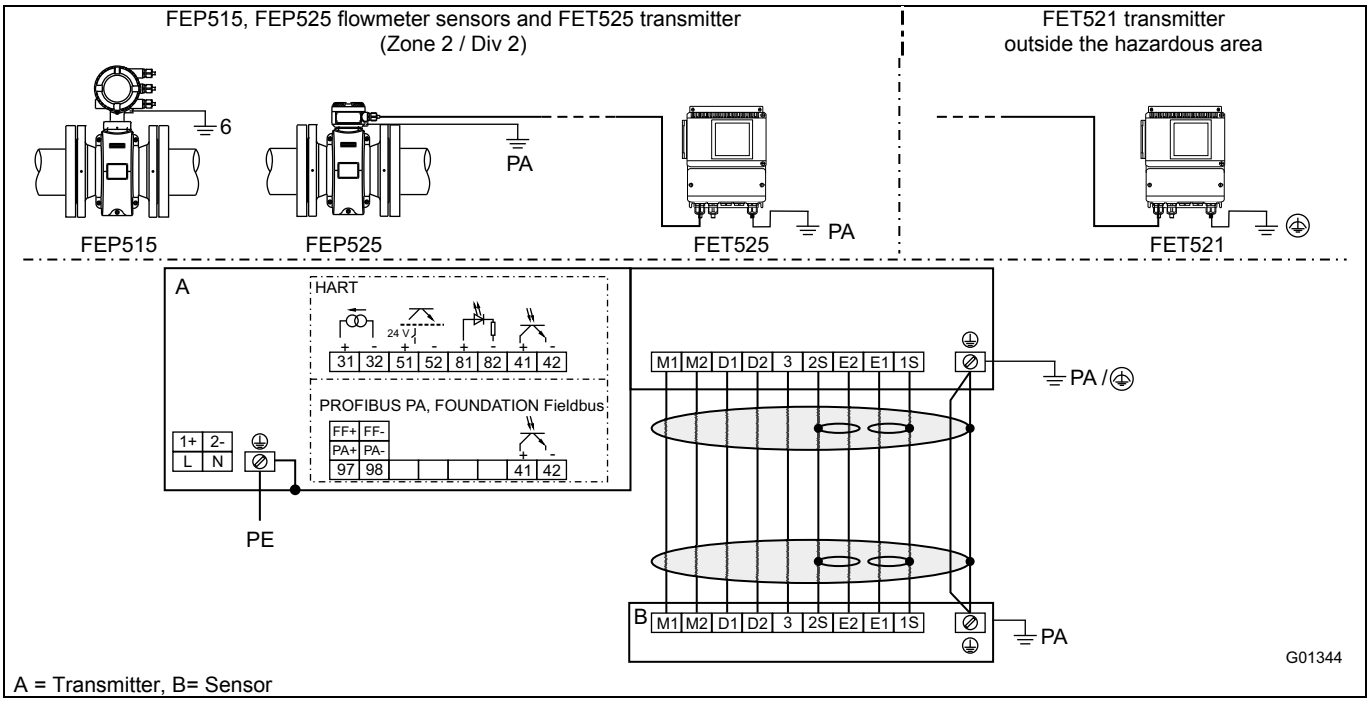
Note

The standard version includes explosion protection for gases and dust.

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

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

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



A = Transmitter, B= Sensor

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

Power supply connections

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

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

Sensor cable terminal connections

Only on remote mount design.

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

Output connections

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

Note

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

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

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

Devices with HART protocol

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

Model: FEP515 or FET525

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

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

Devices with PROFIBUS PA or FOUNDATION Fieldbus

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

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

Model: FEP515 or FET525

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

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

Temperature data

Model name	Surface temperature
FEP515	70 °C (158 °F)
FEP525	85 °C (185 °F)
FET525	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: Measuring medium temperature as a function of lining and flange material for models FEP515 / FEP525

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

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

Table 2: Measuring medium temperature for model FEP515

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

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

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

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

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

Note

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

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

Table 3: Measuring medium temperature for model FEP525

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

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

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

Note

The standard version includes explosion protection for gases and dust.

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

Specifications for operation in areas with combustible dust

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

The Ex certification is provided on the name plate.



DANGER - Risk of explosion!

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

Maximum Allowable Surface Temperature

Model name	Maximum surface temperature
FEP525	T 85 °C (185 °F) ... T_{medium}
FEP515	T 70 °C (158 °F) ... T_{medium}
FET525	T 70 °C (158 °F)

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

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

Minimum signal cable length

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

Installation requirements

Grounding

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

Mounting

The following points must be observed during installation:

