ABB MEASUREMENT & ANALYTICS | DATA SHEET

ProcessMaster FEP630

Electromagnetic flowmeter



Measurement made easy

The first choice for all industrial applications

EtherNet/IP, PROFINET®
- Minimize commissioning and Start-up
- Configure the Device remotely
- Take advantage of the in-built device driver (EDS for EtherNet/IP™, GSDML for PROFINET®) reducing integration cost
- Monitor your Process and the Flowmeter Status
- Diagnose your Process and the Flowmeter Status
- Verify the Flowmeter remotely

Diagnostics for real-life situations
- To keep your process up and running
- Gas bubble, partial filling or empty pipe detection, electrode impedance, conductivity and sensor temperature monitoring
- Clear text messages for simplified troubleshooting

On board health check
- Flowmeter sensor and transmitter integrity check utilizing fingerprint technology

Noise / Grounding check
- Verify the installation is correct from day one

Service interval monitoring
- Receive timed notifications

Backwards compatibility
- Protect your investment in ABB flowmetering

ProcessMaster series

The ProcessMaster is available in two series – ProcessMaster FEP620 the good fit for everyday applications and ProcessMaster FEP630 the first choice for all process industry applications delivering best in class functionality and options.

Applicability	**FEP620 series**	**FEP630 series**
	Good fit for everyday applications	**The first choice for all industrial applications**
Chemical Industry Corrosive liquids, acids, bases	✔	✔
Power Coal slurry, Lime slurry, Cooling	✔	✔
Mining Abrasive slurries, hydraulic transport	✔	✔
Pulp & Paper Stock Flows, Latex, Clay, Liquor, Chemicals	Up to 2 % Stock	Up to 4 % Stock
Oil & Gas High pressure applications	✔	✔
Food & Beverage Hygienic applications	✔	✔
Measuring medium minimum conductivity	20 µS/cm	5 µS/cm
Measuring medium temperature	Up to 130 °C (266 °F)	Up to 180 °C (356 °F)
Pressure	≤ PN 40 / Cl 300	≤ PN 40 / Cl 300, option for high pressure
Hazardous area	—	Yes

Features	**FEP620 series**	**FEP630 series**
Accuracy	0.5 %	0.4 %, Option up to 0.2 %
Nominal diameter	DN 3 to 2000 (1/8 to 80″)	DN 3 to 2000 (1/8 to 80″)
Liner material	PTFE, Rubber, PFA, ETFE	PTFE, Rubber, PFA, ETFE, Ceramic Carbide, Linatex
I/O's	1 x analog, 2 x digital	1 x analog, 2 x digital, option for add-in modules
Communication	HART®, Modbus RTU®	HART®, PROFIBUS DP®, PROFIBUS PA®, Modbus RTU®, Modbus TCP®, Ethernet IP®, PROFINET®, Ethernet-APL™ (PROFINET, Modbus TCP, Webserver communication)
Process diagnostics	Empty pipe, Partially filling, Electrode Impedance	Empty pipe, Partially filling, Gas bubbles, Electrode Impedance, Conductivity, Sensor temperature
Backwards compatibility	—	Yes

… ProcessMaster series

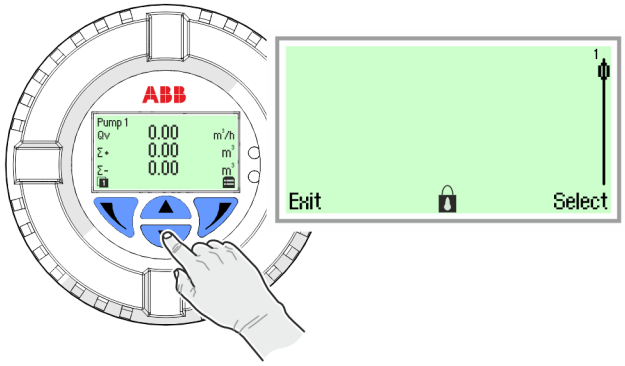
Features and Functions

On-board Health Check

ProcessMaster's in-built fingerprint technology helps to ensure Sensor and Transmitter Integrity without the need to remove the flowmeter from the process. The Check provides a pass / failed result based on a comparison of the current flowmeter status to a set of reference data.

Benefits:

- Easy to operate
- No additional equipment required
- No training necessary
- Quick check of flowmeter integrity



Backwards Compatibility saves your Investment in ABB Flowmetering

Take advantage of new features and improved performance. Switch to the new product at your own timeline. Minimize the cost of change in stock keeping, documentation and change of internal processes.

Benefits:

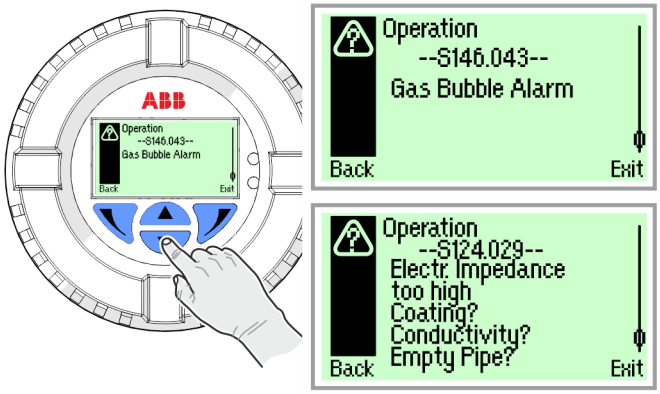
- Drop in replacement
- Same terminal designation I/O's, sensor connections
- No need to change wiring documentation
- Sensor cable stays unchanged
- Identical operating philosophy:
  Easy Set-up and Sensor Set-up
- Common user experience, less training
- Less inventory, less cost

Diagnostics for real-life situations

Detecting critical process conditions at an early stage helps reducing unscheduled downtime and maintenance. Clear text messages simplify troubleshooting.
Device diagnostic information can be accessed without any intervention – either through the HMI or bus communication.

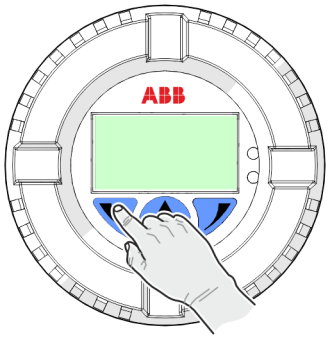
Benefits:

- Peace-of-mind that flowmeter is operating within its specification
- Prioritized alarms to correct most important alarm first
- Through-the-glass operation without the need to open the housing



Verify the Installation is correct - from day one

Improving quality and reducing cost can be a challenge if the flow measurement is unstable. A proper grounding is fundamental to an accurate electromagnetic flow measurement. ProcessMaster's in-built noise / grounding check helps getting the wiring / grounding right from day one without the need for further Tools.



Standard functionality

Flowmeter sensor coil inductance

A measurement of the flowmeter sensor coil inductance can be triggered. This enables to check for the flowmeter sensor coil integrity.

Noise check / Grounding check

This function allows checking for noise and proper electrical grounding of the device. While the check is in progress, no flow measurement can take place.

Pre-requisites using the functionality:

- Flowmeter sensor must be completely filled
- No flow must occur in the flowmeter sensor

Fingerprint

The "fingerprint" database integrated in the transmitter allows for comparison of the values at the time of factory calibration or commissioning with the currently recorded values.
A quick "on-board health check" resulting in a pass / fail information can be performed.
For an in-depth verification, an external tool is available from ABB (in preparation).

Detection of partial filling

A partially filled sensor affects the flowmeter reading and the measuring accuracy.
If the flowmeter sensor is ordered with a full pipe detection electrode, which is located at the Top of the sensor, the transmitter's '...Diagnosis Tfe' function enables for an alarm in case the sensor tube starts to become partially filled.

Pre-requisites using the functionality:

- Nominal diameter: > DN 50 (> 2")
- Flowmeter sensor design level A
- Conductivity of the measuring medium:
  20 to 20000 µS/cm

Installation conditions:

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

Verification

There is an Option for an in-depth verification of the device using an external Tool from ABB.
This Tool provides a brief documentation of the Verification results allowing for a print out.

… ProcessMaster series

… Features and Functions

Optional diagnostic functions
The extended diagnostics functionality package contains the following functions.

Gasbubble detection
Gas bubbles in the measuring medium effect the flowmeter reading and the accuracy.
Enhanced diagnostics feature the option for gas bubble detection to make the flow measurement most reliable.
There is the option for a gas bubble alarm triggered once the actual gas bubble value exceeds the threshold configured.
This alarm is shown in the HMI. The digital output flags an alarm if configured accordingly.

Pre-requisites using the functionality:
- Nominal diameter: DN 10 to DN 300 (⅜ to 12 in).
- Conductivity of the measuring medium: 20 to 20000 µS/cm.

Installation conditions:
- The flowmeter sensor can be installed either horizontally or vertically. Vertical installation is preferable.

Conductivity monitoring
The conductivity of the fluid can be monitored by setting minimum / maximum alarm thresholds.
Once alarm limits are exceeded, the digital output flags an alarm if configured accordingly.
The conductivity is available as 4 to 20 mA output (option card).

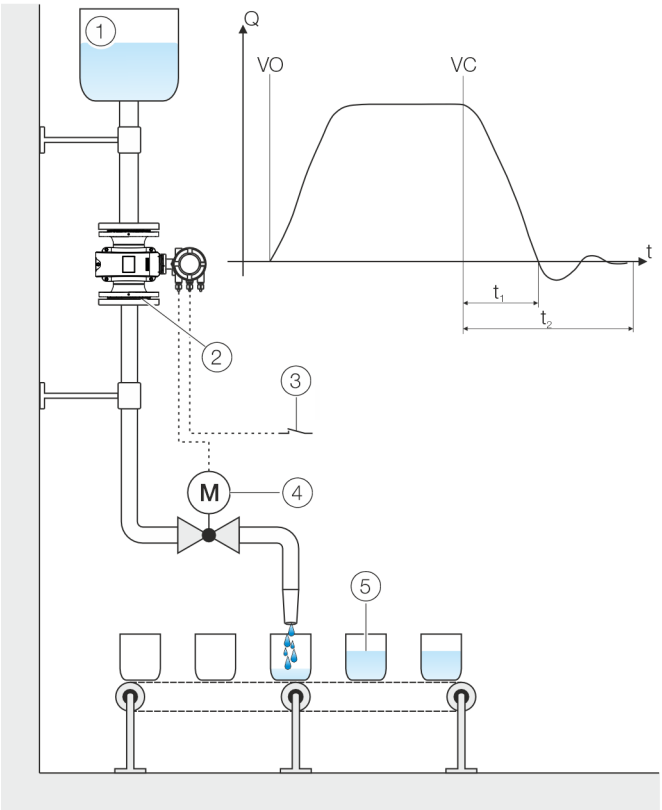
Pre-requisites using the functionality:
- Conductivity of the measuring medium: 20 to 20000 µS/cm.

Electrode impedance
An Impedance measurement between the electrode and ground can be triggered.
This enables to check for the electrode integrity.

Flowmeter sensor temperature
A flowmeter sensor temperature measurement can be triggered.
This enables to check for the flowmeter sensor temperature.
With flowmeter sensor temperature out of spec, the digital output flags an alarm if configured accordingly.

Transmitter in-house temperature
Monitoring the temperature of the electronic unit in the transmitter triggers an alarm via the digital output, if configured.
In the '…Diagnosis Values', the current temperature as well as the smallest and largest previously measured temperature is displayed.

Filling function



1. Supply tank
2. Sensor
3. Start / stop fill operation (digital input through plug-in card)
4. Fill valve
5. Filling tank

VO Valve open (filling started)
VC Valve closed (fill quantity reached)
t_1 Valve closing time
t_2 Overrun time

Figure 1: FillMass fill function

The optional filling function allows filling with filling times> 3 seconds.

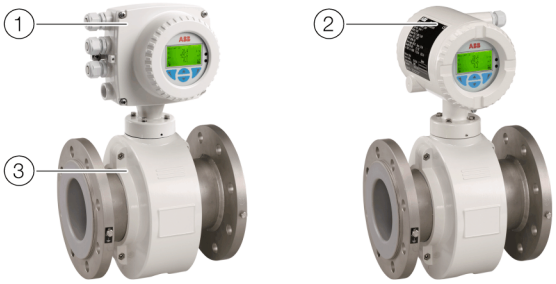
Filling quantity is configurable and the filling process can be started via the digital input (plug-in card).
As soon as the filling quantity has been reached, the valve can be closed via the digital output.
Filling quantity correction is calculated by measuring the overrun quantity.
Additionally, the low flow cut-off can be configured if required.

Overview – models without hazardous area approval

Sensor

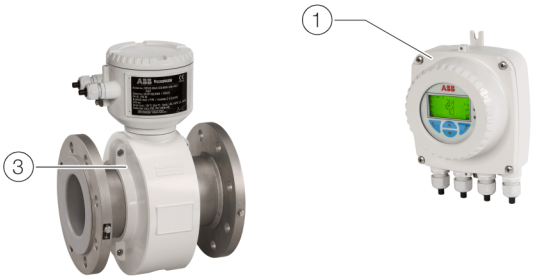
Integral mount design

FEP631



Remote mount design

FEP632 **FET632**



① Single-compartment transmitter housing
② Dual-compartment transmitter housing
③ Flowmeter sensor, Design Level A (DN 3 to 2000)

Figure 2: Designs

Flowmeter sensor	
Model	ProcessMaster FEP631, FEP632, FET632
Housing	Integral mount design, remote mount design
Measuring accuracy for liquids	0.4 % of the measured value, option for 0.3 % and 0.2 % of the measured value
Permissible measuring medium temperature T_{medium}	Standard: −25 to 130 °C (−13 to 266 °F) Option: −25 to 180 °C (−13 to 356 °F)
Minimum conductivity	> 5 µS/cm, (20 µS/cm for demineralized water)
Nominal pressure rating	PN 6 to 100; ASME CL 150 to 2500; JIS 5K to 20K, AS flanges, AWWA C207 Class B, D, E
Nominal diameter	DN 3 to 2000 (1/10 to 80 in)
Process connection	Flange based on DIN, ASME, JIS, AS2129 table D, E, AWWA C207 Class B, D, E
Materials process connection	Steel, stainless steel
Lining material	Hard rubber (DN 25 to 2000), soft rubber (DN 50 to 2000), PTFE (DN 10 to 600), PFA (DN 3 to 200), ETFE (DN 25 to 600), Ceramic Carbide (DN 25 to 1000), Linatex® (DN 50 to 600)
Electrode material	Stainless steel, Hastelloy B®, Hastelloy C®, Platinum-iridium, Tantalum, Titanium, Double Layer, Tungsten carbide
IP rating	Integral mount design: IP 65 / IP 67, NEMA 4X Remote mount design: IP 65 / IP 67 / IP 68 (sensor only), NEMA 4X

Approvals	
Pressure Equipment Directive 2014/68/EU	Conformity assessment in accordance with category III, fluid group 1
CRN (Canadian regulatory number)	On request
Explosion protection	ATEX / IECEx / Zone 1, 2, 21, 22 FM / cFM Cl 1 Div 1 (≤ DN 300), Cl 1 Div 2
Additional approvals	At www.abb.com/flow or on request.

Transmitter



① Dual-compartment transmitter housing

② Single-compartment transmitter housing

Figure 3: Designs

Transmitter	
Model	FET632
Housing	Integral mount design, remote mount design
IP rating	IP 65 / IP 67 / NEMA 4X
Cable length	Maximum 200 m (656 ft), remote mount design only
Power supply	100 to 240 V AC (−15 / +10 %) 50 / 60 Hz, 16.8 to 30 V DC
Outputs	Current output: 4 to 20 mA active or passive (can be configured on-site) Digital output 1: passive, configurable as pulse, frequency or switch output Digital output 2: passive, configurable as pulse or switch output
Additional outputs	The transmitter has two slots which can be used to insert plug-in cards to extend the outputs. The following plug-in cards are available: • Current output (passive) • Digital output (passive) • Digital input (passive): • 24 V DC power supply for active outputs
Communication	Standard: HART® 7.1 Option: PROFIBUS DP®, PROFIBUS PA®, Modbus RTU®, Modbus TCP®, EtherNet/IP®, Ethernet-APL™, ProfiNet®

Approvals	
Explosion protection	None
Additional approvals	At www.abb.com/flow or on request.
Certificate of Conformity	Electrical Equipment per Canadian Requirements. Applicable Standards: CSA-C22.2 No. 94, ANSI/UL 61010 Electrical Equipment per US Requirements. Applicable Standards: FM3810, ANSI/UL 50

Overview – devices with Ex protection

Overview – The fast track to explosion protection device data

These safety instructions related to explosion protection are valid in conjunction with the following test documentation and certificates:

Scope	Certificate
ATEX Zone 1 / 21	FM17ATEX0016X
ATEX Zone 2 / 22	FM17ATEX 0017X
IEC Ex Zone 1 / 21	IECEx FME 17.0001X
IEC Ex Zone 2 / 22	IECEx FME 17.0001X
FMus Div 1 (USA)	FM17US0062X
FMus Div 2 (USA)	FM17US0062X
cFM Div 1 (Canada)	FM17CA0033X
cFM Div 2 (Canada)	FM17CA0033X
NEPSI Zone 1	GYJ18.1487X
NEPSI Zone 2	GYJ18.1487X

Model	Operation in zone	Electrical connection and explosion protection data from chapter
FEP631-A1	Zone1, 21	**Operation in Zone 1, 21** on page 72
FEP631-A2	Zones 2, 22	**Operation in Zone 2, 22** on page 77
FEP632-A1 and FET632-A1	Zone1, 21	**Operation in Zone 1, 21** on page 72
FEP632-A1 and FET632-Y0	Zone1, 21	**Operation in Zone 1, 21** on page 72
FEP632-A2 and FET632-A2	Zones 2, 22	**Operation in Zone 2, 22** on page 77
FEP632-A2 and FET632-Y0	Zones 2, 22	**Operation in Zone 2, 22** on page 77

Version in integral mount design

The transmitter and the flowmeter sensor form a single mechanical entity.
The transmitter is available in two housing designs:

- Single-compartment housing
  This is suited for use in ATEX/IEC Ex Zone 2, 22.
  In the single-compartment housing, the electronics chamber and the connection chamber in the transmitter are not separated from each other.
- Dual- compartment housing:
  This is suited for use in ATEX/IEC Ex Zone 2, 22.
  In the dual-compartment housing, the electronics chamber and the connection chamber in the transmitter are separated from each other.

Note
Further information on the Ex Approval of devices can be found in the type examination certificates or the relevant certificates at www.abb.com/flow.

ATEX / IEC Zone 1, FM Cl1 Div 1

Sensor

ProcessMaster 630

FEP631-A1 (Zone 1, 21)

FEP631-F1 (Cl1, Div. 1)



ATEX

Certificate ATEX: FM17ATEX0016X

DN 3 to 300:

II 2 (1) G Ex db eb ib mb [ia Ga] IIC T6…T1 Gb

II 2 (1) D Ex tb [ia Da] IIIC T80°C…T_{medium} Db

DN 350 to 2000:

II 2 (1) G Ex db eb ib [ia Ga] IIC T6…T1 Gb

II 2 (1) D Ex tb [ia Da] IIIC T80°C…T_{medium} Db

IEC

Certificate: IECEx FME 17.0001X

DN 3 to 300:

II 2 (1) G Ex db eb ib mb [ia Ga] IIC T6…T1 Gb

II 2 (1) D Ex tb [ia Da] IIIC T80°C…T_{medium} Db

DN 350 to 2000:

II 2 (1) G Ex db eb ib [ia Ga] IIC T6…T1 Gb

II 2 (1) D Ex tb [ia Da] IIIC T80°C…T_{medium} Db

USA, FM approval

Certificate: FM17US0062X

DN 3 to 300:

S-XP-IS: CL I, Div 1, GPS ABCD T6...T1

DIP: CL II,III, Div 1, GPS EFG T6...T3B

CL I, ZN 1, AEx db eb mb [ia Ga] IIB+H2 T6…T1 Gb

ZN 21, AEx tb [ia Da] IIIC T80°C...T165°C Db

Canada, FM approval

Certificate: FM17CA0033X

DN 3 to 300:

S-XP-IS: CL I, Div 1, GPS BCD T6...T1

DIP: CL II,III, Div 1, GPS EFG T6...T3B

CL I, ZN 1, Ex db eb mb [ia Ga] IIB+H2 T6…T1 Gb

Ex tb [ia Da] IIIC T80°C...T165°C Db

ATEX / IEC Zone 2, FM Cl1 Div 2

Sensor

ProcessMaster 630

FEP631-A2 (Zone 2, 22)

FEP631-F2 (Cl1, Div. 2)

1)



2)



ATEX

Certificate ATEX: FM17ATEX0017X

II 3G Ex ec IIC T6…T1 Gc [3)]

II 3D Ex tc IIIC T80°C…T_{medium} Dc

IEC

Certificate: IECEx FME 17.0001X

II 3G Ex ec IIC T6…T1 Gc [3)]

II 3D Ex tc IIIC T80°C…Tmedium Dc

USA, FM approval

Certificate: FM17US0062X

NI: CL I, Div 2, GPS ABCD T6...T1 [3)]

DIP: CL II,III, Div 2, GPS EFG T6…T3B

CL I, ZN 2, AEx ec IIC T6…T1 [3)]

ZN 21, AEx tb IIIC T80°C...T165°C

Canada, FM approval

Certificate: FM17CA0033X

NI: CL I, Div 2, GPS ABCD T6...T1 [3)]

DIP: CL II,III, Div 2, GPS EFG T6…T3B [3)]

CL I, ZN 2, Ex ec IIC T6...T1 Gc [3)]

Ex tb IIIC T80°C...T165°C Db [4)]

1) Single-compartment housing

2) Dual-compartment housing

When Flowmeter is equipped with Ethernet Card (Ethernet Card availabe with Zone 2, Div. 2 only), the following Notes apply:

3) T4 instead of T6

4) T80°C instead of T80°C ...T165°C

… Overview – devices with Ex protection

Version with remote mount design

The transmitter is mounted in a separate location from the flowmeter sensor. The electrical connection between the transmitter and flowmeter sensor may only be established using the signal cable supplied. A maximum signal cable length of 200 m (656 ft) is possible.

Note
Further information on the Ex Approval of devices can be found in the type examination certificates or the relevant certificates at www.abb.com/flow.

ATEX / IEC Zone 1, FM Cl1 Div1

The following table presents the combination of the FEP632 sensor in explosion-proof design with the FET632 transmitter.