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

Flow direction

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

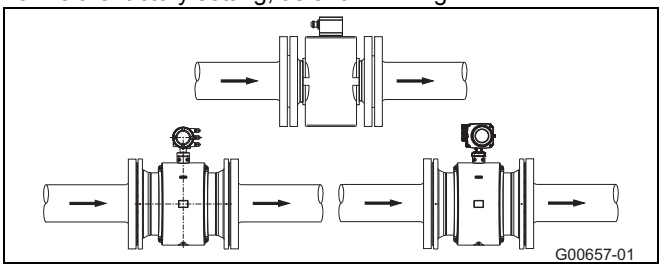


Fig. 27

Electrode axis

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

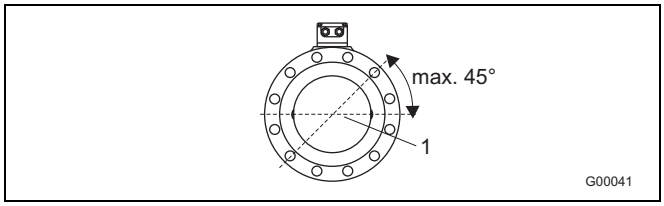


Fig. 28

Inlet and outlet pipe sections

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

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

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

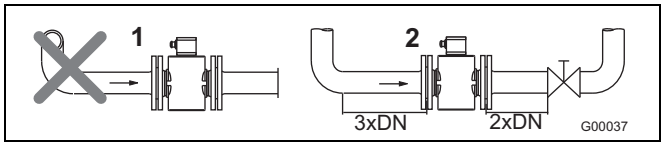


Fig. 29

Vertical connections

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

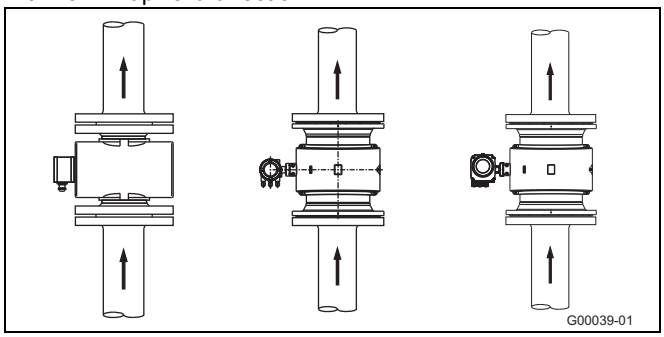


Fig. 30

Horizontal connections

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

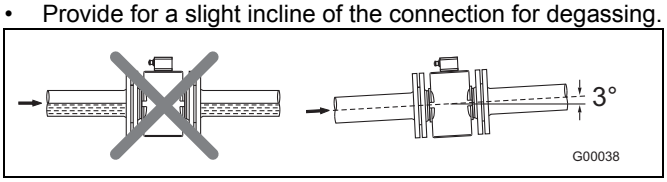


Fig. 31

Free inlet or outlet

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

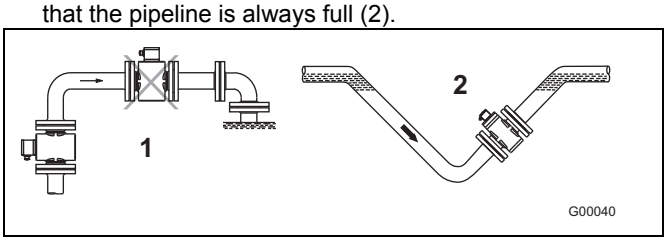


Fig. 32

Strongly contaminated measuring media

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

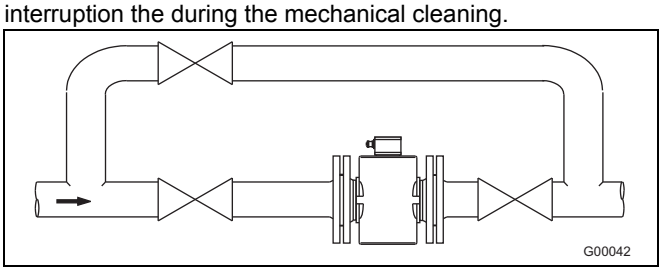


Fig. 33

Installation near pumps

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

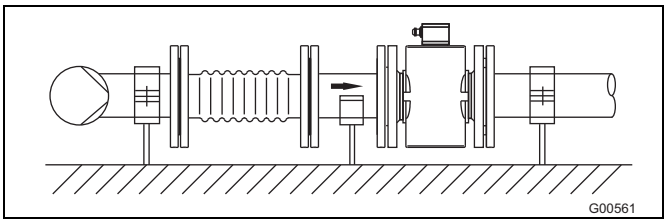


Fig. 34

Installation of the high temperature design

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

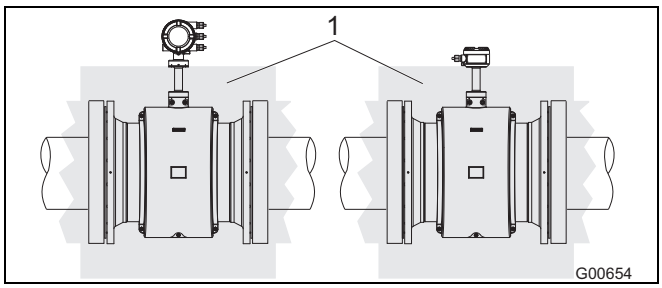


Fig. 35

1 Insulation

Devices with extended diagnostic functions

For devices with extended diagnostic functions different installation conditions may be valid.

For further information read and observe chapter "Extended diagnostic functions" on page 8.

Installation in pipelines with larger nominal diameters

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

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

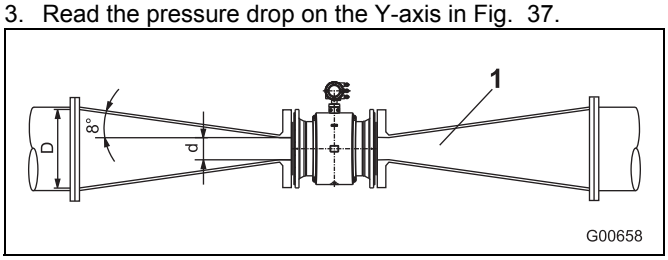


Fig. 36

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

Nomograph for pressure drop calculations

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

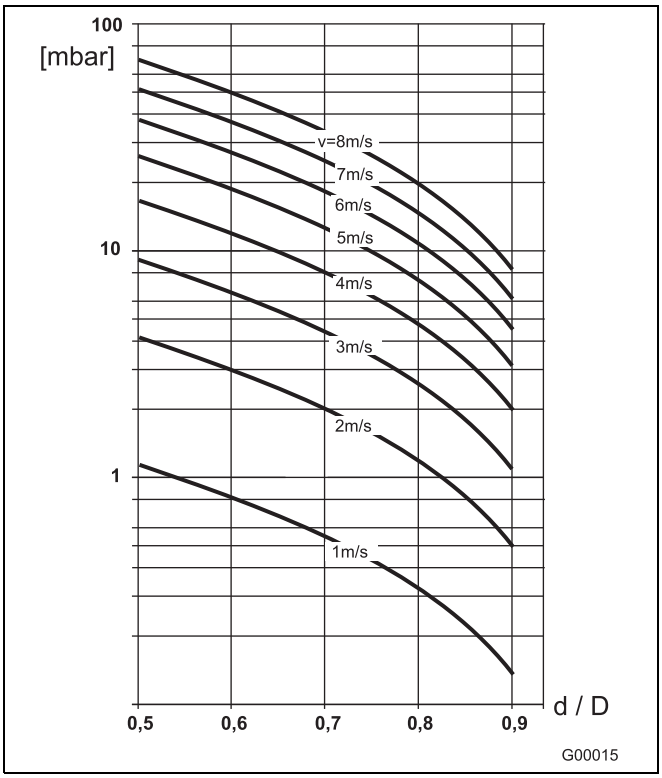


Fig. 37

Dimensions for sensor design level „B“

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

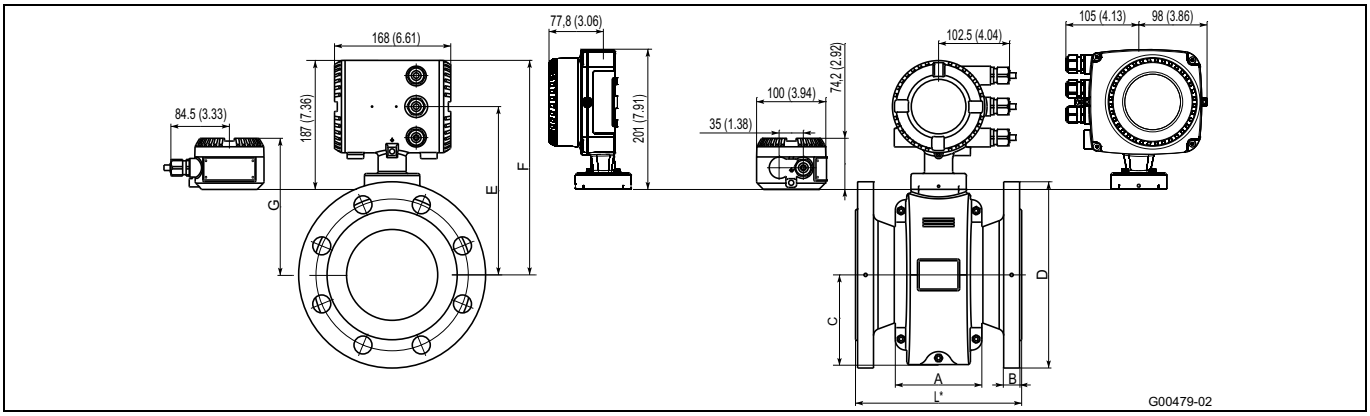


Fig. 38: Dimensions in mm (inches)

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

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

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

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

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

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

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

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

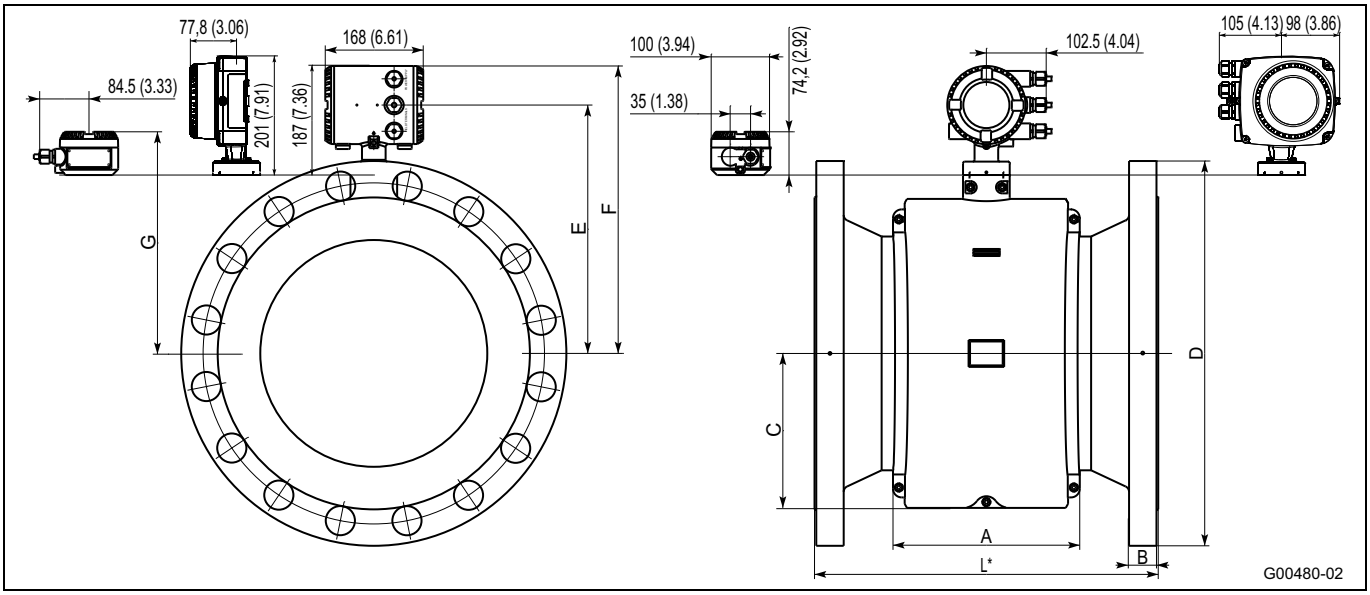


Fig. 39: Dimensions in mm (inches)

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

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

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

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

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

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

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

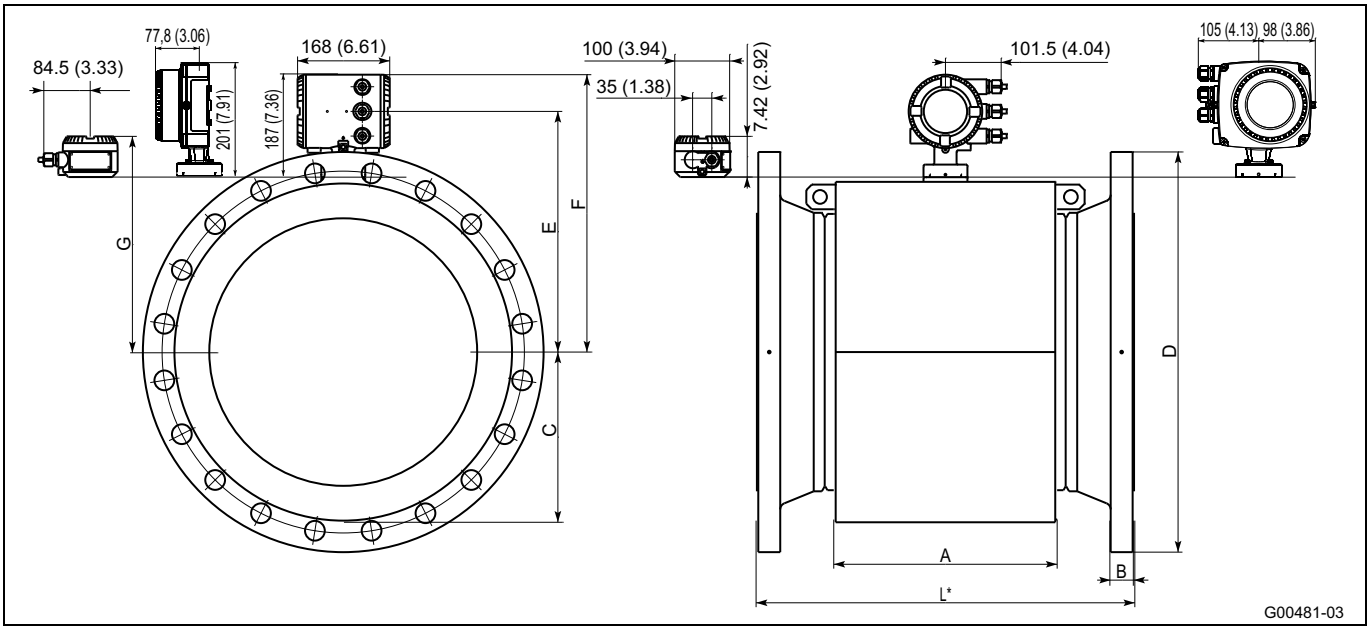


Fig. 40: Dimensions in mm (inches)

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

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

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

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

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

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

Dimensions for sensor design level „C“

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

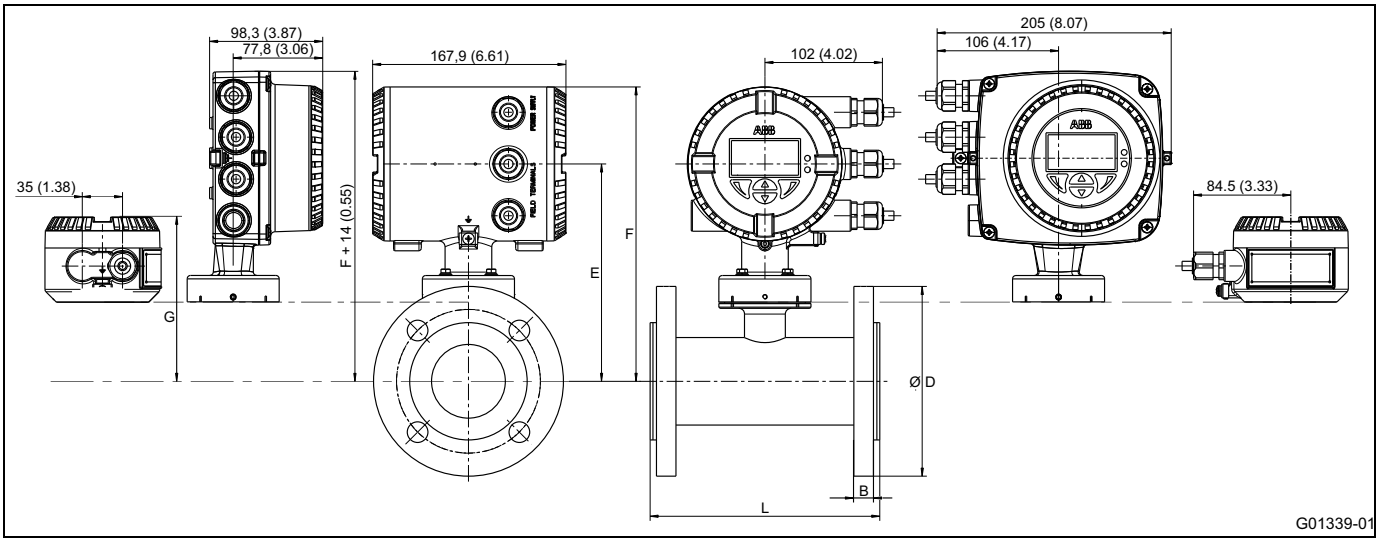


Fig. 41: Dimensions in mm (inches)

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

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

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

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

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

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

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

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

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

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

Dimensions for high-pressure sensor version

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

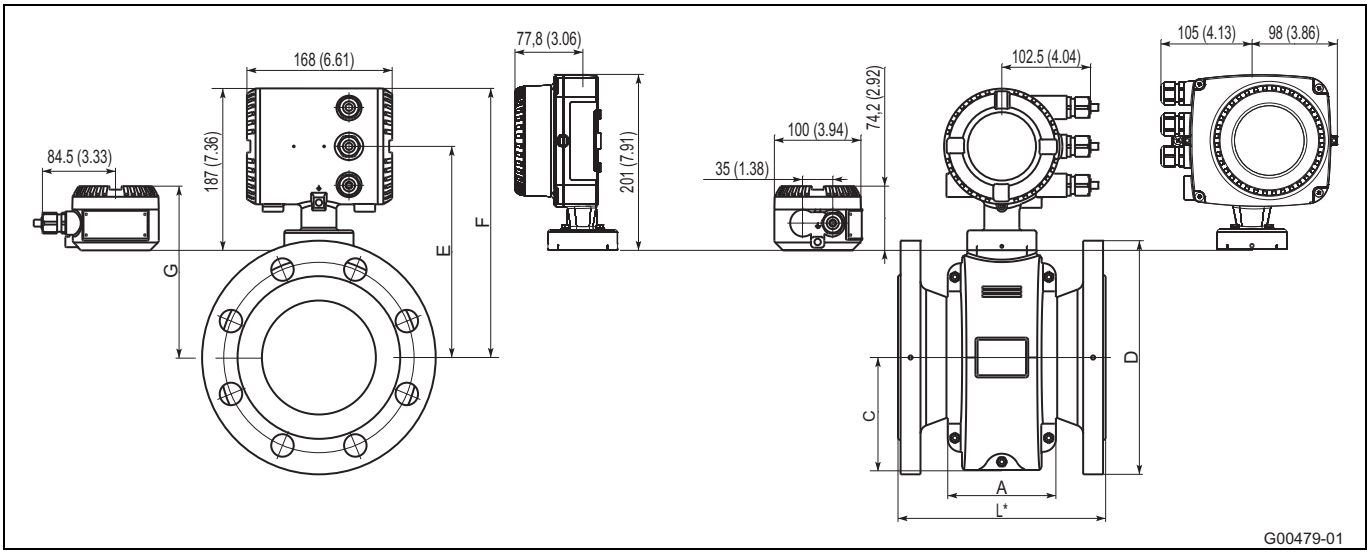


Fig. 42: Dimensions in mm (inch)