Sensor	
ProcessMaster 630	**ProcessMaster 630**
FEP632-A1 (Zone 1, 21)	FEP632-F1 (Cl1, Div. 1)
	
ATEX	**USA, FM approval**
Certificate ATEX: FM17ATEX0016X	Certificate: FM17US0062X
DN 3 to 300:	DN 3 to 300:
II 2 G Ex eb ib mb IIC T6…T1 Gb	S-XP: CL I, Div 1, GPS ABCD T6…T1
II 2 D Ex tb IIIC T80°C…T_{medium} Db	DIP: CL II,III, Div 1, GPS EFG T6…T3B
DN 350 to 2000:	CL I, ZN 1, AEx db eb mb IIB+H2 T6…T1 Gb
II 2 G Ex eb ib IIC T6…T1 Gb	ZN 21, AEx tb IIIC T80°C…T165°C Db
II 2 D Ex tb IIIC T80°C…T_{medium} Db	
IEC	**Canada, FM approval**
Certificate: IECEx FME 17.0001X	Certificate: FM17CA0033X
DN 3 to 300:	DN 3 to 300:
II 2 G Ex eb ib mb IIC T6…T1 Gb	S-XP: CL I, Div 1, GPS BCD T6…T1
II 2 D Ex tb IIIC T80°C…T_{medium} Db	DIP: CL II,III, Div 1, GPS EFG T6…T3B
DN 350 to 2000:	CL I, ZN 1, Ex db eb mb IIB+H2 T6…T1 Gb
II 2 G Ex eb ib IIC T6…T1 Gb	Ex tb IIIC T80°C…T165°C Db
II 2 D Ex tb IIIC T80°C…T_{medium} Db	

Transmitter		
FET632-A1 (Zone 1, 21)	FET632-A2 (Zone 2, 22)	FET632-Y0
FEP632-F1 (Cl1, Div. 1)	FEP632-F2 (Cl1, Div. 2)	Outside Ex-area
2) 	2) 	1) 
		1) 
ATEX	**ATEX**	—
Certificate ATEX: FM17ATEX0016X	Certificate ATEX: FM17ATEX0017X	No Ex Approval!
II 2 (1) G Ex db eb mb [ia Ga] IIC T6 Gb	II 3G Ex ec IIC T6 Gc [3]	
II 2 (1) D Ex tb [ia Da] IIIC T80°C Db	II 3D Ex tc IIIC T80°C Dc	
IEC	**IEC**	—
Certificate: IECEx FME 17.0001X	Certificate: IECEx FME 17.0001 X	No Ex Approval!
II 2 (1) G Ex db eb mb [ia Ga] IIC T6 Gb	II 3G Ex ec IIC T6 Gc [3]	
II 2 (1) D Ex tb [ia Da] IIIC T80°C Db	II 3D Ex tc IIIC T80°C Dc	
USA, FM approval	**USA, FM approval**	—
Certificate: FM17US0062X	Certificate: FM17US0062X	No Ex Approval!
XP-IS: CL I, Div 1, GPS BCD T6	NI: CL I, Div 2, GPS ABCD T6 [3]	
DIP: CL II,III, Div 1, GPS EFG T6	DIP: CL II,III, Div 2, GPS EFG T6 [3]	
CL I, ZN 1, AEx db [ia Ga] IIB+H2 T6 Gb	CL I, ZN 2, AEx ec IIC T6 [3]	
ZN 21, AEx tb [ia Da] IIIC T80°C Db	ZN 21, AEx tb IIIC T80°C	
Canada, FM approval	**Canada, FM approval**	—
Certificate: FM17CA0033X	Certificate: FM17CA0033X	No Ex Approval!
XP-IS: CL I, Div 1, GPS BCD T6	NI: CL I, Div 2, GPS ABCD T6 [3]	
DIP: CL II,III, Div 1, GPS EFG T6	DIP: CL II,III, Div 2, GPS EFG T6 [3]	
CL I, ZN 1, Ex db [ia Ga] IIB+H2 T6 Gb	Ex ec IIC T6 Gc [3]	
Ex tb [ia Da] IIIC T80°C Db	Ex tb IIIC T80°C Db	

* Single-compartment housing

** Dual-compartment housing

When Flowmeter is equipped with Ethernet Card (Ethernet Card availabe with Zone 2, Div. 2 only), the following Notes apply:

3) T4 instead of T6

… Overview – devices with Ex protection

… Version with remote mount design

ATEX / IEC Zone 2, FM Cl1 Div2

The following table presents the combination of the FEP632 sensor in explosion-proof design with the FET632 transmitter.

Sensor	**Transmitter**	
ProcessMaster 630	FET632-A2 (Zone 2, 22)	FET632-Y0
FEP632-A2 (Zone 2, 22)	FEP632-F2 (Cl1, Div. 2)	Outside Ex-area
FEP632-F2 (Cl1, Div. 2)		
	2)  1) 	1) 
ATEX	**ATEX**	—
Certificate ATEX: FM17ATEX0017X	Certificate ATEX: FM17ATEX0017X	No Ex Approval!
II 3G Ex ec IIC T6…T1 Gc	Ex ec IIC T6 Gc 2)	
II 3D Ex tc IIIC T80°C…Tmedium Dc	Ex tc IIIC T80°C Dc	
IEC	**IEC**	—
Certificate: IECEx FME 17.0001X	Certificate: IECEx FME 17.0001 X	No Ex Approval!
II 3G Ex ec IIC T6…T1 Gc	II 3G Ex ec IIC T6 Gc 2)	
II 3D Ex tc IIIC T80°C…Tmedium Dc	II 3D Ex tc IIIC T80°C Dc	
USA, FM approval	**USA, FM approval**	—
Certificate: FM17US0062X	Certificate: FM17US0062X	No Ex Approval!
NI: CL I, Div 2, GPS ABCD T6...T1	NI: CL I, Div 2, GPS ABCD T6 2)	
DIP: CL II,III, Div 2, GPS EFG T6…T6…T3B	DIP: CL II,III, Div 2, GPS EFG T6 2)	
CL I, ZN 2, AEx ec IIC T6…T1	CL I, ZN 2, AEx ec IIC T6 2)	
ZN 21, AEx tb IIIC T80°C...T165°C	ZN 21, AEx tb IIIC T80°C	
Canada, FM approval	**Canada, FM approval**	—
Certificate: FM17CA0033X	Certificate: FM17CA0033X	No Ex Approval!
NI: CL I, Div 2, GPS ABCD T6...T1	NI: CL I, Div 2, GPS ABCD T6 2)	
DIP: CL II,III, Div 2, GPS EFG T6…T3B	DIP: CL II,III, Div 2, GPS EFG T6 2)	
CL I, ZN 2, Ex ec IIC T6...T1 Gc	Ex ec IIC T6 Gc 2)	
Ex tb IIIC T80°C...T165°C Db	Ex tb IIIC T80°C Db	

1) Single-compartment housing

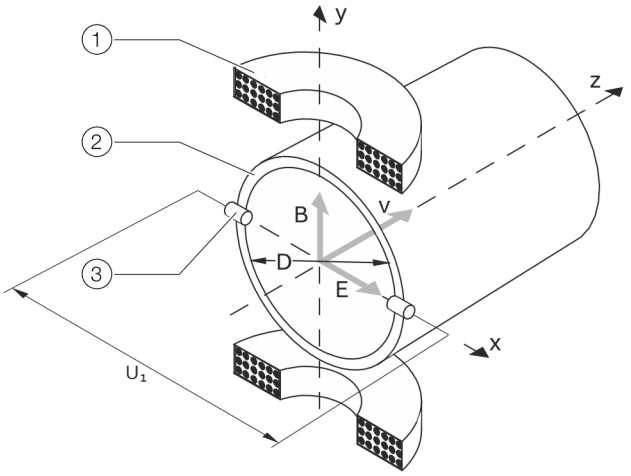
When Flowmeter is equipped with Ethernet Card (Ethernet Card availabe with Zone 2, Div. 2 only), the following notes apply:

2) T4 instead of T6

Flowmeter sensor

Measuring principle

Measurements performed by the electromagnetic flowmeter are based on Faraday's law of induction. A voltage is generated in a conductor when it moves through a magnetic field.



(1) Magnet coil
(2) Measuring tube in electrode plane
(3) Measuring electrode

Figure 4: Electromagnetic flowmeter diagram

$U_1 \sim B \times D \times v$	$qv = \frac{D^2 \times \pi}{4} \times v$	$U_1 \sim qv$
U_1 Measuring span	v Average flow velocity	
B Magnetic induction	qv Volume flow rate	
D Electrode spacing		

With the device-relevant application of this measuring principle, a conductive measuring medium flows through a tube in which a magnetic field is generated perpendicular to the flow direction (see Figure 4).
The voltage induced in the measuring medium is tapped by two diametrically opposed electrodes. This measurement voltage is proportional to the magnetic induction, the electrode spacing and the average medium velocity v.
Taking into account that the magnetic induction and the electrode spacing are constant values results in a proportion between the measurement voltage U_1 and the average medium velocity.
From the calculation of the volume flow rate follows that the measurement voltage is linear and proportional to the volume flow rate.

The induced voltage is converted by the transmitter to standardized, analog and digital signals.

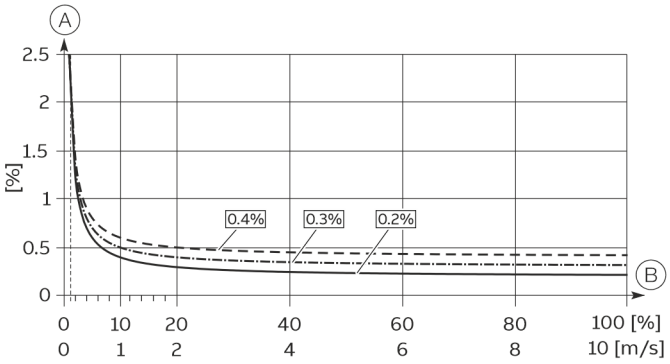
Measuring accuracy

Reference conditions

Based on EN 29104	
Temperature of medium being measured	20 °C (68 °F) ±2 K
Ambient temperature	20 °C (68 °F) ±2 K
Power supply	Nominal voltage acc. to name plate U = ±1 %; frequency f = ±1 %
Installation conditions	• Upstream: > 10 x DN straight section • Downstream: > 5 x DN straight section
Warm-up phase	30 minutes

Measurement value deviation and reproducibility

Measuring error



(A) Accuracy ± of measured value in %
(B) Flow velocity v in m/s, Q / Q_{max}DN in %

Figure 5: Measuring error

Impulse output
Standard calibration DN 3 to 2000
±0.4 % of measured value, ±0.02 % Q_{max}DN*
Optional calibration
DN 3 to 600, 800: ±0.3 % of measured value, ±0.02 % Q_{max}DN*
Or
DN 10 to 600, 800: ±0.2 % of measured value, ±0.02 % Q_{max}DN*

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

* Q_{max}DN: See table in chapter **Measuring range table** on page 20.

Repeatability, response time

Repeatability	**Response time****
≤ 0.11 % of measured value, t_{meas} = 100 s, v = 0.5 ... 10 m/s	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

Table 1 Repeatability, response time

** Of current output with damping of 0.04 seconds.

… Flowmeter sensor

Permitted pipe vibration

In accordance with EN 60068-2-6
Applicable to sensors in remote mount design and sensors in integral mount design.

- Maximum deflection: 0.15 mm (0.006 in) in the frequency range of 10 to 58 Hz
- Maximum acceleration: 2 g in the frequency range of 58 to 150 Hz
- Maximum acceleration: 4g (Tested to DNV DNVGL CG 0339-2019) for Devices specified with code 'CL5' in Modelcode. CL5 = DNV approved device.

IP rating

- IP 65 / IP 67 in accordance with EN 60529
- IP 68 in accordance with EN 60529 (for remote mount design only)
- NEMA 4X

Signal cables

For remote mount design only.
The maximum signal cable length between flowmeter sensor and transmitter is 200 m (656 ft).
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 – see **Accessories** on page 98.

For marine applications, a certified signal cable is available.

Temperature data

Storage temperature range
−40 to 70 °C (−40 to 158 °F)

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

Maximum permissible cleaning temperature

CIP media	Liner	Cleaning temperature
Steam	PTFE, PFA	150 °C (302 °F)
Cleaning fluid	PTFE, PFA	140 °C (284 °F)

- The maximum cleaning temperature specified applies to a maximum ambient temperature of 25 °C (77 °F).
  If the ambient temperature up-scales > 25 °C (> 77 °F), then the temperature difference to the current temperature must be subtracted from the max. cleaning temperature.
- The specified cleaning temperature may have an effect for a maximum of 60 minutes.

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 **Operation in Zone 1, 21** on page 72 and chapter **Operation in Zone 2, 22** on page 77.

Integral mount design

Flowmeter sensor in standard version					
Lining material	**Flange material**	**Ambient temperature range (T_{amb})**		**Measuring medium temperature (T_{medium})**	
		Minimum	**Maximum**	**Minimum**	**Maximum**
Hard rubber	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	85 °C (185 °F)
				−5 °C (23 °F)*	80 °C (176 °F)*
Hard rubber	Stainless steel	−15 °C (5 °F)	60 °C (140 °F)	−15 °C (5 °F)	85 °C (185 °F)
				−5 °C (23 °F) *	80 °C (176 °F) *
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)	90 °C (194 °F)
			45 °C (113 °F)		130 °C (266 °F)
PTFE	Stainless steel	−20 °C (−4 °F)	60 °C (140 °F)	−25 °C (−13 °F)	90 °C (194 °F)
		−40 °C (−40 °F)**	45 °C (113 °F)		130 °C (266 °F)
Thick PTFE***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	90 °C (194 °F)
			45 °C (113 °F)		130 °C (266 °F)
Thick PTFE***	Stainless steel	−20 °C (−4 °F)	60 °C (140 °F)	−25 °C (−13 °F)	90 °C (194 °F)
		−40 °C (−40 °F)**	45 °C (113 °F)		130 °C (266 °F)
PFA***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	90 °C (194 °F)
			45 °C (113 °F)		130 °C (266 °F)
PFA***	Stainless steel	−20 °C (−4 °F)	60 °C (140 °F)	−25 °C (−13 °F)	90 °C (194 °F)
		−40 °C (−40 °F)**	45 °C (113 °F)		130 °C (266 °F)
ETFE***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	90 °C (194 °F)
			45 °C (113 °F)		130 °C (266 °F)
ETFE***	Stainless steel	−20 °C (−4 °F)	60 °C (140 °F)	−25 °C (−13 °F)	90 °C (194 °F)
		−40 °C (−40 °F)**	45 °C (113 °F)		130 °C (266 °F)
Linatex*	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	70 °C (158 °F)
Linatex*	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	−20 °C (−4 °F)	60 °C (140 °F)	−20 °C (−4 °F)	80 °C (176 °F)

* Only for China production site

** For (optional) low−temperature version only

*** Only for design level ‘A’

… Flowmeter sensor

… Temperature data

Flowmeter sensor in high temperature version* **					
Lining material	**Flange material**	**Ambient temperature range (T_{amb})**		**Measuring medium temperature (T_{medium})**	
		Minimum	**Maximum**	**Minimum**	**Maximum**
Thick PTFE***	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	180 °C (356 °F)
Thick PTFE***	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–20 °C (–4 °F)	180 °C (356 °F)
		–40 °C (–40 °F)**			
PFA***	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	180 °C (356 °F)
PFA***	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–20 °C (–4 °F)	180 °C (356 °F)
		–40 °C (–40 °F)**			
ETFE***	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	130 °C (266 °F)
ETFE***	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–20 °C (–4 °F)	130 °C (266 °F)
		–40 °C (–40 °F)**			

* Only for China production site

** For (optional) low–temperature version only

*** Only for design level ‘A’

Note
When using the device in potentially explosive atmospheres, note the additional temperature data in the chapter entitled **Operation in Zone 1, 21** on page 72 and chapter **Operation in Zone 2, 22** on page 77.

Remote mount design

Flowmeter sensor in standard version

Lining material	Flange material	Ambient temperature range (T_{amb})		Measuring medium temperature (T_{medium})	
		Minimum	Maximum	Minimum	Maximum
Hard rubber	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	85 °C (185 °F)
				−5 °C (23 °F)*	80 °C (176 °F)*
Hard rubber	Stainless steel	−15 °C (5 °F)	60 °C (140 °F)	−15 °C (5 °F)	85 °C (185 °F)
				−5 °C (23 °F)*	80 °C (176 °F) *
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)	90 °C (194 °F)
		−10 °C (14 °F)	45 °C (113 °F)	−10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	−25 °C (−13 °F)	60 °C (140 °F)	−25 °C (−13 °F)	130 °C (266 °F)
		−40 °C (−40 °F)**			
Thick PTFE***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	130 °C (266 °F)
Thick PTFE***	Stainless steel	−25 °C (−13 °F)	60 °C (140 °F)	−25 °C (−13 °F)	130 °C (266 °F)
		−40 °C (−40 °F)**			
PFA***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	130 °C (266 °F)
PFA***	Stainless steel	−25 °C (−13 °F)	60 °C (140 °F)	−25 °C (−13 °F)	130 °C (266 °F)
		−40 °C (−40 °F)**			
ETFE***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	130 °C (266 °F)
ETFE***	Stainless steel	−25 °C (−13 °F)	60 °C (140 °F)	−25 °C (−13 °F)	130 °C (266 °F)
Linatex*	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	70 °C (158 °F)
Linatex*	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)

Flowmeter sensor in high temperature version***

Lining material	Flange material	Ambient temperature range ($T_{amb.}$)		Measuring medium temperature (T_{medium})	
		Minimum	Maximum	Minimum	Maximum
Thick PTFE***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	180 °C (356 °F)
Thick PTFE***	Stainless steel	−25 °C (−13 °F)	60 °C (140 °F)	−25 °C (−13 °F)	180 °C (356 °F)
		−40 °C (−40 °F)**			
PFA***	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	180 °C (356 °F)
PFA***	Stainless steel	−25 °C (−13 °F)	60 °C (140 °F)	−25 °C (−13 °F)	180 °C (356 °F)
		−40 °C (−40 °F)**			
ETFE	Steel	−10 °C (14 °F)	60 °C (140 °F)	−10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	−25 °C (−13 °F)	60 °C (140 °F)	−25 °C (−13 °F)	130 °C (266 °F)
		−40 °C (−40 °F)**			

* Only for China production site

** For (optional) low−temperature version only

*** Only for design level ‘A’

… Flowmeter sensor

Measuring range table

The full-scale value can be set between 0.02 x Q_{max}DN and 2 x Q_{max}DN.

Nominal diameter		Lower range value	Q_{max}DN	Upper range value
DN	**in**	**0.02 x Q_{max}DN (≈ 0.2 m/s)**	**0 to ≈ 10 m/s**	**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	¼	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	⅜	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	½	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	¾	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 ¼	8 l/min (2.11 US gal/min)	400 l/min (106 US gal/min)	800 l/min (211 US gal/min)
40	1 ½	12 l/min (3.17 US gal/min)	600 l/min (159 US gal/min)	1200 l/min (317 US gal/min)
50	2	1.2 m^3/h (5.28 US gal/min)	60 m^3/h (264 US gal/min)	120 m^3/h (528 US gal/min)
65	2 ½	2.4 m^3/h (10.57 US gal/min)	120 m^3/h (528 US gal/min)	240 m^3/h (1057 US gal/min)
80	3	3.6 m^3/h (15.9 US gal/min)	180 m^3/h (793 US gal/min)	360 m^3/h (1585 US gal/min)
100	4	4.8 m^3/h (21.1 US gal/min)	240 m^3/h (1057 US gal/min)	480 m^3/h (2113 US gal/min)
125	5	8.4 m^3/h (37 US gal/min)	420 m^3/h (1849 US gal/min)	840 m^3/h (3698 US gal/min)
150	6	12 m^3/h (52.8 US gal/min)	600 m^3/h (2642 US gal/min)	1200 m^3/h (5283 US gal/min)
200	8	21.6 m^3/h (95.1 US gal/min)	1080 m^3/h (4755 US gal/min)	2160 m^3/h (9510 US gal/min)
250	10	36 m^3/h (159 US gal/min)	1800 m^3/h (7925 US gal/min)	3600 m^3/h (15850 US gal/min)
300	12	48 m^3/h (211 US gal/min)	2400 m^3/h (10567 US gal/min)	4800 m^3/h (21134 US gal/min)
350	14	66 m^3/h (291 US gal/min)	3300 m^3/h (14529 US gal/min)	6600 m^3/h (29059 US gal/min)
400	16	90 m^3/h (396 US gal/min)	4500 m^3/h (19813 US gal/min)	9000 m^3/h (39626 US gal/min)
450	18	120 m^3/h (528 US gal/min)	6000 m^3/h (26417 US gal/min)	12000 m^3/h (52834 US gal/min)
500	20	132 m^3/h (581 US gal/min)	6600 m^3/h (29059 US gal/min)	13200 m^3/h (58117 US gal/min)
600	24	192 m^3/h (845 US gal/min)	9600 m^3/h (42268 US gal/min)	19200 m^3/h (84535 US gal/min)
700	28	264 m^3/h (1162 US gal/min)	13200 m^3/h (58118 US gal/min)	26400 m^3/h (116236 US gal/min)
760	30	312 m^3/h (1374 US gal/min)	15600 m^3/h (68685 US gal/min)	31200 m^3/h (137369 US gal/min)
800	32	360 m^3/h (1585 US gal/min)	18000 m^3/h (79252 US gal/min)	36000 m^3/h (158503 US gal/min)
900	36	480 m^3/h (2113 US gal/min)	24000 m^3/h (105669 US gal/min)	48000 m^3/h (211337 US gal/min)
1000	40	540 m^3/h (2378 US gal/min)	27000 m^3/h (118877 US gal/min)	54000 m^3/h (237754 US gal/min)
1050	42	616 m^3/h (2712 US gal/min)	30800 m^3/h (135608 US gal/min)	61600 m^3/h (271217 US gal/min)
1100	44	660 m^3/h (3038 US gal/min)	33000 m^3/h (151899 US gal/min)	66000 m^3/h (290589 US gal/min)
1200	48	840 m^3/h (3698 US gal/min)	42000 m^3/h (184920 US gal/min)	84000 m^3/h (369841 US gal/min)
1400	54	1080 m^3/h (4755 US gal/min)	54000 m^3/h (237755 US gal/min)	108000 m^3/h (475510 US gal/min)
1500	60	1260 m^3/h (5548 US gal/min)	63000 m^3/h (277381 US gal/min)	126000 m^3/h (554761 US gal/min)
1600	66	1440 m^3/h (6340 US gal/min)	72000 m^3/h (317006 US gal/min)	144000 m^3/h (634013 US gal/min)
1800	72	1800 m^3/h (7925 US gal/min)	90000 m^3/h (396258 US gal/min)	180000 m^3/h (792516 US gal/min)
2000	80	2280 m^3/h (10039 US gal/min)	114000 m^3/h (501927 US gal/min)	228000 m^3/h (1003853 US gal/min)

Process connections

For an overview of available process connection versions, see **Overview – models without hazardous area approval** on page 8.

Installation length

The sensor installation length is based on ISO 13359.
For further details, refer to chapter **Dimensions** on page 36.