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

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

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

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

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

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

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

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

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

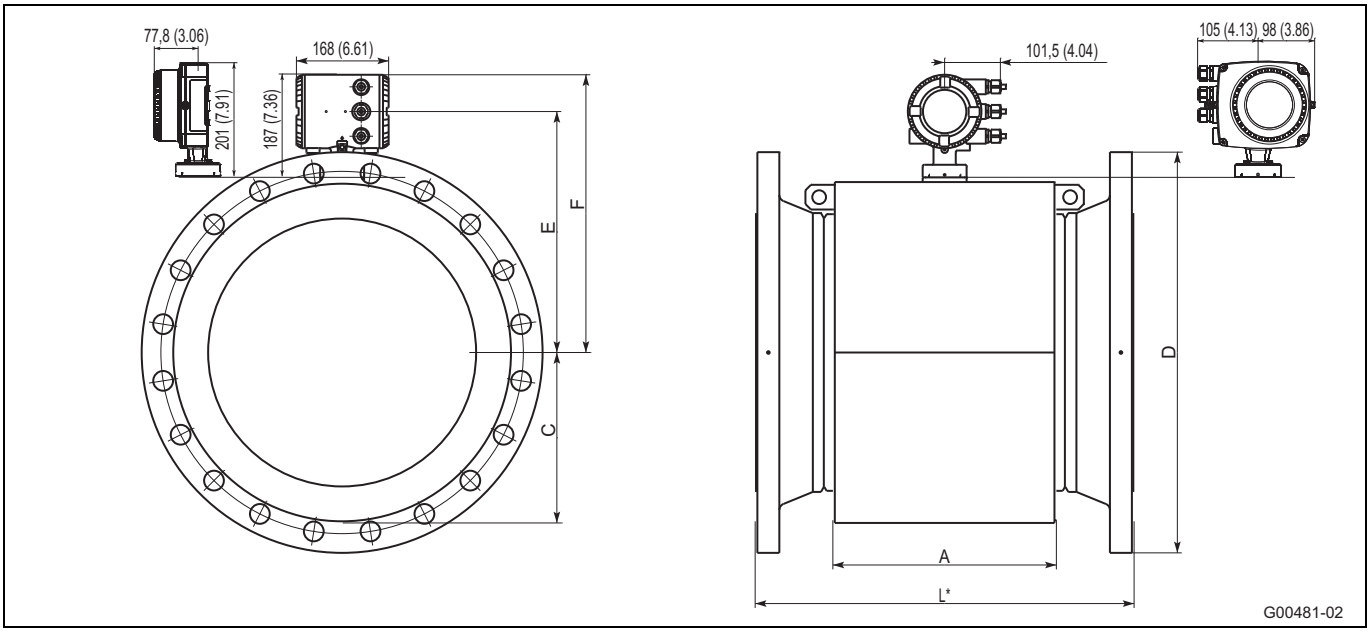


Fig. 43: Dimensions in mm (inch)

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

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

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

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

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

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

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

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

Dimensions for transmitter

Model FET521 and FET525 (dual-compartment housing) Zone 2, Div 2

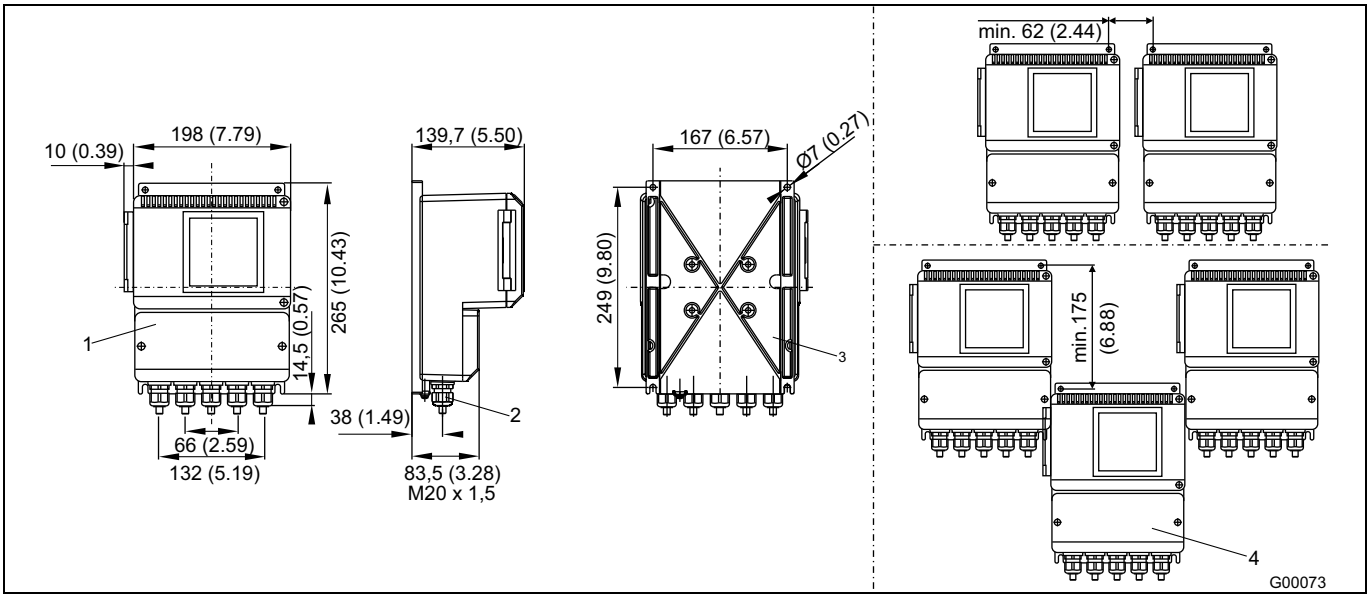


Fig. 44: Dimensions in mm (inch)

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

Transmitter housing for model FET525 for Ex zone 1 / Div. 1

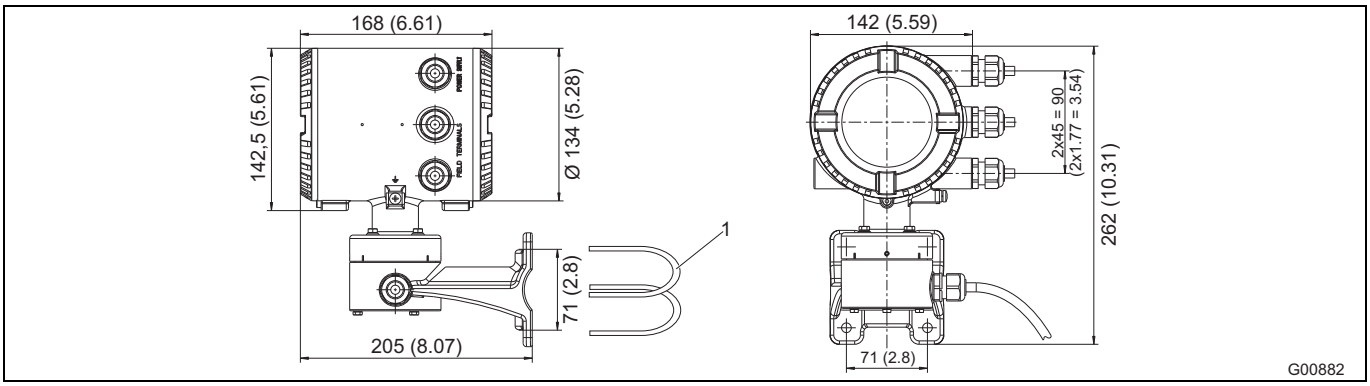


Fig. 45: Dimensions in mm (inch)

1 Installation set for 2" pipe installation in dual-compartment field-mount housing

Transmitter housing (single-compartment housing) model FET521

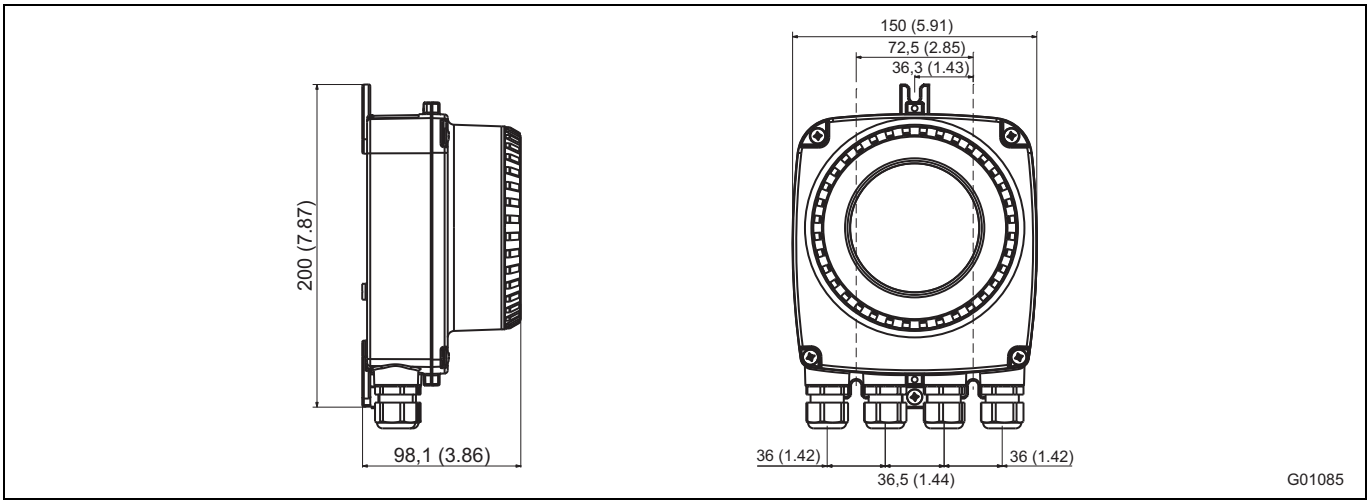


Fig. 46: Dimensions in mm (inch)

Ordering information

ProcessMaster FEP511, FEP515 electromagnetic flowmeter, compact design

		Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP511**	**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	**FEP515**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 3 (1/10 in.)		0	0	3																				
DN 4 (5/32 in.)		0	0	4																				
DN 6 (1/4 in.)		0	0	6																				
DN 8 (5/16 in.)		0	0	8																				
DN 10 (3/8 in.)		0	1	0																				
DN 15 (1/2 in.)		0	1	5																				
DN 20 (3/4 in.)		0	2	0																				
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
DN 450 (18 in.)		4	5	0																				
DN 500 (20 in.)		5	0	0																				
DN 550 (22 in.)	1)	5	5	0																				
DN 600 (24 in.)		6	0	0																				
DN 650 (26 in.)	1)	6	5	0																				
DN 700 (28 in.)		7	0	0																				
DN 760 (30 in.)		7	6	0																				
DN 800 (32 in.)		8	0	0																				
DN 900 (36 in.)		9	0	0																				
DN 1000 (40 in.)		0	0	1																				
DN 1050 (42 in.)		0	5	1																				
DN 1100 (44 in.)		1	0	1																				
DN 1200 (48 in.)		2	0	1																				
DN 1400 (54 in.)		4	0	1																				
DN 1500 (60 in.)		5	0	1																				
DN 1600 (66 in.)		6	0	1																				
DN 1800 (72 in.)		8	0	1																				
DN 2000 (80 in.)		0	0	2																				
Lining material																								
PTFE					A																			
Ceramic carbide				2)	D																			
ETFE					E																			
Thick PTFE					F																			
Hard rubber					H																			
Linatex				3)	J																			
PFA					P																			
Soft rubber					S																			
Electrode design																								
Standard						1																		
Standard + full filling electrode (TFE)					4)	2																		
Pointed head						5																		
Pointed head + full filling electrode (TFE)					4)	6																		

Continued on next page

1) Available with JIS flanges.
2) Only with Tungsten carbide electrodes / protection plates attached to both sides of the flange
3) Upon request: Available with model FEP511 DN 50 … 600 (2 … 24 in.)
4) TFE electrode for detecting partially filled tubes, available from DN 50 (2 in.) with sensor design level "B". Not available for Zone 1 / Div 1.

Continued

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP511**	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	**FEP515**	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
Signal electrode material																								
Stainless steel 1.4539 (904)							A																	
Hastelloy C-4 (2.4610)							D																	
Titanium							F																	
Tantalum							G																	
Hastelloy B-3 (2.4600)							H																	
Platinum-iridium							J																	
Stainless steel 1.4571 (316Ti)							S																	
Double layer						5)	W																	
Tungsten carbide coated							T																	
Grounding accessories																								
Standard								1																
Grounding electrodes (for material, refer to "Signal electrode material")								2																
Grounding plate made of stainless steel, attached to one side of the flange							6)	3																
Protection plate made of stainless steel, attached to both sides of the flange							6)	4																
Process connection																								
Flange DIN PN 6								7)	D	0														
Flange DIN PN 10									D	1														
Flange DIN PN 16									**D**	**2**														
Flange DIN PN 25									D	3														
Flange DIN PN 40									D	4														
Flange DIN PN 64								8)	D	5														
Flange DIN PN 100								8)	D	6														
Flange, ASME CL 150								9)	A	1														
Flange, ASME CL 300								9)	A	3														
Flange, JIS 10K									J	1														
Process connection material																								
Steel											**B**													
Stainless steel flange									10)		D													
Certificates																								
Meter tube with PED approval												**0**												
Meter tube without PED approval (only China and US production sites. Specify installation length J1, J3 or JN)												1												
Acceptance test certificate (3.1) to EN 10204												2												
Pressure test to AD-2000												3												
Material certificate 3.1 to EN 10204 and pressure test to AD-2000												4												
Calibration																								
Standard accuracy											11)		**A**											
Increased accuracy											12)		B											
Standard accuracy + ScanMaster function											11)		K											
Increased accuracy + ScanMaster function											12)		L											
Witnessed factory calibration													M											
5-point DKD calibration											13)		T											

Continued on next page

5) Base material Hastelloy C4
6) Can only be used for sensors ≤ DN 600 (24 in) and PTFE / thick PTFE / ETFE / PFA linings. Material: See data sheet
7) Available from DN 1000 (40 in.)
8) DN 15 ... DN 200 (1/2 ... 8 in.) Hard rubber.
9) Flange DN 15 … 600 accordinf to ASME B16.5. Flange > DN 600 according to ASME 16.47 Serie B.
10) Material: See data sheet.
11) Standard accuracy (0.3% 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".
12) 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.)
13) Available for nominal diameters DN 50 (2 in.) ... 600 (24 in.), DN 800 (32 in.).

Continued

	Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP511**	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	**FEP515**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												14)		1										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												14)		2										
High-temperature sensor design / -20 ... 60 °C (-4 ... 140 °F)												15)		3										
High-temperature sensor design / -40 ... 60 °C (-40 ... 140 °F)												15)		4										
Name plate																								
Sticker															A									
Stainless steel															B									
Stainless steel, and TAG label stainless steel															C									
Signal cable length																								
No cable																0								
Explosion protection															16)									
None															17)		A							
ATEX / IEC Zone 1																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															18)		R							
Protection type for transmitter / sensor																								
Standard / IP67 (NEMA 4X)																19)		1						
Other																		9						
Cable gland																								
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				
Signal inputs and outputs																								
HART + 20 mA passive + pulses + contact input / output																			20)		B			
HART + 20 mA active + pulses + contact input / output																			21)		C			
HART + 20 mA active + pulses + contact output																			22)		D			
PROFIBUS PA + contact output																					E			
FOUNDATION Fieldbus + contact output																					F			
Default settings / Diagnostics																								
Parameters are at factory settings / Extended diagnostics functions activated.																						2		
Parameters are set according to customer specifications / Extended diagnostics functions activated.																						4		
Design Level																								
Sensordesign Level B																					23)		B	
Sensordesign Level C																					23)		C	

Continued on next page

14) 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,
-40 °C only in conjunction with stainless steel flange.

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

16) Explosion protection only possible in conjunction with dual-compartment transmitter housing

17) Model FEP511 only.

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

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

20) Choice with design Zone 2 / Div 2 or Zone 1 / Div1.

21) Choice with design Zone 2 / Div 2.

22) Choice with design Zone 1 / Div 1.

23) Specified by ABB. Sesordesign Level C with model FEP511 only.

Continued

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP511**	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	**FEP515**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
Accessories																								
None																								AY
Plug connector																								
M12 x 1 fieldbus																						24)		U2
Transmitter housing design																								
Single-compartment housing / Aluminium																						25)		H1
Dual-compartment housing / Aluminium																								H2
Insertion depth																								
Flanges, ASME CL 150, ISO-compliant installation length																								JA
Flanges, ASME CL 300, ISO-compliant installation length																								JC
Flanges (Chinese installation length) (production site: China. Certificate: Without PED approval)																								JN
Sensor housing material																								
Aluminium / Carbon steel																								SMA
Number of test points																								
3 points																								T3
5 points																								T5
Language of documentation																								
German																								M1
English																								M5
Chinese																								M6
Russian																								MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																								MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																								ME
Shipping Register Certificates																								
Marine class approval (DNV)																								CL5
SIL2 - Declaration of Conformity																								
SIL2 - Declaration of Conformity																								CS

24) Only for PROFIBUS PA Not for model FEP515.
25) For model FEP511 only.