Materials

Wetted parts		
Part	**Standard**	**Option**
Liner material	PTFE, PFA, ETFE, hard rubber, soft rubber	Ceramic Carbide, Linatex
Measurement and grounding electrode for liner material		
• Hard rubber • Soft rubber	SST 1.4571 (AISI 316Ti)	Hastelloy B-3 (2.4600), Hastelloy C-4 (2.4610), titanium, Tantalum, Platinum-iridium, SST 1.4539 (AISI 904L)
• PTFE, PFA, ETFE	SST 1.4539 (AISI 904L)	SST 1.4571 (AISI 316Ti), Hastelloy B-3 (2.4600), Hastelloy C-4 (2.4610), Titanium, Tantalum, Platinum-iridium
Grounding ring	Stainless steel	On request
Protection plate	Stainless steel	On request

Non-wetted parts (process connection), Design level 'A'



DN	**Standard**	**Option**
DN 3 to 15 (1/10 to 1/2″)	Stainless steel [1)]	–
DN 20 to 400 (3/4 to 16″)	Steel (galvanized) [2)]	Stainless steel[1)]
DN 450 to 2000 (18 to 80″)	Steel (painted) [2)]	–

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

1) 1.4301 (AISI 304), 1.4307, 1.4404 (AISI 316L) 1.4435 (AISI 316L), 1.4541 (AISI 321) 1.4571 (AISI 316Ti)
2) 1.0038, 1.0460, 1.0570, 1.0432, ASTM A105, Q255A, 20#, 16Mn

Sensor housing, Design level 'A'



Part / DN	**Material**
Housing	
DN 3 to 400 (1/10 to 16″)	Cast aluminum (painted) Paint coat: ≥ 80 µm thick, RAL 9002
DN 450 to 2000 (18 to 80″)	Welded steel design (painted) Paint coat: ≥ 80 µm thick, RAL 9002
Meter tube	Stainless steel [1)]
Terminal box	Aluminum alloy, painted, ≥ 80 µm thick, light gray, RAL 9002 Option: Plastic, gray white, RAL 9002 Option: Stainless Steel
Cable gland [2)]	Polyamide, stainless Steel [3)]

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

1) 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
2) Cable gland with M 20 x 1.5 or NPT thread, to be selected via the order number.
3) In the case of explosion-proof design or for ambient temperature of -40 °C (40 °F).

… Flowmeter sensor

Material load for process connections

The limits of the permissible measuring medium temperature (T_{medium}) and permissible pressure (P_{medium}) are calculated on the basis of the liner and flange material used in the device (see device name plate).

Minimum permissible operating pressure

The following tables show the permissible minimum operating pressure (P_{medium}) as a function of the measuring medium temperature (T_{medium}) and the liner material.

Design Level 'A'



Lining material	Nominal diameter	P_{medium} [mbar abs]	T_{medium}*
Hard rubber	DN 25 to DN 2000 (1 to 80″)	0	< 85 °C (185 °F) < 80 °C (176 °F)**
Soft rubber	DN 50 to DN 2000 (2 to 80″)	0	< 60 °C (140 °F)
PTFE	DN 10 to DN 600 (⅜ to 24″)	270	< 20 °C (68 °F)
		400	< 100 °C (212 °F)
		500	< 130 °C (266 °F)
Thick PTFE	DN 25 to DN 80 (1 to 3″)	0	< 180 °C (356 °F)
	DN 100 to DN 250 (4 to 10″)	67	< 180 °C (356 °F)
	DN 300 (12″)	27	< 180 °C (356 °F)
PFA	DN 3 to DN 200 (1/10 to 8″)	0	< 180 °C (356 °F)
ETFE	DN 25 to DN 600 (1 to 24″)	100	< 130 °C (266 °F)
Ceramic carbide	DN 25 to DN 1000 (1 to 40″)	0	< 80 °C (176 °F)
Linatex**	DN 50 to DN 600 (6 to 24″)	0	< 70 °C (158 °F)

* For CIP/SIP cleaning, higher temperatures are permitted for limited time periods; refer to **Maximum permissible cleaning temperature** on page 16.

** Only for China production site

Material load diagrams

Devices with DN 3 to 600 (1/10 to 24 in)

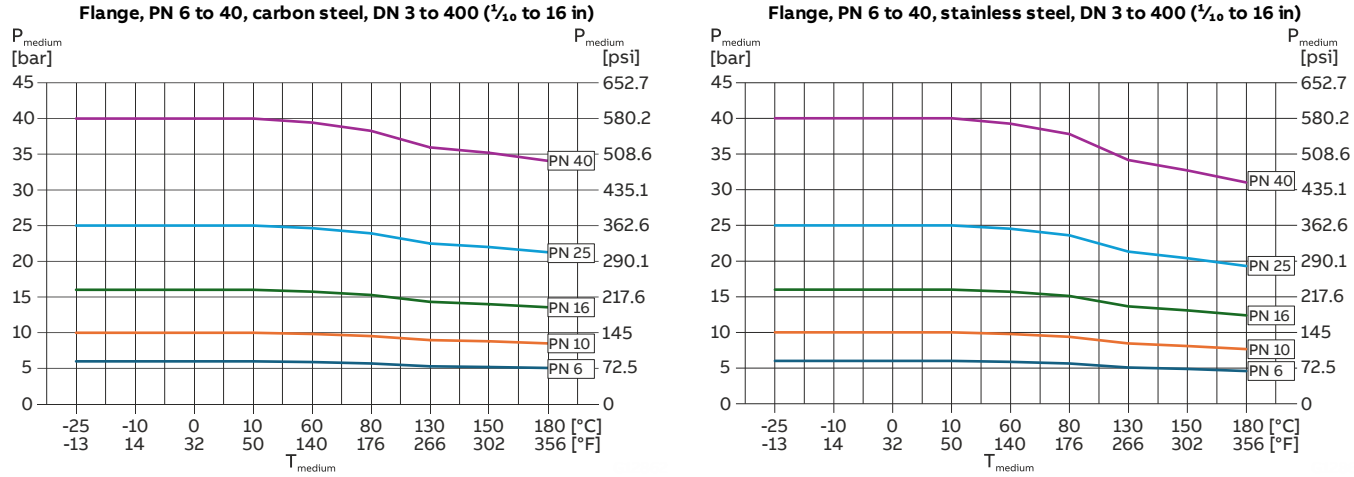


Figure 6: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 3 to 400, Pressure Rating PN 6 to 40

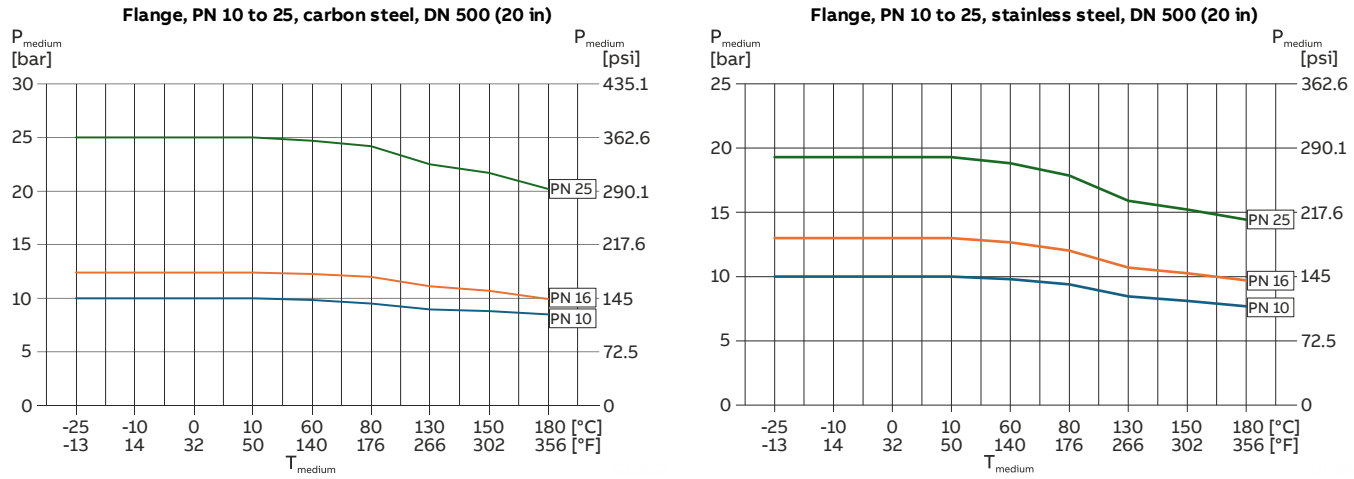


Figure 7: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 500, Pressure Rating PN 10 to 25

… Flowmeter sensor

… Material load for process connections

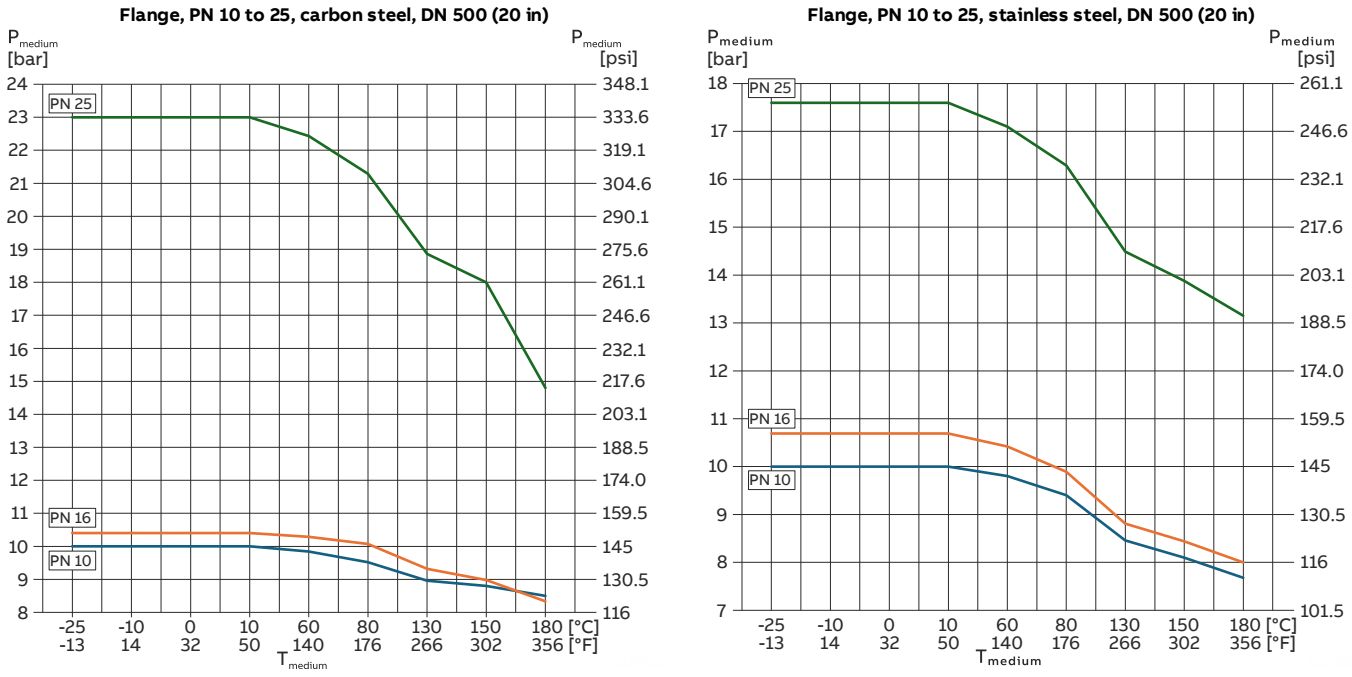


Figure 8: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 500, Pressure Rating PN 10 to 25

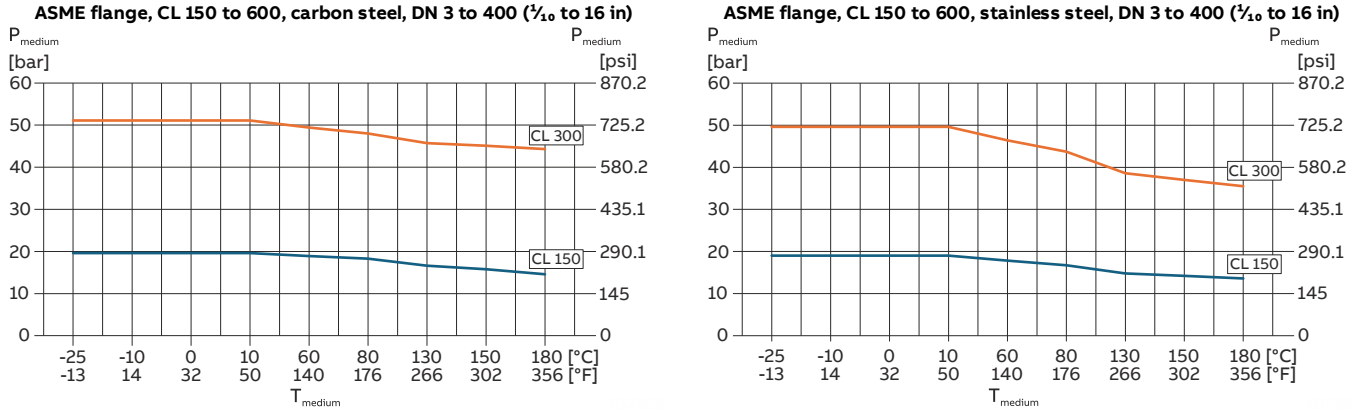
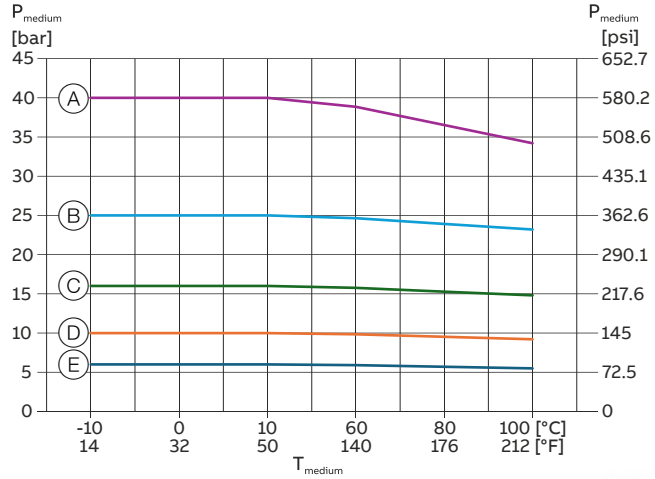


Figure 9: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 3 to 400 (½ to 24 in), Pressure Rating CL 150 to 600

Devices with DN 700 to 1000 (28 to 40 in), ABB standard lay length (1.3 × D)

Flange, PN 6 to 40, carbon steel, DN 700 to 1000 (28 to 40 in)



Ⓐ DN 700 to 1000 (28 to 40 in), PN 40

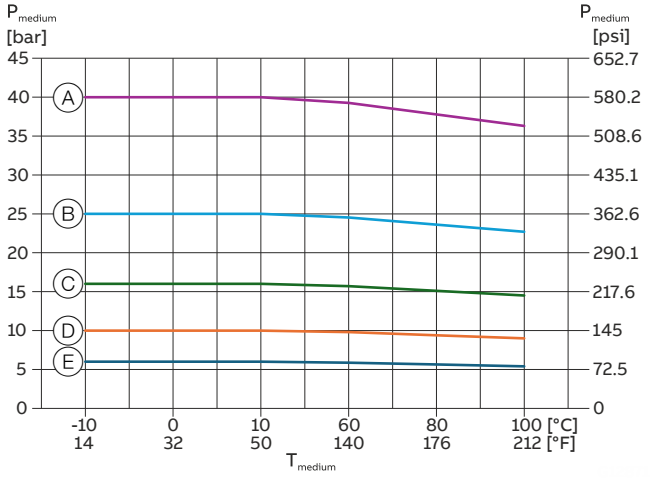
Ⓑ DN 700 to 1000 (28 to 40 in), PN 25

Ⓒ DN 700 to 1000 (28 to 40 in), PN 16

Ⓓ DN 700 to 1000 (28 to 40 in), PN 10

Ⓔ DN 1000 (40 in), PN 6

Flange, PN 6 to 40, stainless steel, DN 700 to 1000 (28 to 40 in)



Ⓐ DN 700 to 1000 (28 to 40 in), PN 40

Ⓑ DN 700 to 1000 (28 to 40 in), PN 25

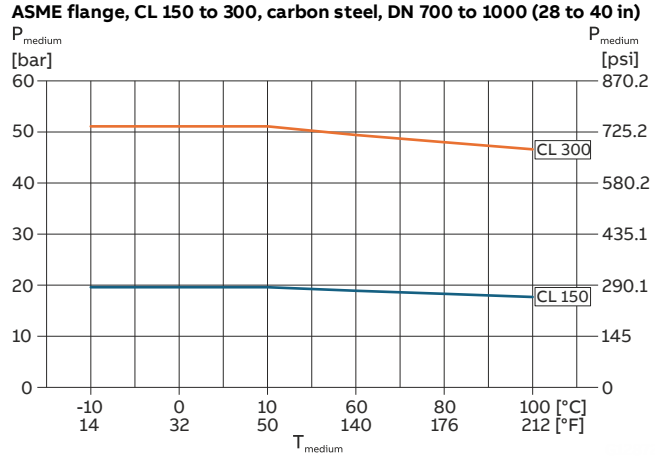
Ⓒ DN 700 to 1000 (28 to 40 in), PN 16

Ⓓ DN 700 to 1000 (28 to 40 in), PN 10

Ⓔ DN 1000 (40 in), PN 6

Figure 10: Flowmeter sensor with carbon steel flange or stainless steel flange, nominal diameter DN 700 to 100 (28 to 40 in), pressure Rating PN 6 to 40

ASME flange, CL 150 to 300, carbon steel, DN 700 to 1000 (28 to 40 in)



ASME flange, CL 150 to 300, stainless steel, DN 700 to 1000 (28 to 40 in)

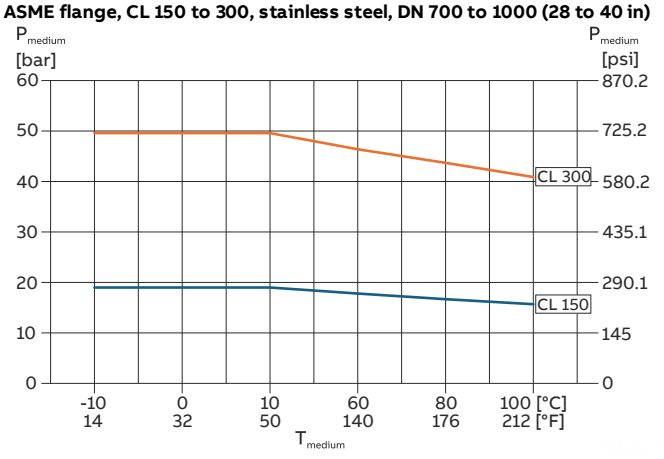


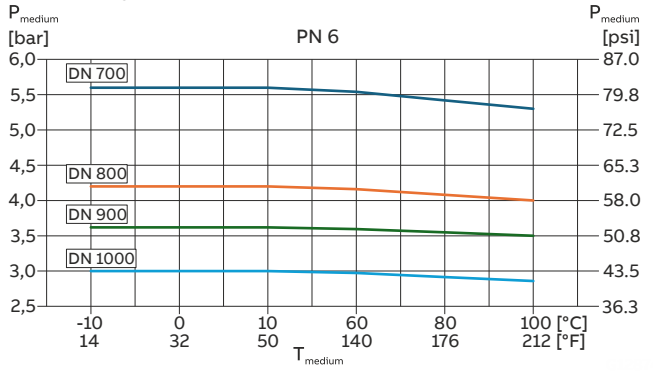
Figure 11: Flowmeter sensor with carbon steel flange or stainless steel flange, nominal diameter DN 700 to 1000 (28 to 40 in), pressure Rating CL 150 to 300

… Flowmeter sensor

… Material load for process connections

Devices with DN 700 to 1000 (28 to 40 in), ABB short lay length (1 × D)

Flange, PN 6, carbon steel, DN 700 to 1000 (28 to 40 in)



Flange, PN 10, carbon steel, DN 700 to 1000 (28 to 40 in)

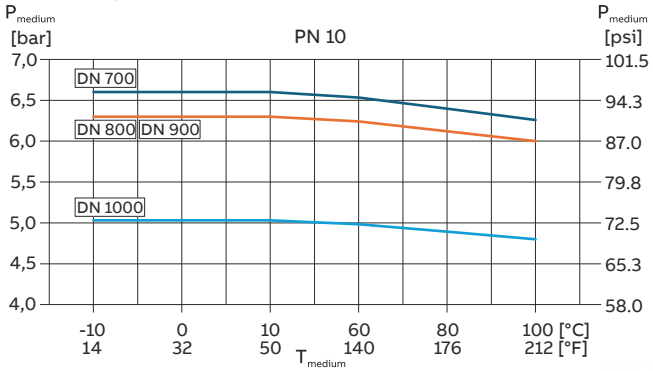
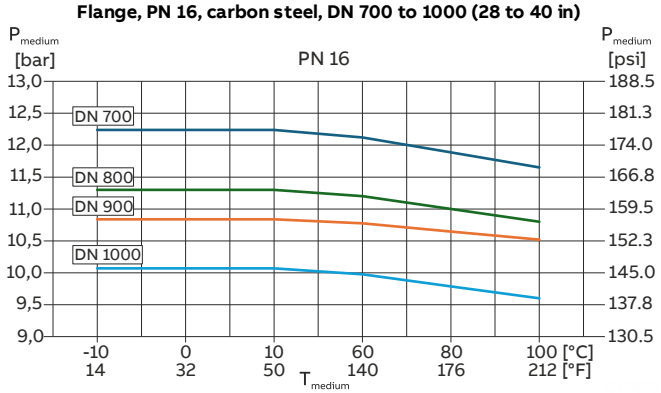


Figure 12: Flowmeter sensor with carbon steel flange, nominal diameter DN 700 to 1000 (28 to 40 in), pressure Rating PN 6 and PN 10

Flange, PN 16, carbon steel, DN 700 to 1000 (28 to 40 in)



Flange, PN 25, carbon steel, DN 700 to 1000 (28 to 40 in)

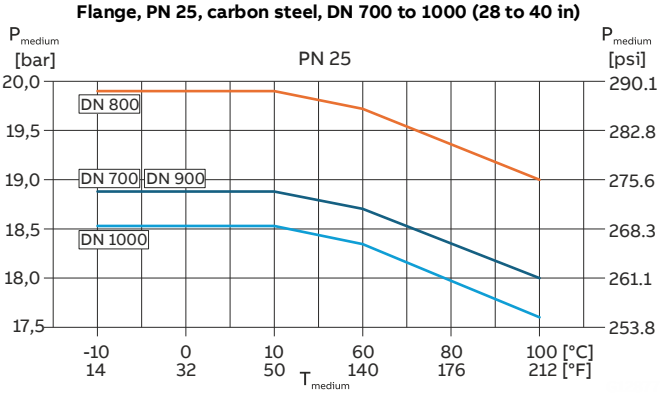


Figure 13: Flowmeter sensor with carbon steel flange, nominal diameter DN 700 to 1000 (28 to 40 in), pressure Rating PN 16 and PN 25