ProcessMaster FEP521, FEP525 electromagnetic flowmeter, remote mount design

		Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP521**	**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	**FEP525**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 3 (1/10 in.)		0	0	3																				
DN 4 (5/32 in.)		0	0	4																				
DN 6 (1/4 in.)		0	0	6																				
DN 8 (5/16 in.)		0	0	8																				
DN 10 (3/8 in.)		0	1	0																				
DN 15 (1/2 in.)		0	1	5																				
DN 20 (3/4 in.)		0	2	0																				
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
DN 450 (18 in.)		4	5	0																				
DN 500 (20 in.)		5	0	0																				
DN 550 (22 in.)	1)	5	5	0																				
DN 600 (24 in.)		6	0	0																				
DN 650 (26 in.)	1)	6	5	0																				
DN 700 (28 in.)		7	0	0																				
DN 760 (30 in.)		7	6	0																				
DN 800 (32 in.)		8	0	0																				
DN 900 (36 in.)		9	0	0																				
DN 1000 (40 in.)		0	0	1																				
DN 1050 (42 in.)		0	5	1																				
DN 1100 (44 in.)		1	0	1																				
DN 1200 (48 in.)		2	0	1																				
DN 1400 (54 in.)		4	0	1																				
DN 1500 (60 in.)		5	0	1																				
DN 1600 (66 in.)		6	0	1																				
DN 1800 (72 in.)		8	0	1																				
DN 2000 (80 in.)		0	0	2																				
Lining material																								
PTFE					A																			
Ceramic carbide				2)	D																			
ETFE					E																			
Thick PTFE					F																			
Hard rubber					H																			
Linatex				3)	J																			
PFA					P																			
Soft rubber					S																			
Electrode design																								
Standard						1																		
Standard + full filling electrode (TFE)					4)	2																		
Pointed head						5																		
Pointed head + full filling electrode (TFE)					4)	6																		

Continued on next page

1) Available with JIS flanges.
2) Only with Tungsten carbide electrodes / protection plates attached to both sides of the flange.
3) Upon request: Available with model FEP321 DN 50 … 600 (2 … 24 in.).
4) TFE electrode for detecting partially filled tubes, available from DN 50 (2 in.) with sensor design level "B". Not available for Zone 1 / Div 1.

Continued

		Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP521**	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	**FEP525**	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
Signal electrode material																								
Stainless steel 1.4539 (904)							A																	
Hastelloy C-4 (2.4610)							D																	
Titanium							F																	
Tantalum							G																	
Hastelloy B-3 (2.4600)							H																	
Platinum-iridium							J																	
Stainless steel 1.4571 (316Ti)							S																	
Double layer					5)		W																	
Tungsten carbide coated							T																	
Grounding accessories																								
Standard								1																
Grounding electrodes (for material, refer to "Signal electrode material")								2																
Grounding plate made of stainless steel, attached to one side of the flange							6)	3																
Protection plate made of stainless steel, attached to both sides of the flange							6)	4																
Process connection																								
Flange DIN PN 6								7)	D	0														
Flange DIN PN 10									D	1														
Flange DIN PN 16									D	2														
Flange DIN PN 25									D	3														
Flange DIN PN 40									D	4														
Flange DIN PN 64								8)	D	5														
Flange DIN PN 100								8)	D	6														
Flange, ASME CL 150								9)	A	1														
Flange, ASME CL 300								9)	A	3														
Flange, JIS 10K									J	1														
Flange, JIS 5K								10)		2														
Flange, JIS 20K								10)		3														
Flange, AS2129 table E								10)		4														
Flange, AS2129 table D								10)		5														
Process connection material																								
Steel											B													
Stainless steel flange									11)		D													
Certificates																								
Meter tube with PED approval												0												
Meter tube without PED approval (only China and US production sites. Specify installation length J1, J3 or JN)												1												
Acceptance test certificate (3.1) to EN 10204												2												
Pressure test to AD-2000												3												
Material certificate 3.1 to EN 10204 and pressure test to AD-2000												4												
Calibration																								
Standard accuracy											12)		A											
Increased accuracy											13)		B											
Standard accuracy + ScanMaster function											12)		K											
Increased accuracy + ScanMaster function											13)		L											
Witnessed factory calibration											14)		M											
5-point DKD calibration											15)		T											

Continued on next page

5) Base material Hastelloy C4.
6) Can only be used for sensors ≤ DN 600 (24 in) and PTFE / thick PTFE / ETFE / PFA linings. Material: See data sheet. Use grounding plate for hard rubber, soft rubber and Linatex.
7) Available from DN 1000 (40 in.)
8) DN 15 ... DN 200 (1/2 ... 8 in.) Hard rubber.
9) Flange DN 15 … 600 according to ASME B16.5. Flange > DN 600 according to ASME 16.47 Serie B.
10) Upon request.
11) Material: See data sheet.
12) Standard accuracy (0.3% 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".
13) 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.)
14) 3rd party witnessed calibration.
15) Available for nominal diameters DN 50 (2 in.) ... 600 (24 in.), DN 800 (32 in.).

Continued

	Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP521**	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	**FEP525**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**XX**
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												15)		1										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												15)		2										
High-temperature sensor design / -20 ... 60 °C (-4 ... 140 °F)												16)		3										
High-temperature sensor design / -40 ... 60 °C (-40 ... 140 °F)												16)		4										
Name plate																								
Sticker															A									
Stainless steel															B									
Stainless steel, and TAG label stainless steel															C									
Sticker, chinese language													17)		S									
Stainless steel, chinese language													17)		T									
Stainless steel, and TAG label stainless steel, chinese language													17)		U									
Signal cable length														18)										
No cable																0								
5 m (approx. 15 ft.) standard cable																1								
10 m (approx. 30 ft.) standard cable																2								
20 m (approx. 60 ft.) standard cable																3								
30 m (approx. 100 ft.) standard cable																4								
50 m (approx. 165 ft.) standard cable																5								
80 m (approx. 260 ft.) standard cable																6								
100 m (approx. 325 ft.) standard cable																7								
150 m (approx. 490 ft.) standard cable																8								
Explosion protection																								
None															19)		A							
ATEX / IEC Zone 1 / 21																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															20)		R							
Protection type for transmitter / sensor																								
Standard / IP 67 (NEMA 4X)															21)				1					
Standard / IP 68 (NEMA 6P)															21)	22)			2					
Standard / IP 68 (NEMA 6P), signal cable fitted and potted															21)	23)			3					
Cable gland																								
M20 x 1.5																			A					
1/2 in. NPT																			B					
PF 1/2 in.																			C					
Power supply																								
None																				0				
Signal inputs and outputs																								
None																					Y			
Default settings / Diagnostics																								
Parameters are at factory settings / Extended diagnostics functions activated																						2		
Parameters are set according to customer specifications / Extended diagnostics functions activated																						4		
Design Level																								
Sensordesign Level B																						25)	B	
Sensordesign Level C																						25)	C	

Continued on next page

16) Maximum fluid temperature for standard sensor design:
130 °C with PTFE, PFA, ETFE, thick PTFE / 90 °C (80 °C for production site: China) with hard rubber / 60 °C with soft rubber / 70 °C with Linatex / -40 °C only in conjunction with stainless steel flange.
17) Maximum fluid temperature for high-temperature sensor design: 180 °C with PFA, thick PTFE. 130 °C with ETFE, PTFE. Thick PTFE available for DN 25 ... DN 300, PFA available for DN 10 ... DN 200. -40 °C only in conjunction with stainless steel flange.
18) Production site: China.
19) For flowmeter sensor model FEP525 designed for Zone 1 / Div 1, signal cable length can be max. 50 m (164 ft) in combination with transmitter model FET521 or transmitter model FET525 designed for Zone 2 / Div 2. For sensor model FEP525 designed for Zone 1 / Div 1, signal cable length can be max. 10 m (32.8 ft) in combination with transmitter model FET525 designed for Zone 1 / Div 1.
20) Model FEP521 only.
21) Div 1 available up to DN 300 (12 in.).
22) Transmitter degree of protection = IP67 (NEMA 4X) with single-compartment and dual-compartment housing.
23) Only with external transmitter, sealing compound (optional) D141B038U01.
24) Not available with FET525 transmitter in Zone1 / Div1 design.
25) Specified by ABB. Sesordesign Level C with model FEP521 only

Continued

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP521**	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	**FEP525**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
Accessories																								
None																								AY
With preamplifier, integrated into sensor housing																						26)		AP
Lay length																								
Flanges, ASME CL 150, ISO-compliant installation length																								JA
Flanges, ASME CL 300, ISO-compliant installation length																								JC
Flanges (Chinese installation length) (production site: China. Certificate: Without PED approval)																								JN
Connection box material																								
Aluminum																								UTA
Sensor housing material																								
Aluminium / Carbon steel																								SMA
Power frequency																								
50 Hz (When ordering the sensor without a transmitter, specify the mains frequency.)																								F5
60 Hz (When ordering the sensor without a transmitter, specify the mains frequency.)																								F6
Number of test points																								
3 points																								T3
5 points																								T5
Language of documentation																								
German																								M1
English																								M5
Chinese																								M6
Russian																								MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																								MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																								ME
Shipping Register Certificates																								
Marine class approval (DNV)																								CL5
SIL2 - Declaration of Conformity																								
SIL2 - Declaration of Conformity																								CS

26) Preamplifier required if signal cable length is > 50 m (160 ft). Preamplifier not available for Zone1 / Div1.