ASME flange, CL 150 and CL300, stainless steel, DN 700 to 1000 (28 to 40 in)

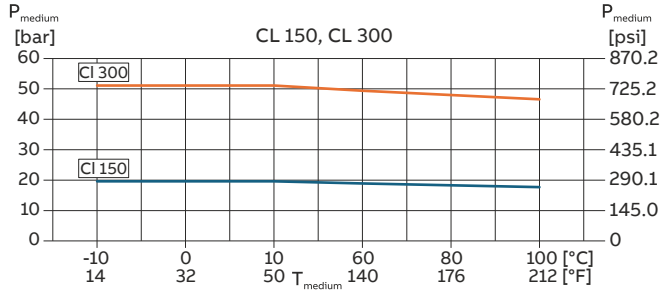
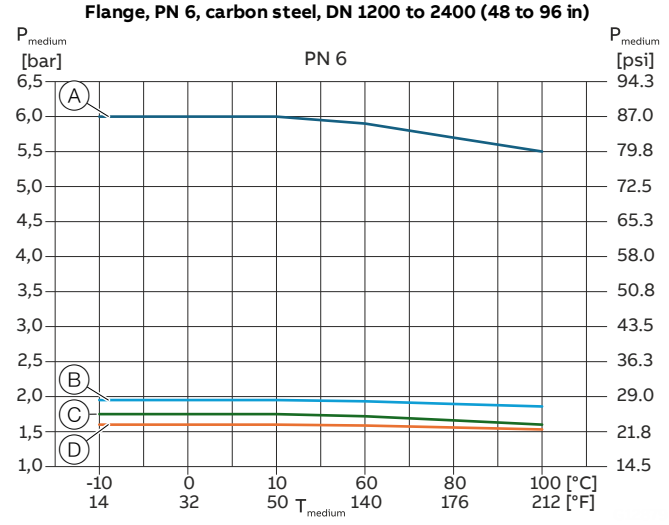


Figure 14: Flowmeter sensor with stainless steel flange, nominal diameter DN 700 to 1000 (28 to 40 in), pressure Rating CL 150 and CL 300

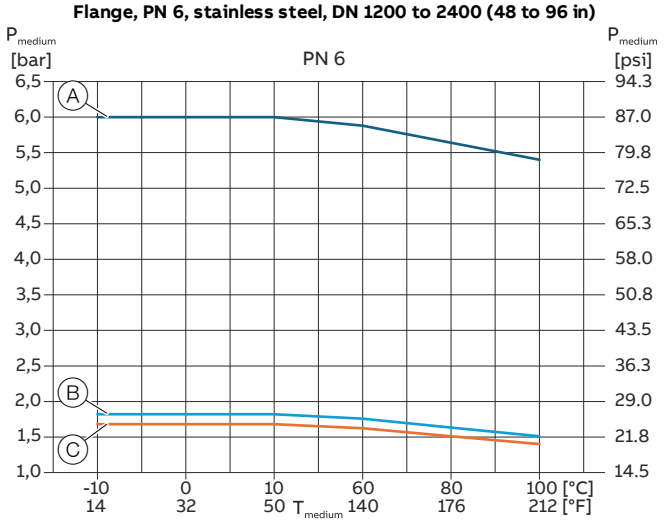
Devices with DN 1200 to 2400 (48 to 96 in), ABB standard lay length (1.3 × D)

Flange, PN 6, carbon steel, DN 1200 to 2400 (48 to 96 in)



(A) DN 1200 to 1800 (48 to 72 in)
(B) DN 2400 (96 in)
(C) DN 2200 (88 in)
(D) DN 2000 (80 in)

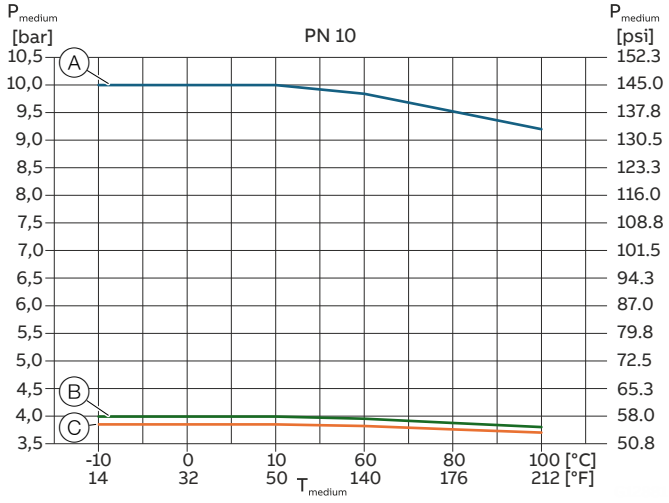
Flange, PN 6, stainless steel, DN 1200 to 2400 (48 to 96 in)



(A) DN 1200 to 1800 (48 to 72 in)
(B) DN 2400 (96 in)
(C) DN 2000 to 2200 (80 to 88 in)

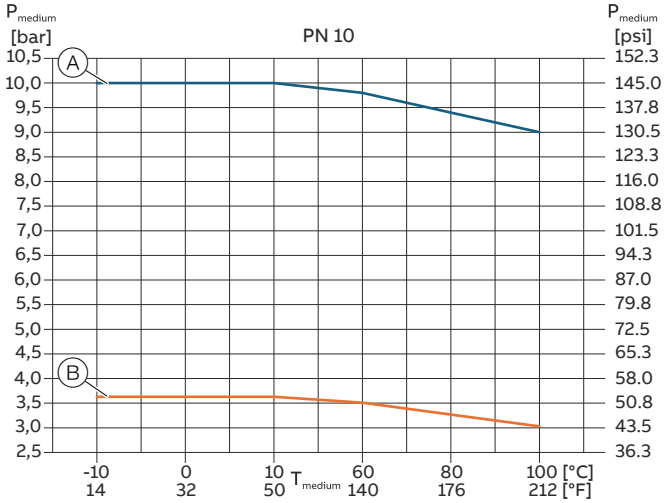
Figure 15: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 1200 to 2400 (48 to 96 in), pressure Rating PN 6

Flange, PN 10, carbon steel, DN 1200 to 2400 (48 to 96 in)



(A) DN 1200 to 1800 (48 to 72 in)
(B) DN 2200 (88 in)
(C) DN 2000 and DN 2200 (80 and 96 in)

Flange, PN 10, stainless steel, DN 1200 to 2000 (48 to 96 in)



(A) DN 1200 to 1800 (48 to 72 in)
(B) DN 2000 and DN 2200 (80 and 96 in)

Figure 16: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 1200 to 2400 (48 to 96 in), pressure Rating PN 10

… Flowmeter sensor

… Material load for process connections

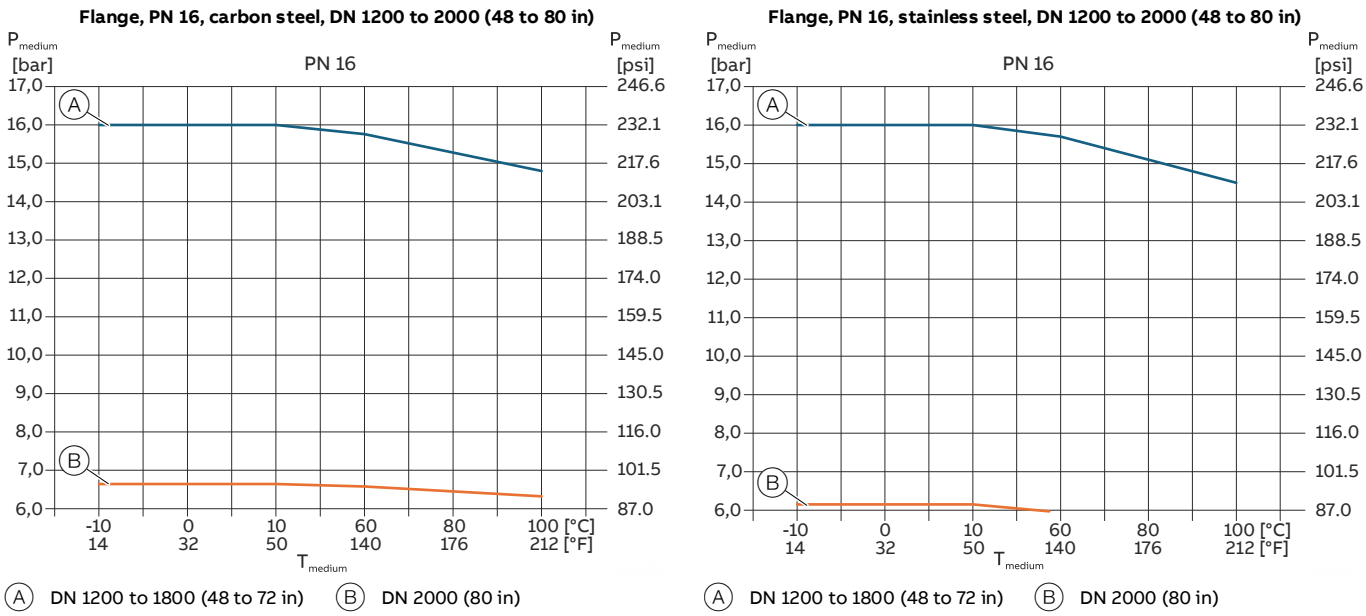


Figure 17: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 1200 to 2000 (48 to 80 in), pressure Rating PN 16

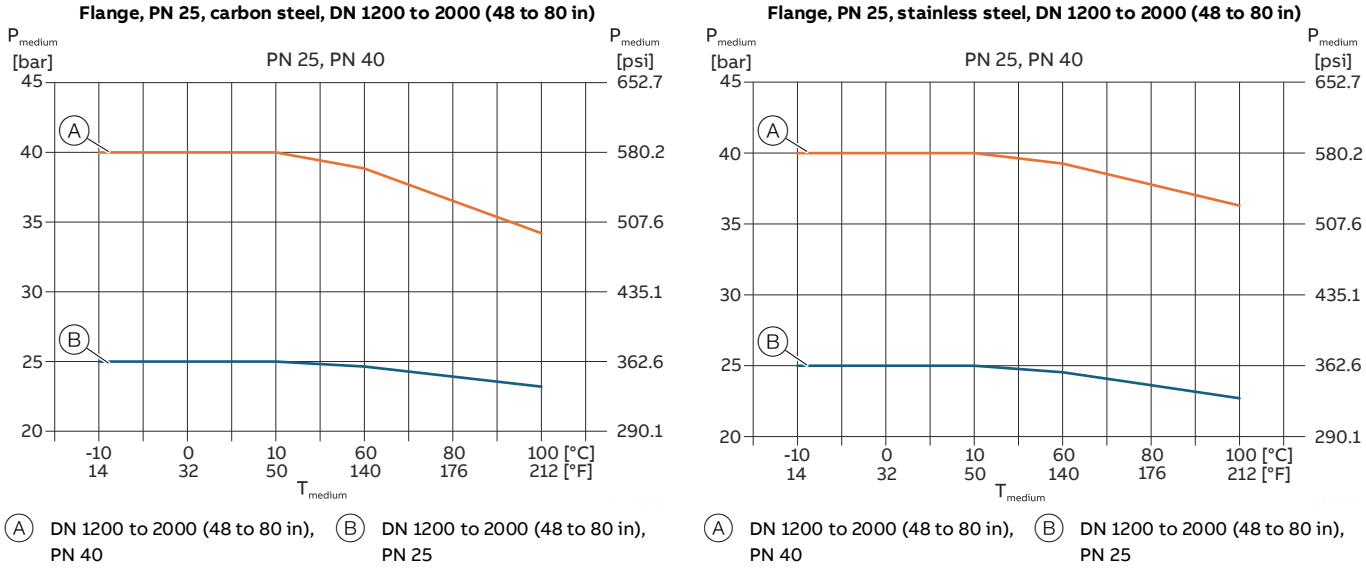


Figure 18: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 1200 to 2000 (48 to 80 in), pressure Rating PN 25

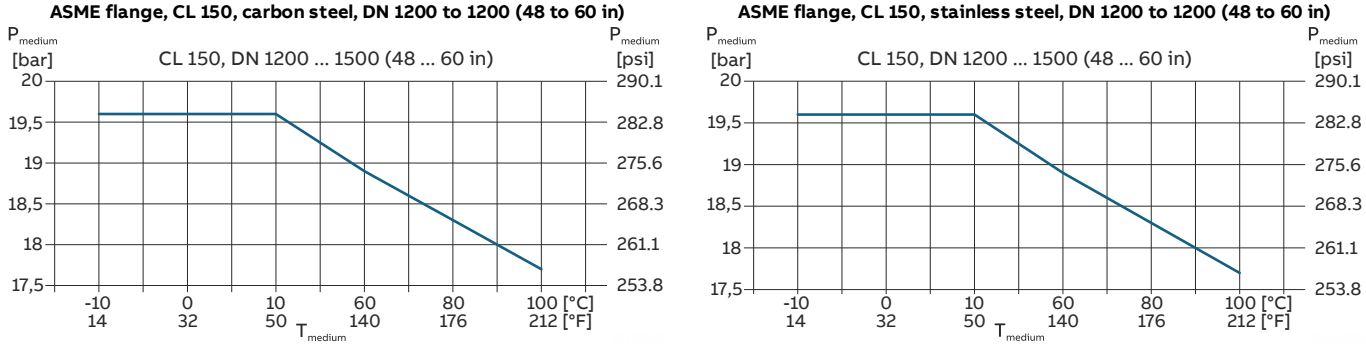
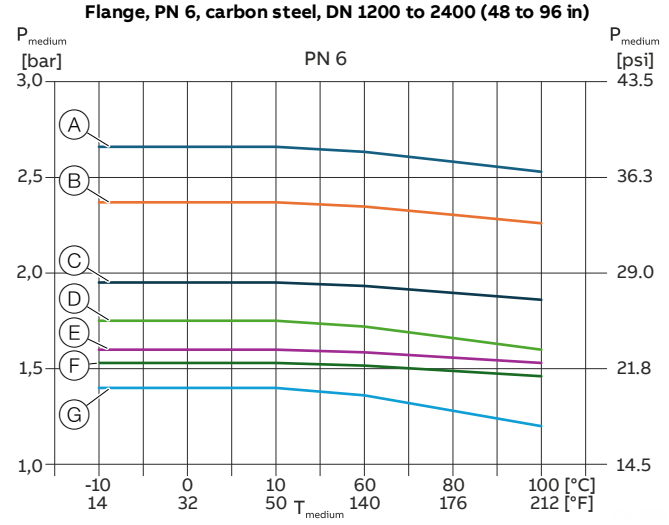


Figure 19: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 1200 to 1200 (48 to 60 in), pressure Rating CL 150

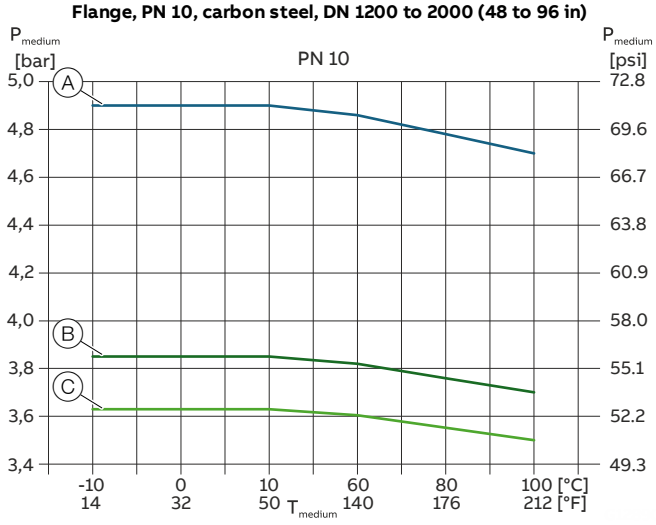
Devices with DN 1200 to 2400 (48 to 96 in), ABB short lay length (1 × D)

Flange, PN 6, carbon steel, DN 1200 to 2400 (48 to 96 in)



Ⓐ DN 1200 (48 in)
Ⓑ DN 1400 (56 in)
Ⓒ DN 2400 (96 in)
Ⓓ DN 2200 (88 in)
Ⓔ DN 2000 (80 in)
Ⓕ DN 1600 (64 in)
Ⓖ DN 1800 (72 in)

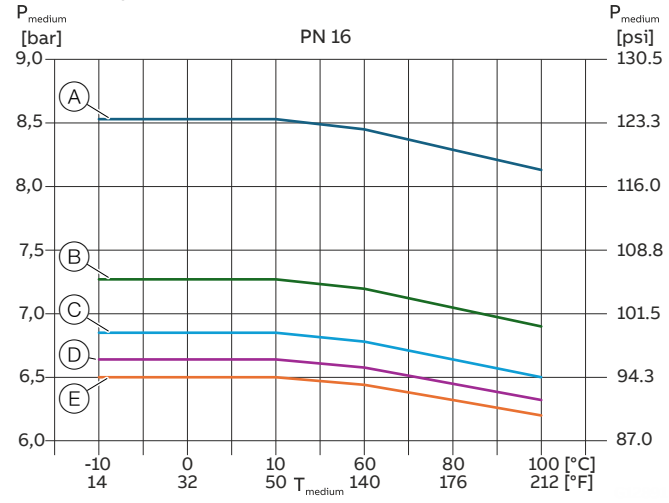
Flange, PN 10, carbon steel, DN 1200 to 2000 (48 to 96 in)



Ⓐ DN 1200 (48 in)
Ⓒ DN 2200 (88 in)
Ⓑ DN 1600 (64 in), DN 1800 (72 in), DN 2000 (80 in), DN 2400 (96 in)

Figure 20: Flowmeter sensor with carbon steel flange, nominal diameter DN 1200 to 2400 (48 to 96 in), pressure Rating PN 6 and PN 10

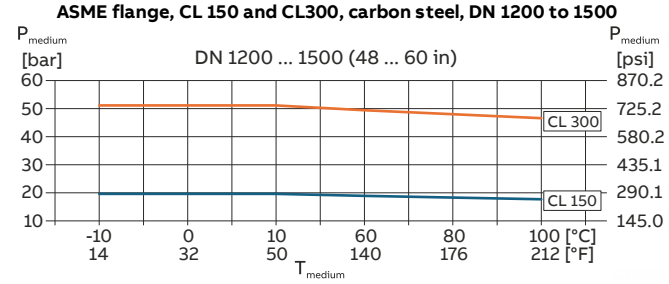
Flange, PN 16, carbon steel, DN 1200 to 2000 (48 to 96 in)



Ⓐ DN 1200 (48 in)
Ⓑ DN 1600 (64 in)
Ⓒ DN 1800 (72 in)
Ⓓ DN 2000 (80 in)
Ⓔ DN 1400 (56 in)

Figure 21: Flowmeter sensor with carbon steel flange, nominal diameter DN 1200 to 2000 (48 to 80 in), pressure Rating PN 16

ASME flange, CL 150 and CL300, carbon steel, DN 1200 to 1500



ASME flange, CL 150 and CL300, stainless steel, DN 1200 to 1500

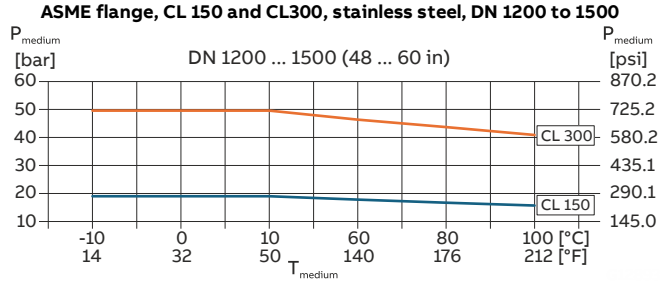


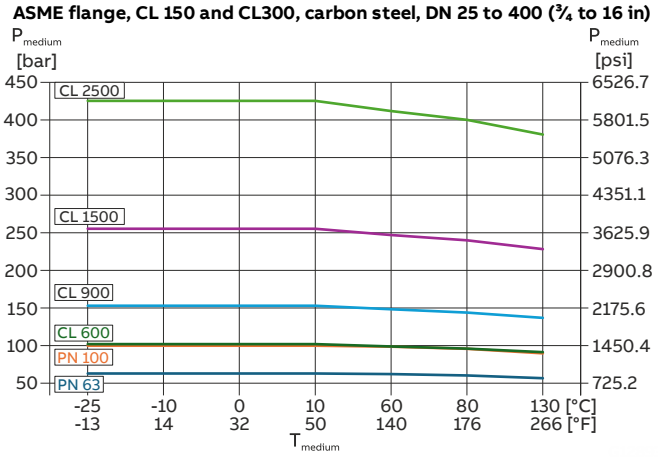
Figure 22: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 1200 to 1500 (48 to 60 in), pressure Rating CL 150 and CL 300

… Flowmeter sensor

… Material load for process connections

Devices in high pressure design, DN 25 to 400 (¾ to 16 in), pressure rating PN 63 to 100 (CL 600 to 2500)

ASME flange, CL 150 and CL300, carbon steel, DN 25 to 400 (¾ to 16 in)



ASME flange, CL 150 and CL300, stainless steel, DN 25 to 400 (¾ to 16 in)

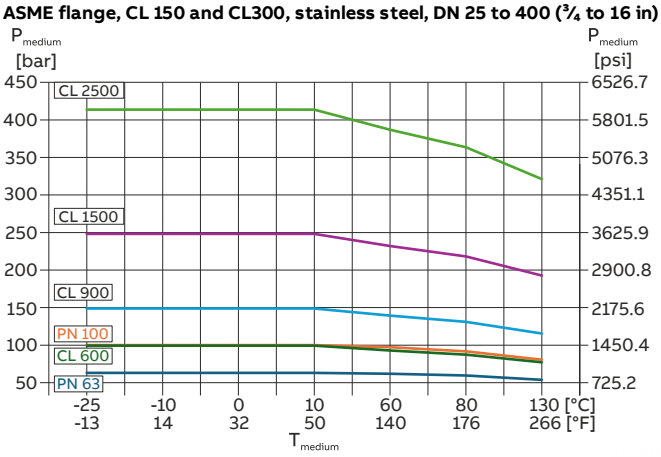


Figure 23: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 25 to 400 (¾ to 16 in), high pressure design

Installation conditions

General

The following points must be observed during installation:

- The flow direction must correspond to the marking, if present
- The maximum torque for all flange screws must be complied with
- Secure flange screws and nuts against pipe vibration.
- The devices must be installed without mechanical tension (torsion, bending)
- Install flange devices / wafer-type devices with plane parallel counterflanges and use appropriate gaskets only
- Use gaskets made from a material that is compatible with the measuring medium and measuring medium temperature.
- 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.
- Make sure that the temperature limits are not up-scaled during operation of the device.
- Vacuum shocks in the piping should be avoided to prevent damage to the liners (PTFE liner). Vacuum shocks can destroy the device.
- Do not remove the sealing plugs in the cable glands until you are ready to install the electrical cable
- Make sure the gaskets for the housing cover are seated correctly. Carefully seal the cover. Tighten the cover fittings
- The transmitter with a remote mount design must be installed at a largely vibration-free location
- Do not expose the transmitter and sensor to direct sunlight. Provide appropriate sun protection as necessary If necessary, provide a suited means of sun protection.
- When installing the transmitter in a control cabinet, make sure adequate cooling is provided

Devices with extended diagnostic functions

For devices with extended diagnostic functions different installation conditions may be valid.
For additional information, see **Optional diagnostic functions** on page 6.

Brackets

NOTE

Potential damage to device!
Improperly placed support structures can result in a deformed housing and damage to the inner solenoids. Place the support structures at the edge of the transmitter housing (see arrows in **Figure 24**).

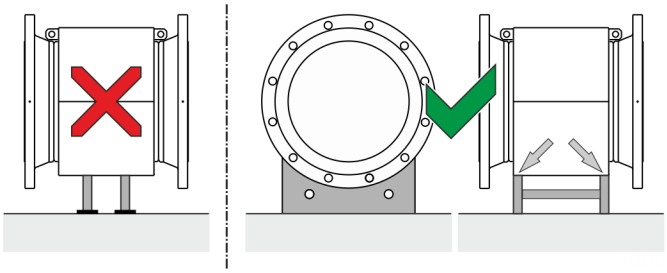


Figure 24: Support for nominal diameters greater than DN 400

Devices with nominal diameters larger than DN 400 must be mounted on a sufficiently strong foundation with support.

Gaskets

The following points must be observed when installing gaskets:

- To achieve the best results, make sure that the gaskets and meter tube fit concentrically.
- To make sure that the flow profile is not distorted, the gaskets may not intrude in the piping cross-section.
- The use of graphite with the flange or process connection gaskets is prohibited. This is because, in some instances, an electrically conductive coating may form on the inside of the meter tube.
- For Non RTJ flange type sensors used in high pressure installations (PN63, CL600 and up), ensure using an appropriate gasket.

… Flowmeter sensor

… Installation conditions

Flow direction

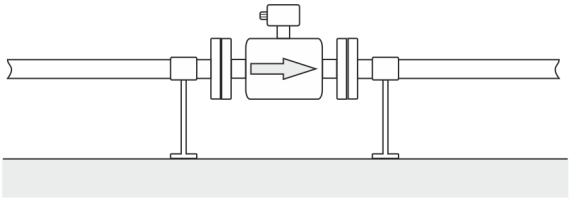


Figure 25: Flow direction

The device measures the flow rate in both flow directions. Forward flow is the factory setting, as shown in Figure 25.

Electrode axis

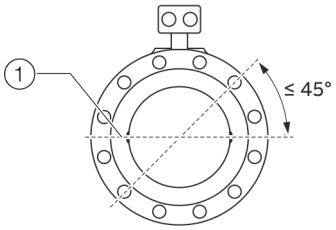


Figure 26: Orientation of the electrode axis

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

Mounting position

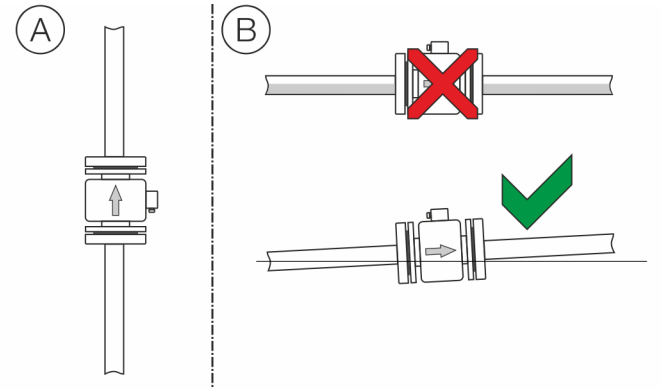
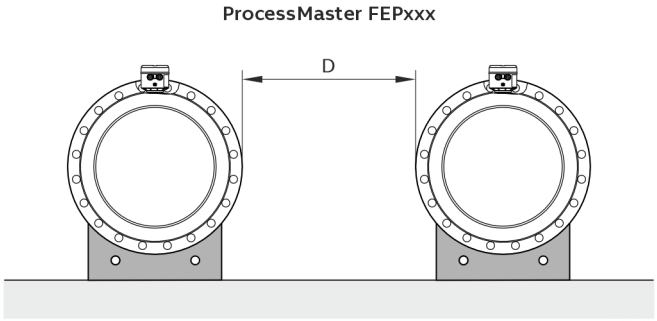


Figure 27: Mounting position

(A) Vertical installation for measuring abrasive materials, preferably with flow in upward direction.
(B) For a horizontal installation, the meter tube must always be completely filled with the measuring medium. Provide for a slight incline of the connection for degassing.

Minimum spacing of the devices

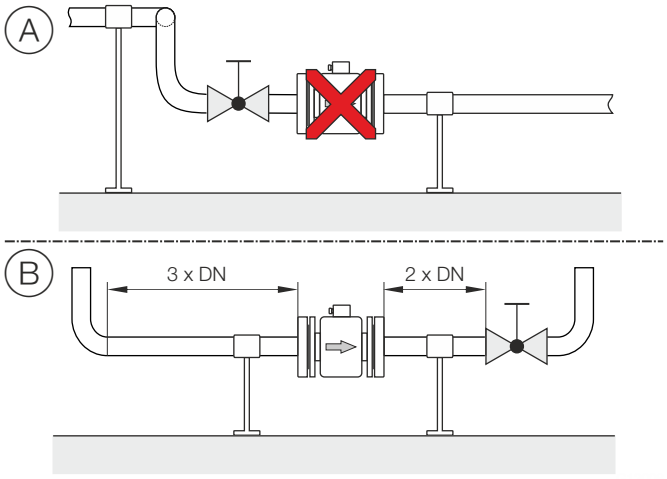


Spacing D: ≥ 1.0 m (3.3 ft) for Design Level 'A'

Figure 28: Minimum spacing of the devices

- In order to prevent the devices from interfering with each other, a minimum distance as presented in **Figure 28** must be maintained between the devices.
- The sensor must not be operated in the vicinity of powerful electromagnetic fields, e.g., motors, pumps, transformers, etc. A minimum spacing of approx. 1 m (3.28 ft) must be maintained.
- For installation on or to steel parts (e.g. steel brackets), a minimum spacing of 100 mm (3.94 in) must be maintained (based on IEC801-2 and IECTC77B).

Inlet and outlet sections



① Double elbow ② Turn-off device

Figure 29: Inlet and outlet section, turn-off devices

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

Ⓐ Do not install fittings, manifolds, valves, etc., right before the flowmeter sensor.

Ⓑ Inlet / outlet sections: length of the straight piping upstream and downstream on the sensor.
Experience has shown that, in most installations, straight inlet sections 3 × DN long and straight outlet sections 2 × DN long are sufficient (DN = nominal diameter of the flowmeter sensor).
For test stands, the reference conditions of 10 × DN straight inlet and 5 × DN straight outlet must be provided, in accordance with EN 29104 / ISO 9104.
Valves or other turn-off devices should be installed in the outlet section.
Valve flaps must be installed so that the valve damper plate does not extend into the flowmeter sensor.

Free inlet or outlet

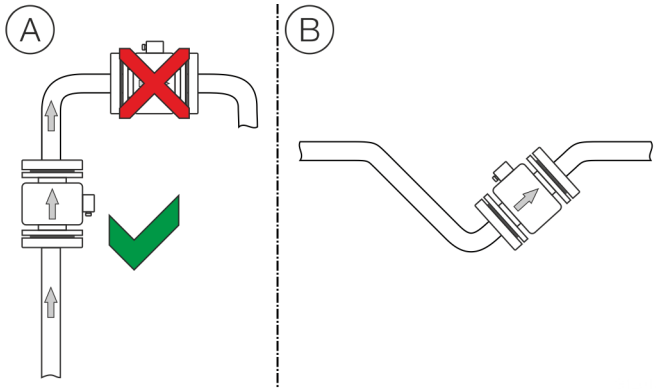


Figure 30: Free inflow and outflow

Ⓐ For a free outflow, do not install flowmeter at the highest point of the piping or on its outflow side, since the measuring tube may run empty, creating air bubbles.

Ⓑ For free inflow/outflow, provide an invert to make sure that the piping is always full

Mounting with heavily contaminated measuring media

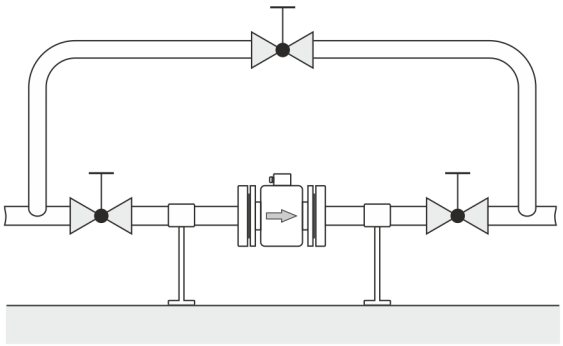


Figure 31: Bypass line

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

… Flowmeter sensor

… Installation conditions

Sensor insulation

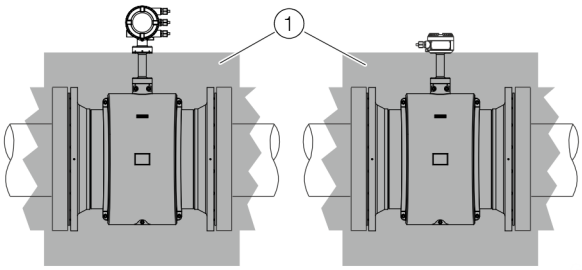


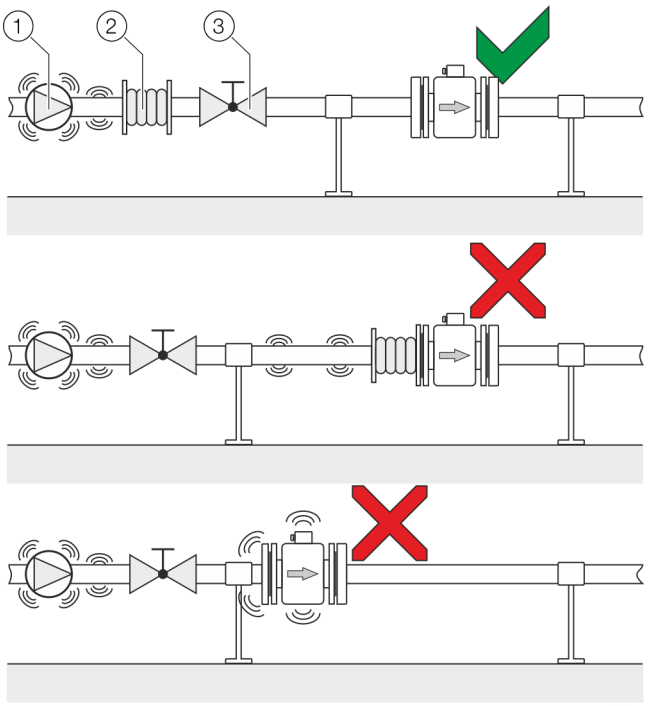
Figure 32: Insulation of the flowmeter sensor

The high temperature design allows for complete thermal insulation of the flowmeter sensor. The pipeline and sensor must be insulated (1) after installing the unit according to the illustration.

Grounding

The flowmeter sensor must be connected to ground potential. For technical reasons, this potential must be identical to the potential of the measuring medium.
For plastic or insulated lined pipelines, the measuring medium is grounded by installing grounding rings.
When there are stray potentials present in the pipeline, a grounding ring is recommended on both ends of the flowmeter sensor.

Mounting with pipe vibration



(1) Pump
(2) Damping device
(3) Shut-off device

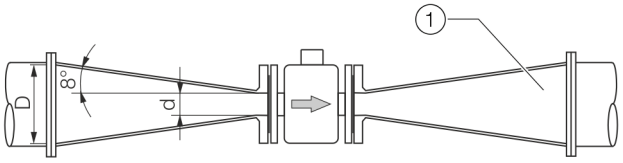
Figure 33: Vibration damping

Strong vibrations in the pipeline must be damped using flexible damping devices.

The damping devices must be installed beyond the supported flowmeter section and outside of the section between the shut-off devices.

Do not connect flexible damping devices directly to the flowmeter sensor.

Installation in piping with larger nominal diameter



(1) Reducer

Figure 34: Using reducers

Determine the resulting pressure loss when using reducers:

1. Determine diameter ratios d/D.
2. Determine the flow velocity based on the flow rate nomogram (Figure 35).
3. Read the pressure loss on the Y-axis in Figure 35.

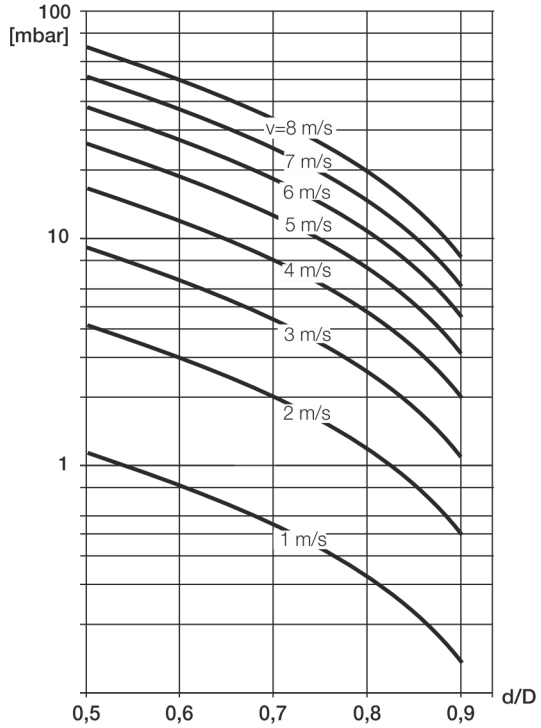


Figure 35: Flow rate nomogram for flange transition piece at α/2 = 8°

High pressure sensors (PN63, Cl600 and up)

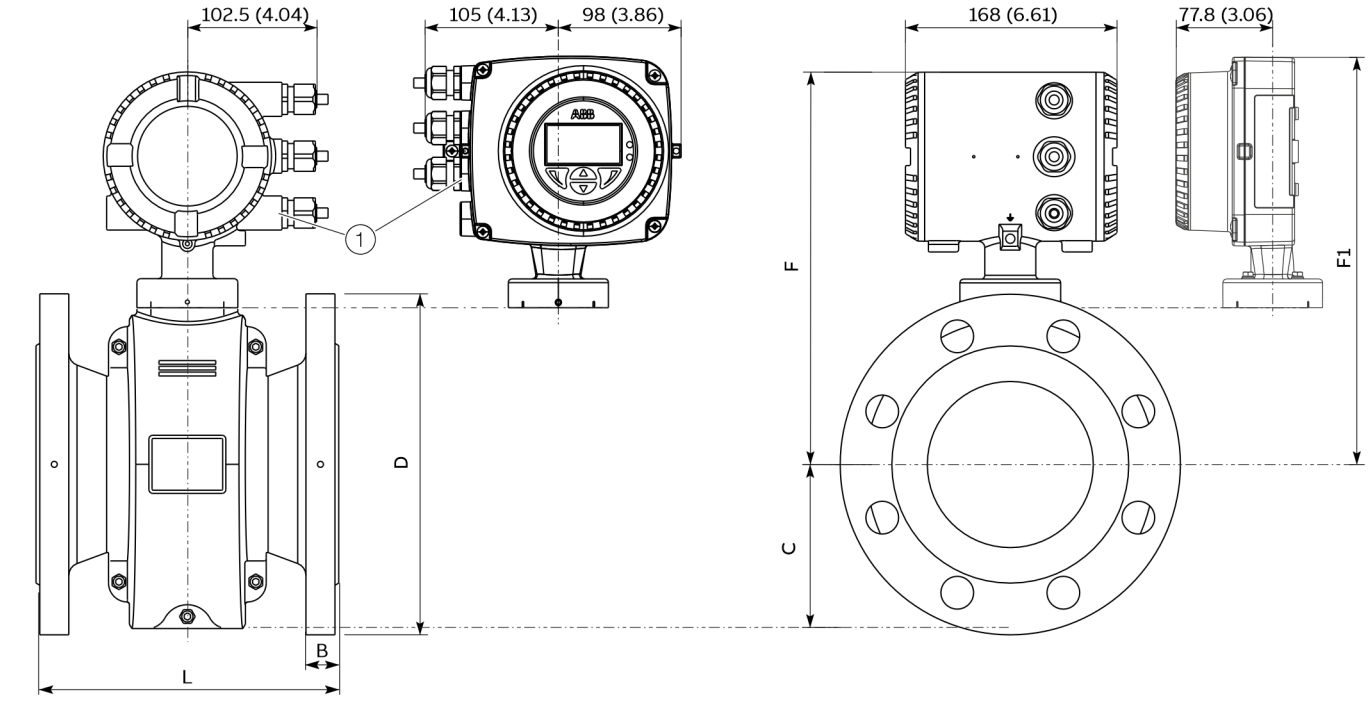
With sensors, designed for higher pressure rating, the inner diameter of the sensor might be different from the attached pipe – see dimensions table.

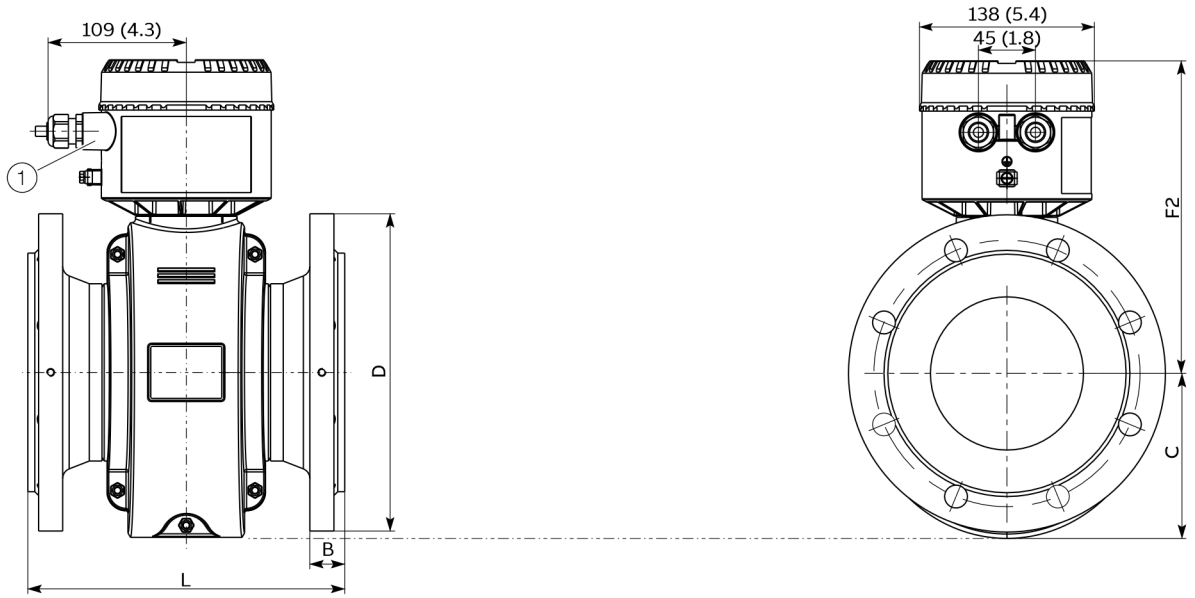
… Flowmeter sensor

Dimensions

Flange DN 3 to 100 (1/10 to 4″), aluminum sensor housing (shell housing) — Design level 'A'
All specified dimensions and weights are in mm (inch) or kg (lb). The stated weights are approximate; the maximum weight is always stated.

Integral mount design





Remote mount design

(1) Female thread (either 1/2″ NPT or M20 x 1,5) refer to model coding. With 1/2″ NPT there will be a plug instead of the PG cable inlet.