Electromagnetic flowmeter ProcessMaster - FEP511 and FEP515, integral mount design, high pressure version

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP511**	**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	**FEP515**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
Lining material																								
ETFE					E																			
Hard rubber					H																			
Electrode design																								
Standard						1																		
Pointed head						5																		
Signal electrode material																								
Hastelloy C-4 (2.4610)							D																	
Stainless steel 1.4571 (316Ti)							S																	
Grounding accessories																								
Standard								1																
Process connection																								
Flange ASME CL 600									A	6														
Flange ASME CL 900									A	7														
Flange ASME CL 1500									A	8														
Flange ASME CL 2500							1)		A	9														
Flange ASME CL 600 RTJ									H	6														
Flange ASME CL 900 RTJ									H	7														
Flange ASME CL 1500 RTJ									H	8														
Flange ASME CL 2500 RTJ							1)		H	9														
Process connection material																								
Steel											B													
Stainless steel flange									2)		D													
Certificates																								
Meter tube with PED approval												0												
Calibration																								
Standard accuracy											3)		A											
Increased accuracy											4)		B											
Standard accuracy + ScanMaster function											3)		K											
Increased accuracy + ScanMaster function											4)		L											
Witnessed factory calibration											5)		M											

Continued on next page

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

Continued

		Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP511**	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	**FEP515**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												6)		**1**										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												6)		2										
Name plate																								
Sticker															**A**									
Stainless steel															B									
Stainless steel, and TAG label stainless steel															C									
Signal cable length																								
No cable																0								
Explosion protection															7)									
None															8)		**A**							
ATEX / IEC Zone 1 / 21																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															9)		R							
Protection type for transmitter / sensor																								
Standard / IP67 (NEMA 4X)																10)		**1**						
Other																		9						
Cable gland																								
M20 x 1.5																			**A**					
1/2 in. NPT																			B					
PF 1/2 in.																	11)		C					
Power supply																								
100 ... 230 V AC, 50 Hz																				1				
24 V AC / DC, 50 Hz																				2				
100 ... 230 V AC, 60 Hz																				3				
24 V AC / DC, 60 Hz																				4				
Signal inputs and outputs																								
HART + 20 mA passive + pulses + contact input / output																			12)		B			
HART + 20 mA active + pulses + contact input / output																			13)		C			
HART + 20 mA active + pulses + contact output																			14)		D			
PROFIBUS PA + contact output																					E			
FOUNDATION Fieldbus + contact output																					F			
Default settings / Diagnostics																								
Parameters are at factory settings / Extended diagnostics																						2		
Parameters are set according to customer specifications / Extended diagnostics																						4		
Design Level																								
Sensordesign Level B																						15)	B	

Continued on next page

6) Maximum fluid temperature for standard sensor design:
130 °C (266 °F) with ETFE // 90 °C (194 °F) with hard rubber,
-40 °C only in conjunction with stainless steel flange.
7) Explosion protection only possible in conjunction with dual-compartment transmitter housing.
8) Only with model FEP511.
9) Div 1 available up to DN 300 (12 in.).
10) Transmitter degree of protection = IP67 (NEMA 4X) with single-compartment and dual-compartment housing
11) Available with model FEP511 only
12) Choice with design Zone 2 / Div 2 or Zone 1 / Div1.
13) Choice with design Zone 2 / Div 2.
14) Choice with design Zone 1 / Div 1.
15) Specified by ABB.

Continued

	Main order number																							Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP511**	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	**FEP515**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
Accessories																								
None																								AY
Steckverbinder																								
Feldbus M12 x 1																						16)		U2
Transmitter housing design																								
Single-compartment housing / Aluminium																						17)		H1
Dual-compartment housing / Aluminium																								H2
Dual-compartment housing / Stainless steel																						18)		H4
Sensor housing material																								
Aluminium / Carbon steel																						19)		SMA
Stainless steel																						20)		SMS
Number of test points																								
3 points																								T3
5 points																								T5
Material Sourcing																								
Material sourcing limitations apply																								MS1
Language of documentation																								
German																								M1
English																								M5
Chinese																								M6
Russian																								MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																								MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																								ME
Material Certifications																								
Test report 2.2 acc. EN 10204 confirmation of material																								C1
Material monitoring with inspection certificate 3.1 acc. EN 10204																								C2
Material monitoring with inspection certificate 3.2 acc. EN 10204																								C3
Declaration of compliance with the order 2.1 acc. EN 10204																								C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test																								C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI (inclusive heat analysis)																								CA
Certificate of accuracy 2.1 acc. EN 10204																								CM
Material monitoring NACE MR 0175 / MR 0103 if applicable, with inspection certificate 3.1 acc. EN 10204																								CN
Others																								CZ
Tests and Reports																								
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (X-Ray) acc. to ASME																								NA
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (Dye Pen Test) acc. to ASME																								NB
Pressure test acc. AD2000 acc. to ASME																								N6
Welder qualification & welding procedure certificate acc. to ASME																								NF

16) Only for PROFIBUS PA Not for model FEP515
17) Not available with design Zone 1.
18) In conjunction with sensor housing material Stainless steel
19) In conjunction with Transmitter housing design (Aluminium) only
20) In conjunction with Transmitter housing design (Stainless steel) only

Electromagnetic flowmeter ProcessMaster - FEP521 and FEP525, remote mount design, high pressure version

	Main order number																						Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP521**	**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	**FEP525**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	X	X	XX
Nominal diameter																								
DN 25 (1 in.)		0	2	5																				
DN 32 (1-1/4 in.)		0	3	2																				
DN 40 (1-1/2 in.)		0	4	0																				
DN 50 (2 in.)		0	5	0																				
DN 65 (2-1/2 in.)		0	6	5																				
DN 80 (3 in.)		0	8	0																				
DN 100 (4 in.)		1	0	0																				
DN 125 (5 in.)		1	2	5																				
DN 150 (6 in.)		1	5	0																				
DN 200 (8 in.)		2	0	0																				
DN 250 (10 in.)		2	5	0																				
DN 300 (12 in.)		3	0	0																				
DN 350 (14 in.)		3	5	0																				
DN 400 (16 in.)		4	0	0																				
Lining material																								
ETFE					E																			
Hard rubber					H																			
Electrode design																								
Standard						1																		
Pointed head						5																		
Signal electrode material																								
Hastelloy C-4 (2.4610)							D																	
Stainless steel 316Ti (1.4571)							S																	
Grounding accessories																								
Standard								1																
Process connection																								
Flanges ANSI Class 600 RF									A	6														
Flanges ANSI Class 900 RF									A	7														
Flanges ANSI Class 1500 RF									A	8														
Flanges ANSI Class 2500 RF							1)		A	9														
Flange ANSI Class 600 RTJ									H	6														
Flange ANSI Class 900 RTJ									H	7														
Flange ANSI Class 1500 RTJ									H	8														
Flange ANSI Class 2500 RTJ							1)		H	9														
Process connection material																								
Steel											B													
Stainless steel flange									2)		D													
Usage Certifications																								
Meter tube with PED approval												0												
Calibration Type																								
Standard accuracy											3)		A											
Increased accuracy											4)		B											
Standard accuracy + ScanMaster function											3)		K											
Increased accuracy + ScanMaster function											4)		L											
Witnessed factory calibration											5)		M											