Figure 36: Integral mount design (top), remote mount design (bottom)

Dimensions - Flange device DN 3 to 40, aluminum sensor housing (shell housing) — Design level 'A'									
Nominal diameter	**Process connection**	**D**	**B**	**L[2), 3)]**	**C**	**F[7), 8)]**	**F1[7), 8)]**	**F2[7), 8)]**	**Weight**
DN 3 ... 8[4)] (1/8 ... 5/16″[5)])	EN 1092-1[6)], PN 10 to 40[1)]	90 (3.54)	19 (0.75)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	5.5 (12)
DN 10 (3/8″[5)])	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)						
	ASME B16.5, CL 300	95 (3.74)	17.3 (0.68)						
	JIS 10K	90 (3.54)	15 (0.59)						
DN 15 (1/2″)	EN 1092-1[6)], PN 10 to 40[1)]	95 (3.74)	19 (0.75)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	5.5 (12)
	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)						
	ASME B16.5, CL 300	95.2 (3.75)	17.3 (0.68)						
	JIS 10K	95 (3.74)	15 (0.59)						
DN 20 (3/4″)	EN 1092-1[6)], PN 10 to 40[1)]	105 (4.13)	21 (0.83)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	6.5 (14)
	ASME B16.5, CL 150	98.6 (3.88)	15.7 (0.62)						
	ASME B16.5, CL 300	117.3 (4.62)	18.7 (0.74)						
	JIS 10K	100 (3.94)	17 (0.67)						
DN 25 (1″)	EN 1092-1[6)], PN 10 to 40[1)]	115 (4.53)	21 (0.83)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	7.5 (16.5)
	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)						
DN 32 (1 1/4″)	EN 1092-1[6)], PN 10 to 40[1)]	140 (5.51)	21 (0.83)	200 (7.84)	92 (3.62)	262 (10.3)	276 (10.87)	198 (7.80)	8.5 (18.5)
	ASME B16.5, CL 150	117.3 (4.62)	18.7 (0.74)						
	ASME B16.5, CL 300	133.4 (5.25)	22.1 (0.87)						
	JIS 10K	135 (5.31)	19 (0.75)						
DN 40 (1 1/2″)	EN 1092-1[6)], PN 10 to 40[1)]	150 (5.91)	21 (0.83)	200 (7.84)	92 (3.62)	262 (10.3)	276 (10.87)	198 (7.80)	9.5 (21)
	ASME B16.5, CL 150	127 (5.00)	20.5 (0.81)						
	ASME B16.5, CL 300	155.4 (6.12)	23.6 (0.93)						
	JIS 10K	140 (5.51)	19 (0.75)						

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

… Flowmeter sensor

… Dimensions

Dimensions - Flange device DN 50 to 100, aluminum sensor housing (shell housing) — Design level 'A'

Nominal diameter	Process connection	D	B	L[2), 3)]	C	F[7), 8)]	F1[7), 8)]	F2[7), 8)]	Weight
DN 50 (2″)	EN 1092-1[6)], PN 10 to 40[1)]	165 (6.50)	23 (0.91)	200 (7.87)	97.5 (3.84)	268 (10.55)	282 (11.1)	204 (8.0)	11 (24)
	ASME B16.5, CL 150	152.4 (6.00)	22.1 (0.87)						
	ASME B16.5, CL 300	165.1 (6.50)	25.4 (1.0)						
	JIS 10K	155 (6.10)	19 (0.75)						
	AS2129 table D, E	150 (5.91)	–						8.5 (18.5)
DN 65 (2 1/2″)	EN 1092-1[6)], PN 16[1)]	185 (7.28)	22 (0.87)	200 (7.87)	108.5 (4.25)	279 (10.98)	293 (11.54)	215 (8.46)	11.5 (25)
	EN 1092-1[6)], PN 40[1)]	185 (7.28)	26 (1.02)						13.5 (30)
	ASME B16.5, CL 150	177.8 (7.00)	25.4 (1.0)						11.5 (25)
	ASME B16.5, CL 300	190.5 (7.50)	28.4 (1.12)						13.5 (30)
	JIS 10K	175 (6.89)	21 (0.83)						13.5 (30)
	AS2129 table D, E	165 (6.50)	–						–
DN 80 (3″)	EN 1092-1[6)], N 10 … 40[1)]	200 (7.87)	28 (1.10)	200 (7.87)	108.5 (4.27)	279 (10.98)	293 (11.54)	215 (8.46)	15.5 (34)
	ASME B16.5, CL 150	190.5 (7.50)	26.9 (1.06)						15.5 (34)
	ASME B16.5, CL 300	210 (8.27)	31.4 (1.24)						17.5 (38.5)
	JIS 10K	185 (7.28)	21 (0.83)						17.5 (38.5)
	AS2129 table D, E	185 (7.28)	–						–
DN 100 (4″)	EN 1092-1[6)] PN 16[1)]	220 (8.66)	24 (0.94)	250 (9.84)	122.5 (4.82)	301 (11.85)	315 (12.4)	237 (9.33)	17.5 (38.5)
	EN 1092-1[6)] PN 25 … 40[1)]	235 (9.25)	28 (1.10)						21.5 (47)
	ASME B16.5 CL 150	228.6 (9.00)	27.4 (1.08)						19.5 (43)
	ASME B16.5 CL 300	254 (10.0)	35.8 (1.41)						28.5 (63)
	JIS 10K	210 (8.72)	21 (0.83)						17.5 (38.5)
	AS2129 table D, E	215 (8.46)	–						–

Tolerance for L: +0 / -3 mm (+0 / -0,018 in.)

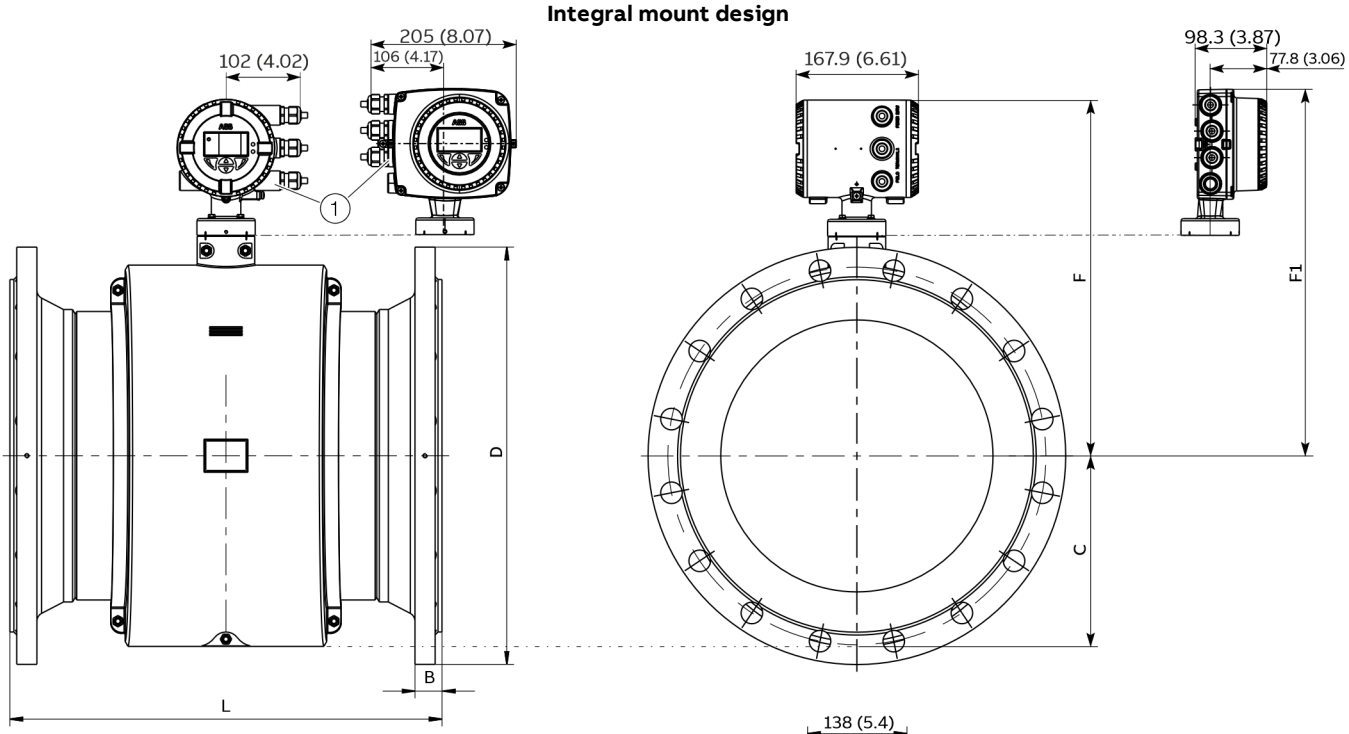
1) Other pressure ratings on request.
2) If a grounding ring is fitted (attached to one side of the flange), dimension L increases as follows: by 3 mm (0.118 inch) for DN 3 ... 100, and by 5 mm (0.197 inch) for DN 125.
3) If protection plates are fitted (attached to both sides of the flange), dimension 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) Connection flange DN 10.
5) Connection flange 1/2″.
6) Connecting dimensions in accordance with EN 1092-1. For DN 65, PN 16 in accordance with EN 1092-1, please order PN 40.
7) For devices in high-temperature design, dimension F, F1, F2 increases by +127 mm (+5.0 inch).
8) Depending on the device design, the dimensions change according to the following table:

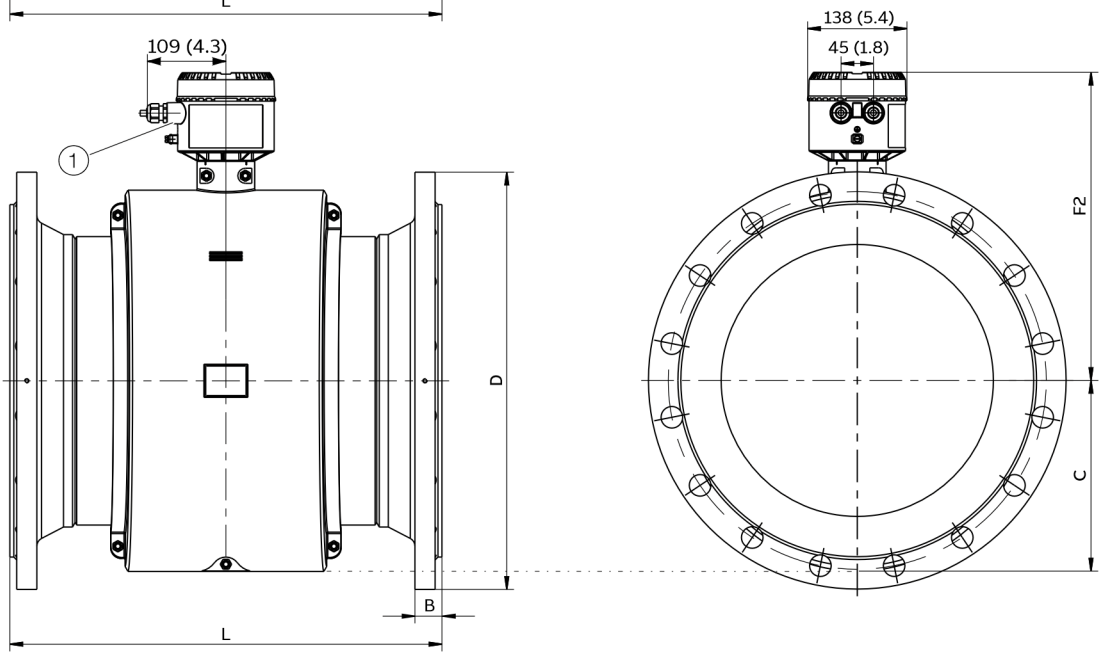
Device design		Dimension F, F1	Dimension F2
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 in)	+47 mm (+1.85 in)
	High-temperature sensor design	+127 mm (+5 in)	+174 mm (+6.85 in)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)

Flange DN 125 to 400 (6 to 16”), aluminum sensor housing (shell housing) — Design level ‘A’

All specified dimensions and weights are in mm (in) or kg (lb).). The stated weights are approximate; the maximum weight is always stated.

Integral mount design





Remote mount design

(1) Female thread (either 1/2” NPT or M20 x 1,5) refer to model coding. With 1/2” NPT there will be a plug instead of the PG cable inlet.

Figure 37: Integral mount design (top), remote mount design (bottom)

… Flowmeter sensor

… Dimensions

Dimensions - Flange device DN 125 to 300, aluminum sensor housing (shell housing) — Design level 'A'

Nominal diameter	Process connection	D	B	L[2), 3)]	C	F[4), 5)]	F1[4), 5)]	F2[4), 5)]	Weight
DN 125 (5″)	EN 1092-1[6)] PN 16[1)]	250 (9,84)	25 (0,98)	250 (9,84)	130 (5,12)	311 (12,24)	325 (12,80)	247 (9,72)	20,5 (45)
	EN 1092-1[6)] PN 25 … 40[1)]	270 (10,63)	29 (1,14)						27,5 (60,5)
	ASME B16.5 CL 150	254 (10,0)	27,9 (1,10)						20,5 (45)
	ASME B16.5 CL 300	279,4 (11,0)	39,1 (1,54)	450 (17,72)					33,5 (74)
	JIS 10K	250 (9,84)	27 (1,06)	250 (9,84)					20,5 (45)
	AS2129 table D, E	255 (10,04)	–						–
DN 150 (6″)	EN 1092-1 PN 16[1)]	285 (11,22)	25 (0,98)	300 (11,81)	146 (5,75)	358 (14,09)	372 (14,65)	294 (11,57)	31,5 (69,5)
	EN 1092-1 PN 25 … 40[1)]	300 (11,81)	31 (1,22)						37,5 (82,5)
	ASME B16.5 CL 150	279,4 (11,0)	29,4 (1,16)						31,5 (69,5)
	ASME B16.5 CL 300	317,5 (12,5)	40,5 (1,59)						45,5 (100)
	JIS 10K	280 (11,02)	28 (1,10)						31,5 (69,5)
	AS2129 table D, E	280 (11,02)	–						31,5 (69,5)
DN 200 (8″)	EN 1092-1, PN 10 … 16[1)]	340 (13,39)	28 (1,10)	350 (13,78)	170,5 (6,71)	399 (15,71)	413 (16,26)	334 (13,15)	41,5 (90,5)
	EN 1092-1, PN 25[1)]	360 (14,17)	34 (1,34)						53,5 (118)
	EN 1092-1, PN 40[1)]	375 (14,76)	38 (1,50)						63,5 (151)
	ASME B16.5, CL 150	345 (13,58)	33,6 (1,32)						48,5 (107)
	ASME B16.5, CL 300	380 (14,96)	46,1 (1,81)						70,5 (155,5)
	JIS 10K	330 (12,99)	33 (1,30)						41,5 (90,5)
	AS2129 table D, E	335 (13,19)	–						48,5 (107)
DN 250 (10″)	EN 1092-1, PN 10[1)]	395 (15,55)	30 (1,18)	450 (17,72)	198 (7,80)	413 (16,26)	427 (16,81)	349 (13,74)	59,5 (131)
	EN 1092-1, PN 16[1)]	405 (15,94)	30 (1,18)						63,5 (140)
	EN 1092-1, PN 25[1)]	425 (16,73)	36 (1,42)						82,5 (182)
	EN 1092-1, PN 40[1)]	450 (17,72)	42 (1,65)						93,5 (206)
	ASME B16.5, CL 150	405 (15,94)	35,2 (1,39)						68,5 (151)
	ASME B16.5, CL 300	445 (17,52)	52,8 (2,08)						103,5 (228)
	JIS 10K	400 (15,75)	37 (1,46)						63,5 (140)
	AS2129 table D, E	405 (15,94)	–						68,5 (151)
DN 300 (12″)	EN 1092-1, PN 10[1)]	445 (17,52)	31 (1,22)	500 (19,68)	228 (8,98)	436 (17,17)	450 (17,72)	372 (14,62)	72,5 (160)
	EN 1092-1, PN 16[1)]	460 (18,11)	33 (1,30)						78,5 (173)
	EN 1092-1, PN 25[1)]	485 (19,09)	39 (1,54)						98,5 (217)
	EN 1092-1, PN 40[1)]	515 (20,28)	47 (1,85)	600 (23,62)					138,5 (305)
	ASME B16.5, CL 150	485 (19,09)	36,8 (1,45)	500 (19,68)					103,5 (228)
	ASME B16.5, CL 300	520 (20,47)	55,8 (2,20)						148,5 (327)
	JIS 10K	450 (17,72)	40 (1,57)						78,5 (173)
	AS2129 table D, E	455 (17,19)	–						103,5 (228)

Tolerance for L: +0 / -3 mm (+0 / -0,018 in.)

Dimensions - Flange device DN 350 to 400, aluminum sensor housing (shell housing) — Design level 'A'

Nominal diameter	Process connection	D	B	L[2), 3)]	C	F[4), 5)]	F1[4), 5)]	F2[4), 5)]	Weight
DN 350 (14″)	EN 1092-1, PN 10[1)]	505 (19,88)	31 (1,22)	550 (21,65)	267 (10,51)	451 (17,76)	465 (18,31)	416 (16,38)	93,5 (206)
	EN 1092-1, PN 16[1)]	520 (20,47)	35 (1,38)						108,5 (239)
	EN 1092-1, PN 25[1)]	555 (21,85)	43 (1,69)						143,5 (316)
	ASME B16.5, CL 150	535 (21,06)	40,1 (1,58)						128,5 (283)
	ASME B16.5, CL 300	585 (23,03)	58,8 (2,31)						196,5 (433)
	JIS 10K	490 (19,29)	–						108,5 (239)
	AS2129 table D, E	525 (20,67)	–						103,5 (228)
DN 400 (16″)	EN 1092-1 PN 10[1)]	565 (22,24)	31 (1,22)	600 (23,62)	267 (10,51)	493 (19,41)	507 (19,96)	416 (16,38)	101,5 (224)
	EN 1092-1 PN 16[1)]	580 (22,83)	37 (1,46)						124,5 (274)
	EN 1092-1 PN 25[1)]	620 (24,41)	45 (1,77)						168,5 (371)
	ASME B16.5 CL 150	595 (23,43)	41,6 (1,64)						173,5 (382)
	ASME B16.5 CL 300	650 (25,59)	62,2 (2,45)						262,5 (579)
	JIS 10K	560 (22,05)	–						124,5 (274)
	AS2129 table D, E	580 (22,83)	–						173,5 (382)

Tolerance for L: DN 150 to 200: +0 / −3 mm (+0 / −0,018 in), DN 250 to 400: +0 / −5 mm (+0 / −0,197 in)

1) Other pressure ratings on request.
2) If a grounding ring is fitted is fitted (attached to one side of the flange) dimension L increases by 5 mm (0.197 in).
3) If protection plates are fitted (attached to both sides of the flange) dimension L increases by 10 mm (0.394 in).
4) For devices in high-temperature design, dimension F, F1, F2 increases by +127 mm (+5.0 in).
5) Depending on the device design, the dimensions change according to the following table:

Device design		Dimension F, F1	Dimension F2
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 in)	+47 mm (+1.85 in)
	High-temperature sensor design	+127 mm (+5 in)	+174 mm (+6.85 in)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)

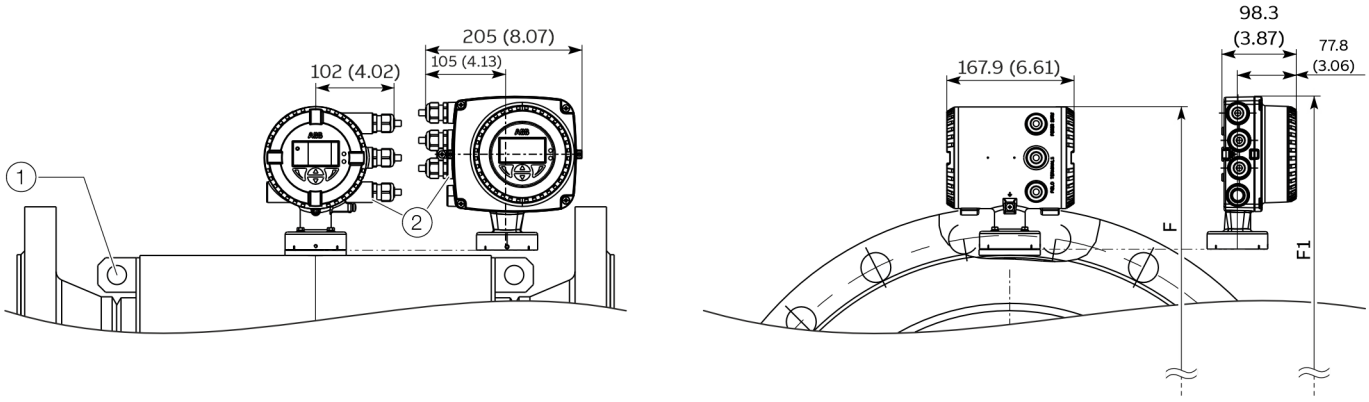
… Flowmeter sensor

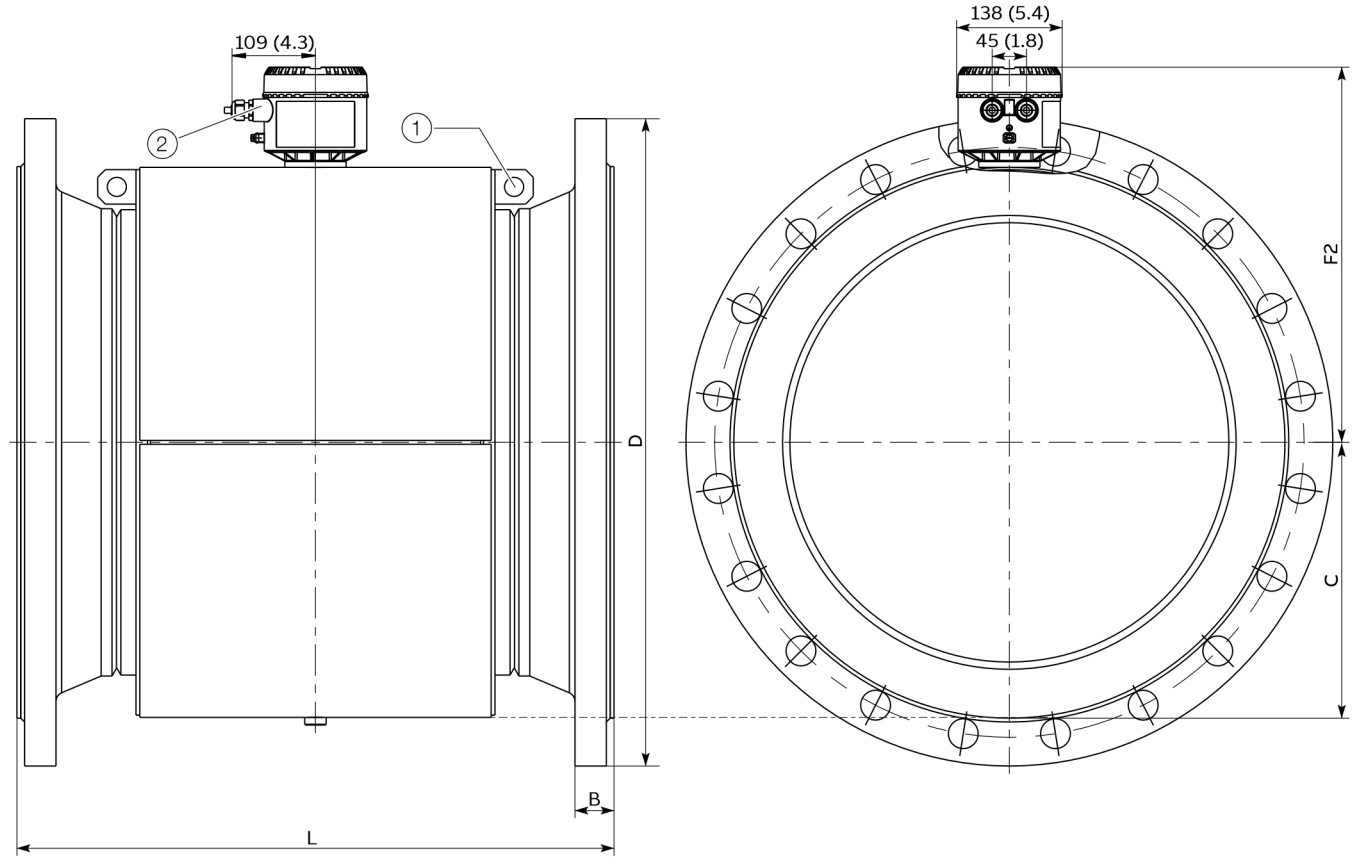
… Dimensions

Flange DN 450 to 2000 (18 to 80″), steel sensor housing - Design level ‘A.

All specified dimensions and weights are in mm (in) or kg (lb). The stated weights are approximate; the maximum weight is always stated.

Integral mount design





Remote mount design

(1) Transport lugs

(2) Female thread (either 1/2″ NPT or M20 x 1,5) refer to model coding. With 1/2″ NPT there will be a plug instead of the PG cable inlet.

Figure 38: Integral mount design (top), remote mount design (bottom)

Dimensions - Flange device, steel sensor housing - Design level 'A'									
Nominal diameter	**Process connection**	**D**	**B**	**L[2) 3)]**	**C**	**F[4) 5)]**	**F1[4) 5)]**	**F2[4) 5)]**	**Weight**
DN 450 (18″)	ASME B16.5, CL 150	635 (25.0)	44.6 (1.76)	686 (27.01)	310 (12.20)	501 (19.72)	515 (20.28)	437 (17.20)	258.5 (570)
	AS2129 table D, E	640 (25.20)	–						
DN 500 (20″)	EN 1092-1, PN 10[1)]	670 (26.38)	33 (1.30)	650 (25.59)	310 (12.20)	501 (19.72)	515 (20.28)	437 (17.20)	188.5 (416)
	EN 1092-1, PN 16[1)]	715 (28.15)	39 (1.54)						238.5 (526)
	ASME B16.5, CL 150	698.5 (27.50)	47.9 (1.89)	762 (30.0)					298.5 (658)
	AS2129 table D, E	705 (27.76)	–	650 (25.59)					
DN 600 (24″)	EN 1092-1, PN 10[1)]	780 (30.71)	33 (1.30)	780 (30.71)	361 (14.21)	552 (21.73)	566 (22.28)	490 (19.29)	338.5 (746)
	EN 1092-1, PN 16[1)]	840 (33.07)	41 (1.61)						316.5 (698)
	ASME B16.5, CL 150	812.8 (32.0)	52.8 (2.08)	914 (35.98)					423.5 (934)
	AS2129 table D, E	825 (32.48)	–	780 (30.71)					

Tolerance for L: DN450, DN500 +0 / −5 mm (+0 / −0.197 in) DN 600 +0 / −10 mm (+0 / −0.394 in)

1) Other pressure ratings on request.
2) If a grounding ring is fitted (attached to one side of the flange) dimension L increases by 5 mm (0.197 in).
3) If protection plates are fitted (attached to both sides of the flange) dimension L increases by 10 mm (0.394 in).
4) For devices in high-temperature design, dimension F, F1, F2 increases by +127 mm (+5.0 in).
5) Depending on the device design, the dimensions change according to the following table:

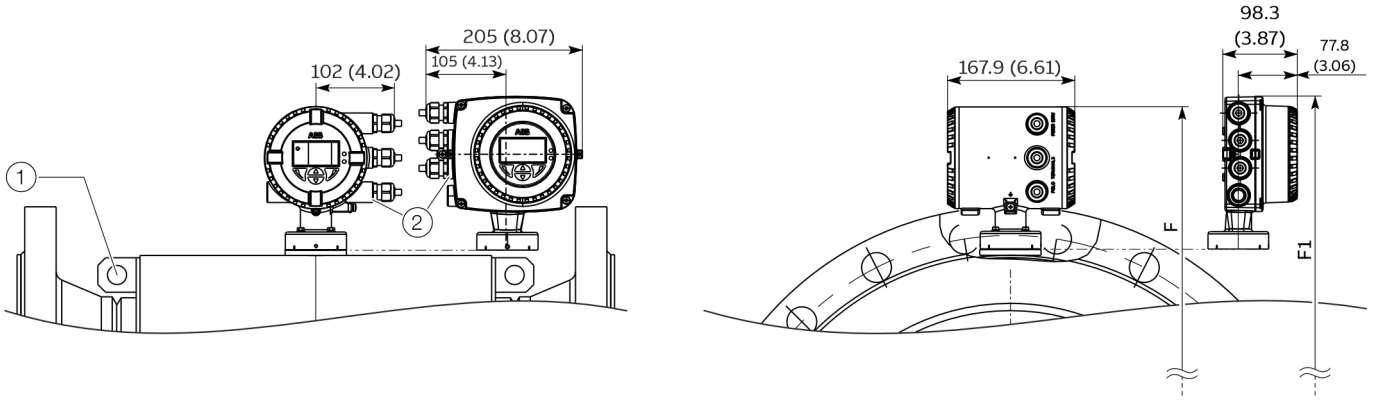
Device design		**Dimension F, F1**	**Dimension F2**
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 in)	+47 mm (+1.85 in)
	High-temperature sensor design	+127 mm (+5 in)	+174 mm (+6.85 in)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)

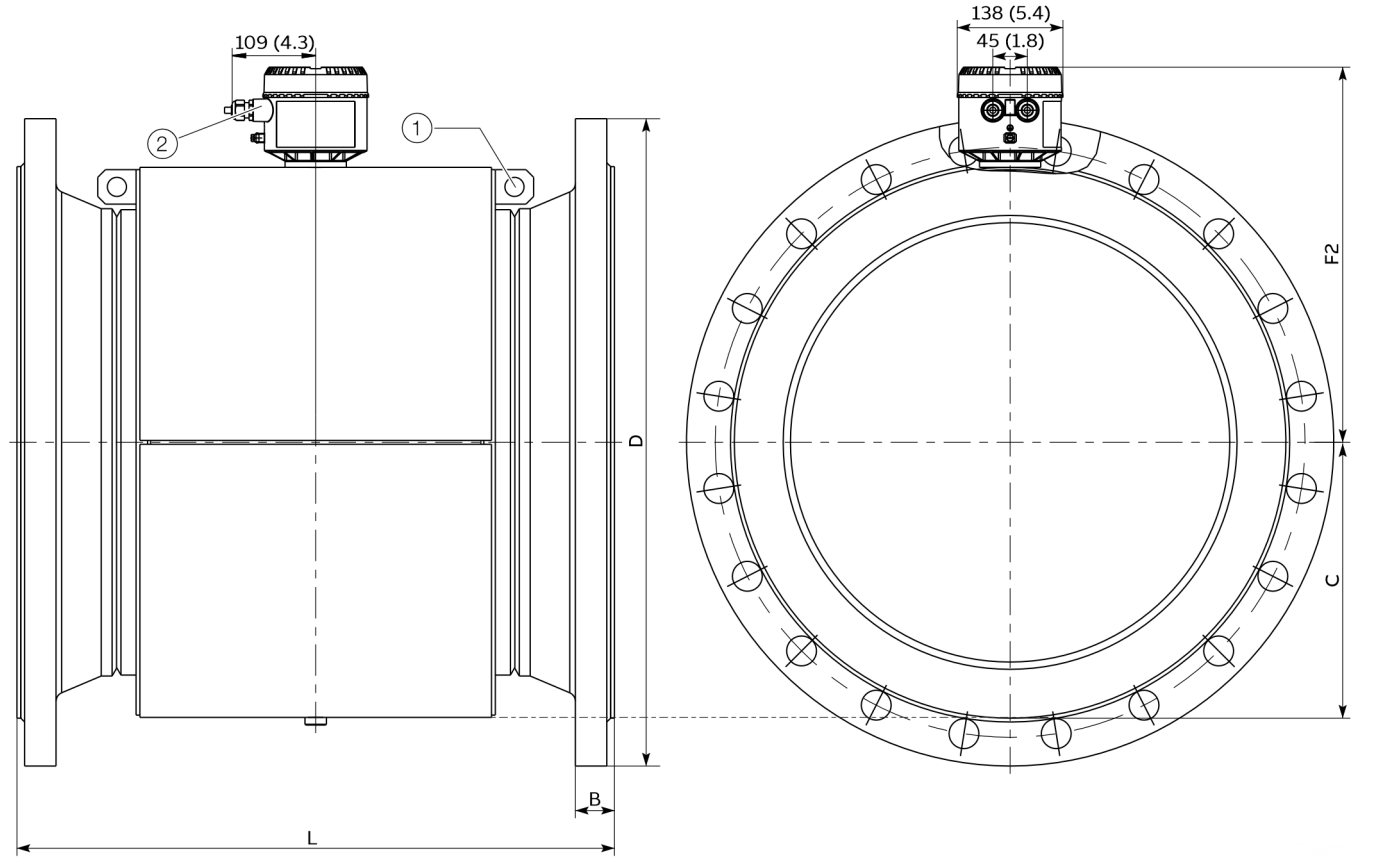
… Flowmeter sensor

… Dimensions

Flange DN 700 to 2000 (28 to 80”), steel sensor housing Design level ‘A’, ABB Standard Lay Length (1,3xDN)
All specified dimensions and weights are in mm (in) or kg (lb). The stated weights are approximate; the maximum weight is always stated.

Integral mount design





Remote mount design

(1) Transport lugs

(2) Female thread (either 1/2” NPT or M20 x 1,5) refer to model coding. With 1/2” NPT there will be a plug instead of the PG cable inlet.

Figure 39: Integral mount design (top), remote mount design (bottom)

Dimensions - Flange device, steel sensor housing - Design level 'A' ABB standard lay length (1,3xDN)									
Nominal diameter	**Process connection**	**D**	**B**	**L[2) 3)]**	**C**	**F[4) 5)]**	**F1[4) 5)]**	**F2[4) 5)]**	**Weight**
DN 700 (28″)	EN 1092-1, PN 10[1)]	895 (35.24)	35 (1.38)	910 (35.83)	405 (15.94)	596 (23.46)	610 (24.02)	534 (21.02)	318.5 (702)
	EN 1092-1, PN 16[1)]	910 (35.83)	36 (1.42)						438.5 (967)
	ASME B16.47, CL 150	836.7 (32.94)	49.5 (1.95)						348.5 (768)
DN 750 (30″)	ASME B16.47, CL 150	888 (34.96)	44.5 (1.75)	990 (38.96)	431 (16.97)	606 (23.86)	620 (24.41)	560 (22.05)	474.5 (1046)
	AWWA C207 CLASS B	984 (38.74)		990 (38.98)	431 (16.97)	606 (23.86)	620 (24.41)	560 (22.05)	324 (713)
	AWWA C207 CLASS D	984 (38.74)							395 (869)
	AWWA C207 CLASS E	995 (39.17)							547 (1204)
DN 800 (32″)	EN 1092-1, PN 10[1)]	1015 (39.96)	37 (1.46)	1040 (40.94)	455 (17.91)	646 (25.43)	660 (25.98)	584 (22.99)	418.5 (923)
	EN 1092-1, PN 16[1)]	1025 (40.35)	43 (1.69)						488.5 (1077)
	ASME B16.47, CL 150	942 (37.09)	51 (2.01)						498.5 (1099)
	AWWA C207 CLASS B	1060 (41.73)		1040 (40.04)	455 (17.91)	646 (25.43)	660 (25.98)	584 (22.99)	384 (845)
	AWWA C207 CLASS D								463 (1019)
	AWWA C207 CLASS E								689 (1516)
DN 900 (36″)	EN 1092-1, PN 10[1)]	1115 (43.90)	39 (1.54)	1170 (46.06)	505 (19.88)	696 (27.40)	710 (27.95)	635 (25.0)	503.5 (1110)
	EN 1092-1, PN 16[1)]	1125 (44.29)	45 (1.77)						588.5 (1297)
	ASME B16.47, CL 150	1157.1 (41.62)	57.3 (2.26)						678.5 (1496)
	AWWA C207 CLASS B	1068 (45.98)		1170 (46.06)	505 (19.88)	696 (27.40)	710 (27.95)	635 (25.00)	480 (1056)
	AWWA C207 CLASS D								556 (1224)
	AWWA C207 CLASS E	1175 (46.26)							753 (1657)
DN 1000 (40″)	EN 1092-1, PN 10[1)]	1230 (48.43)	39 (1.54)	1300 (51.18)	555 (21.85)	746 (29.37)	760 (29.92)	685 (26.97)	688.5 (1517)
	EN 1092-1, PN 16[1)]	1255 (49.41)	47 (1.85)						848.5 (1870)
	ASME B16.47, CL 150	1174.8 (46.25)	60.6 (2.39)						878.5 (1937)
	AWWA C207 CLASS B	1289 (50.75)		1300 (51.18)	555 (21.85)	746 (29.37)	760 (29.92)	685 (26.97)	578 (1272)
	AWWA C207 CLASS D								735 (1617)
	AWWA C207 CLASS E								905 (1991)
DN 1050 (42″)	ASME B16.47, CL 150	1067 (42.01)	58.7 (2.31)	1365 (53.74)	607 (23.90)	771 (30.35)	785 (30.91)	737 (29.02)	930.5 (2051)
	AWWA C207 CLASS B	1346 (52.99)		1365 (53.74)	607 (23.90)	771 (30.35)	785 (30.91)	737 (29.02)	668 (1470)
	AWWA C207 CLASS D								772 (1699)
	AWWA C207 CLASS E								1246 (2742)
DN 1100 (44″)	ASME B16.47, CL 150	1118 (44.02)	60.5 (2.38)	1430 (56.30)	607 (23.90)	–	–	737 (29.02)	960.5 (2117)
	AWWA C207 CLASS B	1403 (55.24)		1430 (56.30)	607 (23.90)	–	–	737 (29.02)	700 (1540)
	AWWA C207 CLASS D								891 (1961)
	AWWA C207 CLASS E	1404 (55.26)							1289 (2836)
DN 1200 (48″)	EN 1092-1, PN 10[1)]	1455 (57.28)	43 (1.69)	1560 (61.42)	660 (25.98)	856 (33.7)	870 (34.25)	791 (31.14)	928.5 (2047)
	EN 1092-1, PN 16[1)]	1485 (58.46)	53 (2.09)						1118.5 (2466)
	AWWA C207 CLASS B	1511 (59.49)		1560 (61.42)	660 (25.98)	856 (33.7)	870 (34.25)	791 (31.14)	872 (1919)
	AWWA C207 CLASS D								1099 (2418)
	AWWA C207 CLASS E								1557 (3426)

Tolerance for L: DN 700 to 2000 +0 / −10 mm (+0 / −0.394 in)

… Flowmeter sensor

… Dimensions

Dimensions - Flange device, steel sensor housing - Design level 'A' ABB standard lay length (1,3xDN)

Nominal diameter	Process connection	D	B	L[2) 3)]	C	F[4) 5)]	F1[4) 5)]	F2[4) 5)]	Weight
DN 1350 (54″)	AWWA C207 CLASS B	1638 (66.26)		1755 (69.09)					1119 (2462)
	AWWA C207 CLASS D								1350 (2970)
	AWWA C207 CLASS E								2079 (4574)
DN 1400 (56″)	EN 1092-1 PN 10[1)]	1675 (65.94)	47 (1.85)	1820 (71.65)	755 (29.72)	950 (37.4)	964 (37.95)	885 (34.84)	1208.5 (2664)
	EN 1092-1 PN 16[1)]	1685 (66.34)	57 (2.24)						1758.5 (3877)
DN 1500 (60″)	ASME B16.47, CL 150	1676 (65.98)	76.2 (3.00)	1950 (76.77)	807 (31.77)	996 (39.21)	1010 (39.76)	937 (36.89)	1950.5 (4300)
	AWWA C207 CLASS B	1854 (72.99)		1950 (76.77)	807 (31.77)	996 (39.21)	1010 (39.76)	937 (36.89)	1460 (3212)
	AWWA C207 CLASS D								1746 (3842)
	AWWA C207 CLASS E								2775 (6105)
DN 1600 (64″)	EN 1092-1 PN 10[1)]	1915 (75.39)	51 (2.01)	2080 (81.89)	865 (34.06)	1060 (41.73)	1074 (42.28)	996 (39.21)	1628.5 (3590)
	EN 1092-1 PN 16[1)]	1930 (75.98)	63 (2.48)						2148.5 (4737)
DN 1650 (66″)	AWWA C207 CLASS B	2032 (80.00)		2145 (84.45)	915 (36.02)		1116 (43.94)	1006 (39.60)	1704 (3749)
	AWWA C207 CLASS D								2225 (4895)
DN 1800 (72″)	EN 1092-1 PN 10[1)]	2115 (83.27)	55 (2.17)	2340 (92.13)	980 (38.58)	1176 (46.3)	1190 (46.85)	1111 (43.74)	2228.5 (4913)
	EN 1092-1 PN 16[1)]	2130 (83.86)	67 (2.64)						2898.5 (6390)
	AWWA C207 CLASS B	2197 (86.50)		2340 (92.13)	980 (38.58)		1181 (46.50)	1071 (42.17)	2009 (4420)
	AWWA C207 CLASS D	2197 (86.50)							2622 (5769)
DN 2000 (80″)	EN 1092-1 PN 10[1)]	2325 (91.54)	59 (2.32)	2600 (102.36)	1090 (42.91)	1286 (50.63)	1300 (51.18)	1221 (48.07)	1878.5 (4141)
	EN 1092-1 PN 16[1)]	2345 (92.32)	71 (2.80)						2648.5 (5839)

Tolerance for L: DN 700 to 2000 +0 / −10 mm (+0 / −0.394 in)

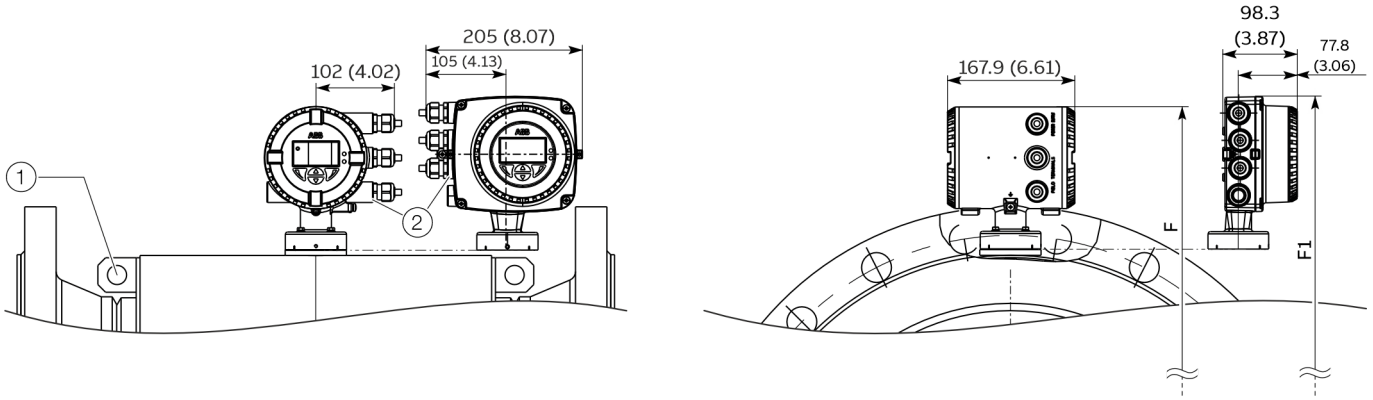
1) Other pressure ratings on request.
2) If a grounding ring is fitted (attached to one side of the flange) dimension L increases by 5 mm (0.197 in).
3) If protection plates are fitted (attached to both sides of the flange) dimension L increases by 10 mm (0.394 in).
4) For devices in high-temperature design, dimension F, F1, F2 increases by +127 mm (+5.0 in).
5) Depending on the device design, the dimensions change according to the following table:

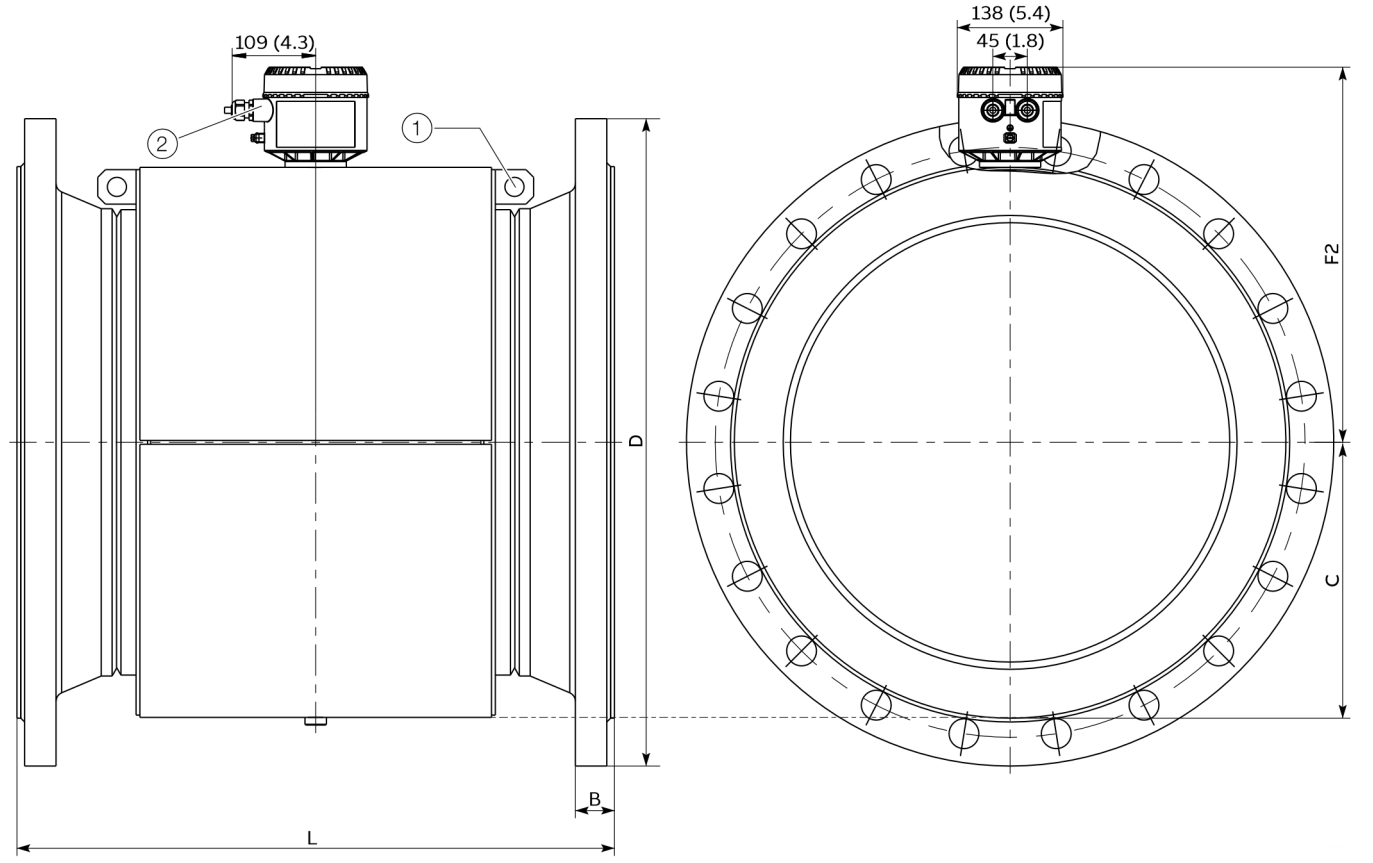
Device design		Dimension F, F1	Dimension F2
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 in)	+47 mm (+1.85 in)
	High-temperature sensor design	+127 mm (+5 in)	+174 mm (+6.85 in)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)

Flange DN 700 to 2000 (28 to 80″), steel sensor housing Design level 'A', Optional Lay Length (1,0xDN)

All specified dimensions and weights are in mm (in) or kg (lb). The stated weights are approximate; the maximum weight is always stated.

Integral mount design





Remote mount design

(1) Transport lugs

(2) Female thread (either 1/2″ NPT or M20 x 1,5) refer to model coding. With 1/2″ NPT there will be a plug instead of the PG cable inlet.