Continued on next page

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

Continued

	Main order number																					Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP521**	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	**FEP525**	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**XX**
Sensor temperature range / Ambient temperature range																								
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)												6)		1										
Standard sensor design / -40 ... 60 °C (-40 ... 140 °F)												6)		2										
Name plate																								
Adhesive label															A									
Stainless steel															B									
Stainless steel and TAG plate (stainless steel)															C									
Signal Cable Length and Type													7)											
No cable																0								
5 m (15 ft) standard cable																1								
10 m (30 ft) standard cable																2								
20 m (60 ft) standard cable																3								
30 m (100 ft) standard cable																4								
50 m (165 ft) standard cable																5								
80 m (260 ft) standard cable																6								
100 m (525 ft) standard cable																7								
150 m (490 ft) standard cable																8								
Other																9								
Explosion Protection Certification																								
None															8)		A							
ATEX / IEC Zone 1 / 21																	L							
ATEX / IEC Zone 2 / 21																	M							
usFMc Div 2 Zone 2																	P							
usFMc Div 1															9)		R							
Protection Class Transmitter / Protection Class Sensor																								
IP 67 (NEMA 4X) / IP 67 (NEMA 4X)																10)		1						
IP 67 (NEMA 4X) / IP 68 (NEMA 6P), cable not fitted and potted																11)		2						
IP 67 (NEMA 4X) / IP 68 (NEMA 6P), cable fitted and potted																12)		3						
Cable Conduits																								
M20 x 1.5																			A					
1/2 in. NPT																			B					
PF 1/2 in.																	13)		C					
Power supply																								
Without																				0				
Input and Output Signal Type																								
Without																					Y			
Configuration Type / Diagnostics Type																								
Parameters set to factory defaults / Standard diagnostic functions activated																						2		
Parameters set customer-specific / Standard diagnostic functions activated																						4		
Design Level																								
Design Level B																						14)		B

Continued on next page

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

7) For flowmeter sensor model FEP525 designed for zone 1 / Div 1, signal cable length can be max. 50 m (164 ft) in combination with transmitter model FET521 or transmitter model FET 525 designed for zone 2 / Div 2.
For sensor model FEP525 designed for zone 1 / Div 1, signal cable length can be max. 10 m (32.8 ft) in combination with transmitter model FET525 designed for zone 1 / Div 1.

8) Model FEP521 only.

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

10) Transmitter degree of protection = IP67.

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

12) Not available with FET525 transmitter in zone1 / Div1 design.

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

14) Specified by ABB.

Continued

	Main order number																							Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Without explosion protection	**FEP521**	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	**FEP525**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**XX**
Accessories																								
None																								AY
With pre-amplifier installed in sensor terminal box																						15)		AP
Connectionbox Material																								
Aluminum																								UTA
Sensor housing material																								
Aluminum < DN 450 / Carbon Steel > DN 400																								SMA
Power Frequency																								
50 Hz (If the Sensor is ordered without a Transmitter, the line frequency has to be specified here)																								F5
60 Hz (If the Sensor is ordered without a Transmitter, the line frequency has to be specified here)																								F6
Number of test points																								
3 points																								T3
5 points																								T5
Material Sourcing																								
Material sourcing limitations apply																								MS1
Language of documentation																								
German																								M1
English																								M5
Chinese																								M6
Russian																								MB
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)																								MW
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)																								ME
Material Certifications																								
Test report 2.2 acc. EN 10204 confirmation of material																								C1
Material monitoring with inspection certificate 3.1 acc. EN 10204																								C2
Material monitoring with inspection certificate 3.2 acc. EN 10204																								C3
Declaration of compliance with the order 2.1 acc. EN 10204																								C4
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test																								C6
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI (inclusive heat analysis)																								CA
Certificate of accuracy 2.1 acc. EN 10204																								CM
Material monitoring NACE MR 0175 / MR 0103 if applicable, with inspection certificate 3.1 acc. EN 10204																								CN
Others																								CZ
Tests and Reports																								
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (X-Ray) acc. to ASME																								NA
Inspection certificate 3.1 acc. EN 10204 for non-destructive testing of welds (Dye Pen Test) acc. to ASME																								NB
Pressure test acc. AD2000 acc. to ASME																								N6
Welder qualification & welding procedure certificate acc. to ASME																								NF

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

FET521, FET525 external transmitter for ProcessMaster

	Main order number									Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	XX
Without explosion protection	**FET521**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
With explosion protection	**FET525**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XX
Sensor temperature range / Ambient temperature range											
Standard sensor design / -20 ... 60 °C (-4 ... 140 °F)		1									
Standard sensor design / -40 ... 60 °C (-4 ... 140 °F)		2									
High-temperature sensor design / -20 ... 60 °C (-4 ... 140 °F)		3									
High-temperature sensor design / -40 ... 60 °C (-4 ... 140 °F)		4									
Name plate											
Sticker			A								
Stainless steel			B								
Stainless steel, and TAG label stainless steel			C								
Sticker, chinese language		3)	S								
Stainless steel, chinese language		3)	T								
Stainless steel, and TAG label stainless steel, chinese language		3)	U								
Signal cable length											
No cable		1)		0							
Explosion protection											
None					A						
ATEX / IEC Zone 1 / 21			2)	10)	L						
ATEX / IEC Zone 2 / 21				2)	M						
usFMc Div 2 Zone 2				2)	P						
usFMc Div 1				2)	R						
NEPSI Zone1		2)	3)	10)	U						
NEPSI Zone2			2)	3)	V						
Protection type for transmitter / sensor											
Standard / IP 67 (NEMA 4X)					4)	1					
Cable gland											
M20 x 1.5							A				
1/2 in. NPT							B				
PF 1/2 in.						9)	C				
None							Y				
Power supply											
100 ... 230 V AC, 50 Hz								1			
24 V AC / DC, 50 Hz								2			
100 ... 230 V AC, 60 Hz								3			
24 V AC / DC, 60 Hz								4			
Signal inputs / outputs											
HART + 20 mA passive + pulses + contact input / output								5)	B		
HART + 20 mA active + pulses + contact input / output								6)	C		
HART + 20 mA active + pulses + contact output								7)	D		
PROFIBUS PA + contact output									E		
FOUNDATION Fieldbus + contact output									F		
Default settings / Diagnostics											
Without / standard diagnostic functions									8)	0	
Parameters are at factory settings / Extended diagnostics functions activated										2	
Parameters are set according to customer specifications / Extended diagnostics functions activated										4	

Continued on next page

1) For model FET525 designed for Ex Zone 1 / Div 1, 10 m (32.81 ft) of cable is connected to the transmitter.
2) Model FET525 only.
3) Production site: China.
4) Protection type for transmitter = IP 67 (NEMA 4X) with single-compartment housing and dual-compartment housing, IP 20 with panel mount housing.
5) Choice with design Zone 2 / Div 2 or Zone 1 / Div 1 or without explosion protection.
6) Choice with design Zone 2 / Div 2 or without explosion protection.
7) Choice with design Zone 1 / Div 1.
8) Must be selected if transmitter is being ordered as a spare part or without a sensor.
9 Only for model FET521.
10) Only available with Dual-compartment housing.

Continued

	Main order number									Add. order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	XX
Without explosion protection	**FET521**	X	X	X	X	X	X	X	X	X	**XX**
With explosion protection	**FET525**	X	X	X	X	X	X	X	X	X	**XX**
Plug connector											
M12 x 1 fieldbus										11)	U2
Transmitter housing design											
Single-compartment housing / Aluminium										12)	H1
Dual-compartment housing / Aluminium											H2
Additional options											
With Gore-Tex diaphragm										12)	KG
Language of documentation											
German											M1
English											M5
Chinese											M6
Russian											MB
Western Europe / Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)											MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)											ME
Shipping Register Certificates											
Marine class approval (DNV)											CL5
SIL2 - Declaration of Conformity											
SIL2 - Declaration of Conformity											CS

11) Only for Profibus PA, not for model FET525.
12) Available with Model FET521 and FET525 Zone 2 / Div 2.

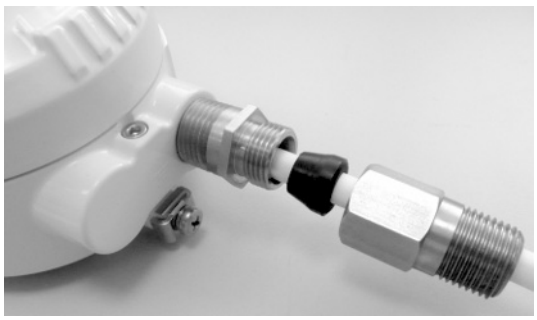
FET501 transmitter plug-in module for ProcessMaster/HygienicMaster

	Main order number									Additional order no.
Version number	1 – 6	7	8	9	10	11	12	13	14	15	XX
	FET501	**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		
FOUNDA FOUNDATION Fieldbus + contact output									F		
Configuration Type / Diagnostics Type											
Without / Standard diagnostic functions										0	
Language of Documentation											
German											M1
English											M5
Chinese											M6
Russian											MB
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)											MW
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)											ME
SIL2 - Declaration of Conformity											
SIL2 - Declaration of Conformity											CS

Flowmeter sensor simulator - FXC4000

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

Accessories

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

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Notes

Notes

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