Figure 40: Integral mount design (top), remote mount design (bottom)

… Flowmeter sensor

… Dimensions

Dimensions – Flange device, steel sensor housing Design level 'A', Optional lay length (1,0xDN)

Nominal diameter	Process connection	D	B	L[2) 3)]	C	F[4),5)]	F1[4),5)]	F2[4),5)]	Weight
DN 700 (28″)	EN 1092-1, PN 10[1)]	895 (35.24)	35 (1.38)	700 (27.56)	405 (15.94)	596 (23.46)	610 (24.02)	534 (21.02)	318.5 (702)
	EN 1092-1, PN 16[1)]	910 (35.83)	36 (1.42)						438.5 (967)
	ASME B16.47, CL 150	836.7 (32.94)	49.5 (1.95)						348.5 (768)
	JIS 5K	875 (34.45)	31 (1.22)						202 (445)
	JIS 10K	905 (35.63)	39 (1.53)						263 (580)
	JIS 7.5K	928 (36.53)	36 (1.42)						320 (705)
	AS 4087 PN16	910 (35.82)	61 (2.40)						327 (720)
	AS2129 TABLE E	910 (35.82)	56 (2.20)						305 (672)
DN 750 (30″)	ASME B16.47, CL 150	888 (34.96)	44.5 (1.75)		431 (16.97)	606 (23.86)	620 (24.41)	560 (22.05)	474.5 (1046)
	JIS 5K	945 (37.20)	33 (1.30)	762 (30.00)	431 (16.97)	616 (24.25)	630 (24.8)	570 (22.44)	233 (513)
	JIS 10K	970 (38.19)	41 (1.61)	762 (30.00)	431 (16.97)	616 (24.25)	630 (24.8)	570 (22.44)	306 (675)
	AS 4087 PN16	995 (39.17)	61 (2.40)	762 (30.00)	431 (16.97)	616 (24.25)	630 (24.8)	570 (22.44)	388 (855)
	AS2129 TABLE E	995 (39.17)	59 (2.32)	762 (30.00)	431 (16.97)	616 (24.25)	630 (24.8)	570 (22.44)	377 (831)
	AWWA C207 CLASS B	984 (38.74)		762 (30.00)	606 (23.86)	431 (16.97)	620 (24.41)	560 (22.05)	268 (590.9)
	AWWA C207 CLASS D	984 (38.74)							322 (709.9)
	AWWA C207 CLASS E	995 (39.17)							472 (1040.6)
DN 800 (32″)	EN 1092-1, PN 10[1)]	1015 (39.96)	37 (1.46)	800 (31.45)	455 (17.91)	646 (25.43)	660 (25.98)	584 (22.99)	373 (822)
	EN 1092-1, PN 16[1)]	1025 (40.35)	43 (1.69)						447 (985)
	ASME B16.47, CL 150	942 (37.09)	51 (2.01)						498.5 (1099)
	JIS 5K	995 (39.17)	33 (1.30)						261 (575)
	JIS 10K	1020 (40.16)	41 (1.61)						340 (750)
	JIS 7.5K	1034 (40.71)	39 (1.53)						420 (926)
	AS 4087 PN16	1060 (41.73)	61 (2.40)						442 (974)
	AS2129 TABLE E	1060 (41.73)	59 (2.32)						431 (950)
	AWWA C207 CLASS B	1060 (41.73)		800 (31.49)	646 (25.43)	455 (17.91)	660 (25.98)	584 (22.99)	334 (736.4)
	AWWA C207 CLASS D								394 (868.7)
	AWWA C207 CLASS E								591 (1303)
DN 900 (36″)	EN 1092-1, PN 10[1)]	1115 (43.90)	39 (1.54)	900 (35.43)	505 (19.88)	696 (27.40)	710 (27.95)	635 (25.0)	420 (926)
	EN 1092-1, PN 16[1)]	1125 (44.29)	45 (1.77)						510 (1124)
	ASME B16.47, CL 150	1157.1 (41.62)	57.3 (2.26)						678.5 (1495)
	JIS 5K	1095 (43.11)	35 (1.38)						319 (703)
	JIS 10K	1120 (44.10)	43 (1.70)						415 (915)
	JIS 7.5K	1156 (45.51)	41 (1.61)						520 (1146)
	AS 4087 PN16	1175 (46.26)	71 (2.78)						658 (1450)
	AS2129 TABLE E	1175 (46.26)	69 (2.71)						645 (1421)
	AWWA C207 CLASS B	1068 (45.98)		900 (35.43)	696 (27.40)	505 (19.88)	710 (27.95)	635 (25.00)	397 (875.3)
	AWWA C207 CLASS D								436 (961.2)
	AWWA C207 CLASS E	1175 (46.26)							744 (1640.3)
DN 1000 (40″)	EN 1092-1, PN 10[1)]	1230 (48.43)	39 (1.54)	1000 (39.40)	555 (21.85)	746 (29.37)	760 (29.92)	685 (26.97)	580 (1279)
	EN 1092-1, PN 16[1)]	1255 (49.41)	47 (1.85)						780 (1719)
	ASME B16.47, CL 150	1174.8 (46.25)	60.6 (2.39)						878.5 (1937)
	JIS 5K	1195 (47.04)	37 (1.46)						379 (835)
	JIS 10K	1235 (48.62)	45 (1.77)						527 (1162)
	JIS 7.5K	1262 (49.68)	43 (1.70)						660 (1455)
	AS 4087 PN16	1255 (49.41)	71 (2.80)						696 (1534)
	AS2129 TABLE E	1255 (49.41)	72 (2.83)						698 (1539)
	AWWA C207 CLASS B	1289 (50.75)		1000 (39.37)	746 (29.37)	555 (21.88)	760 (29.92)	685 (26.97)	474 (1045)
	AWWA C207 CLASS D								618 (1362.5)
	AWWA C207 CLASS E								922 (2032.7)

Tolerance for L: DN 700 to 2000 +0 / −10 mm (+0 / −0.394 in)

Dimensions – Flange device, steel sensor housing Design level 'A', Optional lay length (1,0xDN)

Nominal diameter	Process connection	D	B	L[2) 3)]	C	F[4),5)]	F1[4),5)]	F2[4),5)]	Weight
DN 1050 (42″)	ASME B16.47, CL 150	1067 (42.01)	58.7 (2.31)	1365 (53.74)	607 (23.90)	771 (30.35)	785 (30.91)	737 (29.02)	930.5 (2051)
	AWWA C207 CLASS B	1346 (52.99)		1067 (42.01)	771 (30.35)	607 (23.90)	785 (30.91)	737 (29.02)	559 (1232.4)
	AWWA C207 CLASS D								614 (1353.7)
	AWWA C207 CLASS E								1102 (2429.6)
DN 1100 (44″)	ASME B16.47, CL 150	1118 (44.02)	60.5 (2.38)	1430 (56.30)	607 (23.90)	–	–	737 (29.02)	960.5 (2117)
	AWWA C207 CLASS B	1403 (55.24)		1118 (44.02)	–	607 (23.90)	–	737 (29.02)	605 (1333.8)
	AWWA C207 CLASS D								695 (1532.3)
	AWWA C207 CLASS E	1404 (55.26)							1132 (2495.7)
DN 1200 (48″)	EN 1092-1, PN 10[1)]	1455 (57.28)	43 (1.69)	1560 (61.42)	660 (25.98)	856 (33.7)	870 (34.25)	791 (31.14)	928.5 (2047)
	EN 1092-1, PN 16[1)]	1485 (58.46)	53 (2.09)						1118.5 (2466)
	AWWA C207 CLASS B	1511 (59.49)		1200 (47.24)	856 (33.70)	660 (25.98)	870 (34.25)	791 (31.14)	746 (1644.7)
	AWWA C207 CLASS D								886 (1953.4)
	AWWA C207 CLASS E								1389 (3062.3)
DN 1350 (54″)	AWWA C207 CLASS B	1683 (66.26)		1350 (53.15)					942 (2076.8)
	AWWA C207 CLASS D	1684 (66.30)							1026 (2262)
	AWWA C207 CLASS E	1685 (66.34)							1834 (4043.4)
DN 1400 (56″)	EN 1092-1 PN 10[1)]	1675 (65.94)	47 (1.85)	1820 (71.65)	755 (29.72)	950 (37.4)	964 (37.95)	885 (34.84)	1208.5 (2664)
	EN 1092-1 PN 16[1)]	1685 (66.34)	57 (2.24)						1758.5 (3877)
DN 1500 (60″)	ASME B16.47, CL 150	1676 (65.98)	76.2 (3.00)	1950 (76.77)	807 (31.77)	996 (39.21)	1010 (39.76)	937 (36.89)	1950.5 (4300)
	AWWA C207 CLASS B	1854 (72.99)		1524 (60.00)	996 (39.21)	807 (31.77)	1010 (39.76)	937 (36.89)	1290 (2844.1)
	AWWA C207 CLASS D								1569 (3459.2)
	AWWA C207 CLASS E								2497 (5505.1)
DN 1600 (64″)	EN 1092-1 PN 10[1)]	1915 (75.39)	51 (2.01)	2080 (81.89)	865 (34.06)	1060 (41.73)	1074 (42.28)	996 (39.21)	1628.5 (3590)
	EN 1092-1 PN 16[1)]	1930 (75.98)	63 (2.48)						2148.5 (4737)
DN 1650 (66″)	AWWA C207 CLASS B	2032 (80.00)		1650 (64.96)	915 (36.02)		1116 (43.94)	1000 (39.37)	1497 (3300.4)
	AWWA C207 CLASS D	2033 (80.04)							1763 (3886.9)
	AWWA C207 CLASS E	2032 (80.00)							3044 (6711.1)
DN 1800 (72″)	EN 1092-1 PN 10[1)]	2115 (83.27)	55 (2.17)	2340 (92.13)	980 (38.58)	1176 (46.3)	1190 (46.85)	1111 (43.74)	2228.5 (4913)
	EN 1092-1 PN 16[1)]	2130 (83.86)	67 (2.64)						2898.5 (6390)
	AWWA C207 CLASS B	2197 (86.50)		1800 (70.87)	980 (38.58)		1181 (46.50)	1605 (41.90)	1833 (4041.2)
	AWWA C207 CLASS D	2197 (86.50)							2147 (4733.5)
	AWWA C207 CLASS E	2197 (86.50)							3842 (8470.5)
DN 2000 (80″)	EN 1092-1 PN 10[1)]	2325 (91.54)	59 (2.32)	2600 (102.36)	1090 (42.91)	1286 (50.63)	1300 (51.18)	1221 (48.07)	1878.5 (4141)
	EN 1092-1 PN 16[1)]	2345 (92.32)	71 (2.80)						2648.5 (5839)

Tolerance for L: DN 700 to 2000 +0 / −10 mm (+0 / −0.394 in)

1) Other pressure ratings on request.
2) If a grounding ring is fitted (attached to one side of the flange) dimension L increases by 5 mm (0.197 in).
3) If protection plates are fitted (attached to both sides of the flange) dimension L increases by 10 mm (0.394 in).
4) For devices in high-temperature design, dimension F, F1, F2 increases by +127 mm (+5.0 in).
5) Depending on the device design, the dimensions change according to the following table:

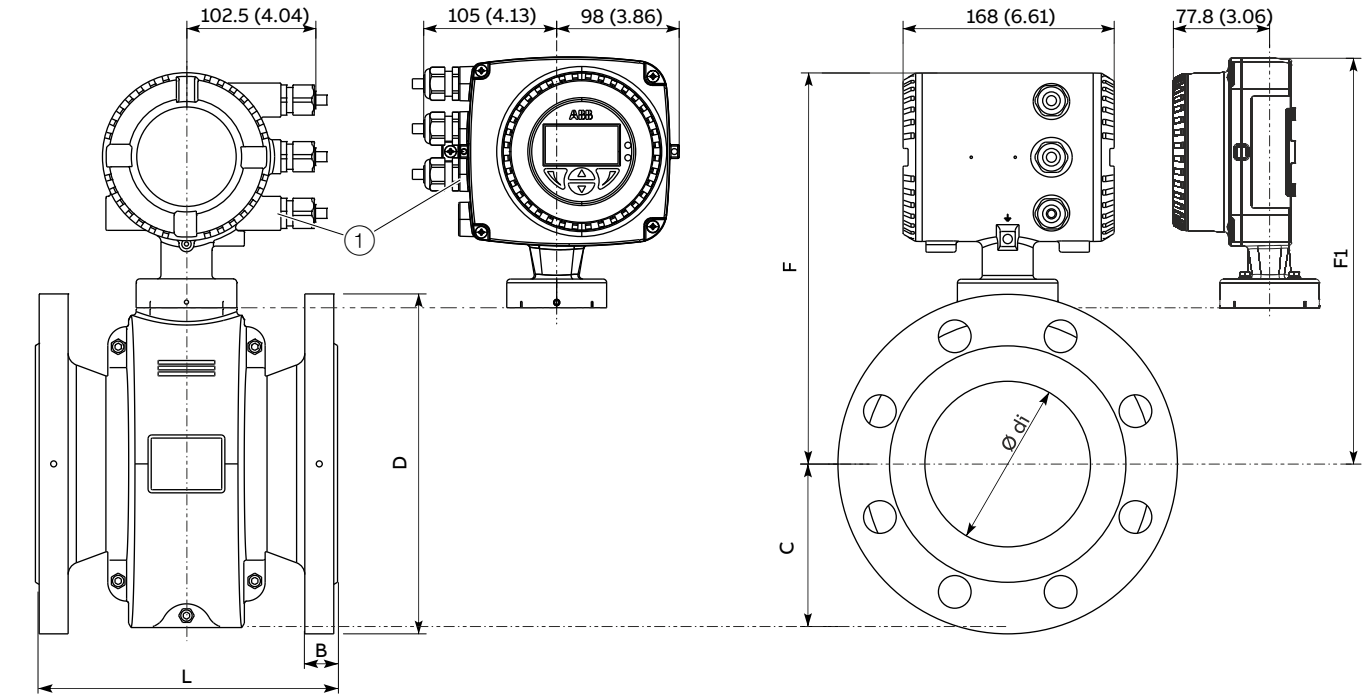
Device design		Dimension F, F1	Dimension F2
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 in)	+47 mm (+1.85 in)
	High-temperature sensor design	+127 mm (+5 in)	+174 mm (+6.85 in)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)

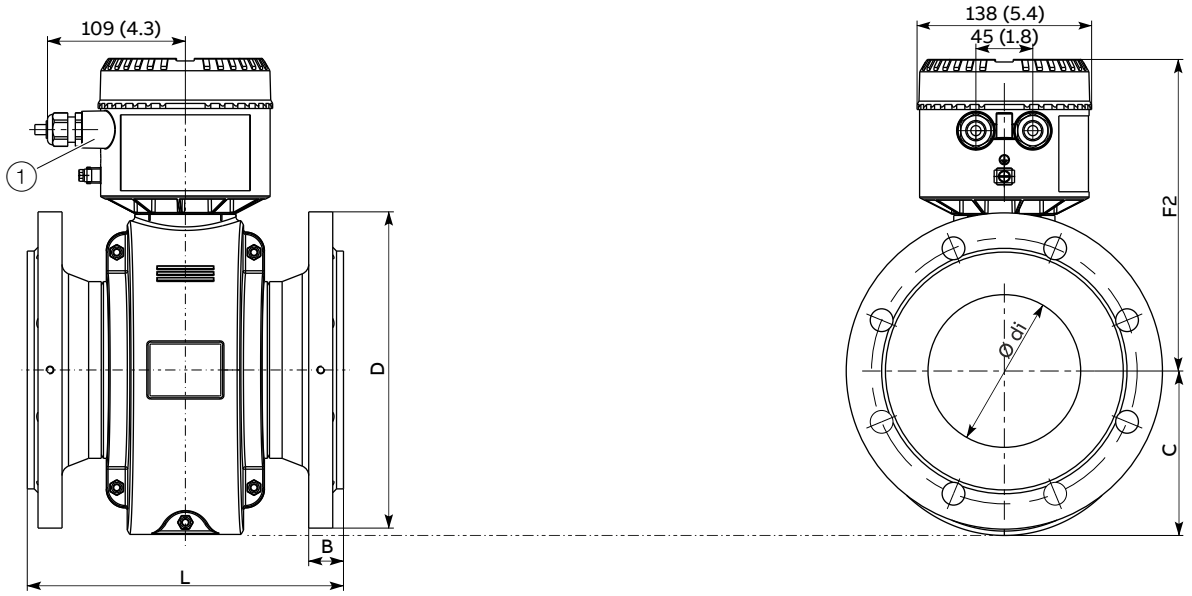
… Flowmeter sensor

… Dimensions

Flange DN 25 to 400 (1 to 16″), high pressure design, aluminum sensor housing (shell housing) — Design level ‘A’
All specified dimensions and weights are in mm (in) or kg (lb). The stated weights are approximate; the maximum weight is always stated.

Integral mount design





Remote mount design

(1) Female thread (either 1/2″ NPT or M20 x 1,5) refer to model coding. With 1/2″ NPT there will be a plug instead of the PG cable inlet.

Figure 41: Integral mount design (top), remote mount design (bottom)

Dimensions - Flange device DN 25 to 65, high pressure design, aluminum sensor housing (shell housing) — Design level 'A'

Nominal diameter	Process connection	D	di	Shedule	L[1), 2)]	A	C	F[3)]	F1[3)]	F2[3)]	Weight Integral	Weight / remote
DN 25 (1")	EN1092-1 PN63 EN1092-1 PN100	140 (5.51)	22 (0.87)	—	270 (10.63)						12 (27)	10 (22)
	ASME B16.5, CL 600	124 (4.88)	22 (0.87)	40 (1.57)	270 (10.63)	113 (4.45)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	12 (27)	10 (22)
	ASME B 16.5 CL900/1500	149 (5.87)	19 (0.75)	80 (3.15)	300 (11.81)						15 (33)	13 (29)
	ASME B16.5, CL 2500	158 (6.22)	15 (0.60)	160 (6.30)	350 (13.78)						18 (40)	16 (35)
DN 40 (1½")	EN1092-1 PN63 EN1092-1 PN100	170 (6.69)	36 (1.42)	—	280 (11.02)						13 / 14 (29 / 31)	11 / 12 (24 / 27)
	ASME B16.5, CL 600	156 (6.14)	35 (1.38)	40 (1.57)	280 (11.02)	113 (4.45)	92 (3.62)	262 (10.31)	276 (10.87)	198 (7.80)	13 (29)	11 (24)
	ASME B 16.5 CL900/1500	177 (6.97)	26 (1.02)	80 (3.15)	350 (13.78)						22 (48.5)	20 (44)
	ASME B16.5, CL 2500	203 (7.99)	22 (0.87)	XXS	400 (15.75)						32 (70.5)	32 (70.5)
DN 50 (2")	EN1092-1 PN63	180 (7.09)	48 (1.89)	—	280 (11.02)						15 (33)	13 (29)
	EN1092-1 PN100	195 (7.68)	48 (1.89)	—	280 (11.02)						18 (40)	16 (35)
	ASME B16.5, CL 600	165 (6.50)	46 (1.81)	40 (1.57)	280 (11.02)	115 (4.53)	97 (3.82)	268 (10.55)	282 (11.1)	204 (8.0)	15 (33)	13 (29)
	ASME B 16.5 CL900/1500	216 (8.50)	37 (1.46)	160 (6.30)	400 (15.75)						32 (70.5)	30 (66)
	ASME B16.5, CL 2500	235 (9.25)	32 (1.26)	XXS	450 (17.72)						42 (92.5)	40 (88)
DN 65 (2½")	EN1092-1 PN63	205 (8.07)	64 (2.52)	—	330 (12.99)						18 (40)	16 (35)
	EN1092-1 PN100	220 (8.66)	63 (2.48)	—	330 (12.99)						23 (51)	21 (46)
	ASME B16.5, CL 600	190 (7.48)	60 (2.36)	30	330 (12.99)	104 (4.09)	108 (4.25)	279 (10.98)	293 (11.54)	215 (8.46)	20 (44)	18 (40)
	ASME B 16.5 CL900/1500	244 (9.61)	48 (1.89)	160	400 (15.75)						37 (81.5)	35 (77)
	ASME B16.5, CL 2500	266 (10.47)	39 (1.53)	XXS	450 (17.72)						56 (123.5)	54 (119)

Tolerance L: DN 25 to 100 +0 / −5 mm (+0 / −0,197 in), DN 150 to 200 +0 / −5 mm (+0 / −0,197 in), DN 250 to 400 +0 / −8 mm (+0 / −0,314 in)
Tolerance Di: ETFE Liner: +1/ −5 mm (+1/ −0,197 in) Hardrubber: +1/ −3 mm (+1/ −0.118 in
All pressure ratings (PN 63, PN 100, CL 600 to CL 2500 available with Hardrubber and ETFE only

… Flowmeter sensor

… Dimensions

Dimensions - Flange device DN 80 to 150, high pressure design, aluminum sensor housing (shell housing) — Design level 'A'

Nominal diameter	Process connection	D	di	Shedule	L[1), 2)]	A	C	F[3)]	F1[3)]	F2[3)]	Weight Integral	Weight / remote
80 (3″)	EN1092-1 PN63	215 (8.46)	76 (2.99)	—	340 (13.39)						22 (49)	20 (44)
	EN1092-1 PN100	230 (9.06)	75 (2.95)	—	340 (13.39)						26 (57)	24 (53)
	ASME B16.5, CL 600	209 (8.23)	72 (2.83)	40	340 (13.39)	104 (4.09)	108 (4.25)	279 (10.98)	293 (11.54)	215 (8.46)	25 (55)	23 (51)
	ASME B16.5, CL 900	241 (9.49)	68 (267)	80	400 (15.75)						38 (84)	36 (80)
	ASME B16.5, CL 1500	266 (10.47)	61 (2.40)	160	400 (15.75)						51 (112)	49 (108)
	ASME B16.5, CL 2500	305 (12.01)	52 (2.05)	XXS	500 (19.68)						84 (185)	82 (181)
100 (4″)	EN1092-1 PN63	250 (9.84)	100 (3.94)	—	400 (15.75)						29 (64)	27 (60)
	EN1092-1 PN100	265 (10.43)	98 (3.85)	—	400 (15.75)						38 (84)	26 (57)
	ASME B16.5, CL 600	273 (10.75)	91 (3.58)	80	400 (15.75)	125 (4.92)	122 (4.8)	301 (11.85)	315 (12.4)	237 (9.33)	46 (101)	44 (97)
	ASME B16.5, CL 900	292 (11.50)	86 (3.38)	120	400 (15.75)						58 (128)	56 (123.5)
	ASME B16.5, CL 1500	311 (12.24)	74 (2.91)	XXS	420 (16.54)						75 (165)	73 (161)
	ASME B16.5, CL 2500	355 (13.98)	68 (2.67)	—	600 (23.62)						128 (282)	126 (278)
125 (5″)	EN1092-1 PN63	295 (11.61)	124 (4.88)	—	450 (17.72)						70 (154)	68 (150)
	EN1092-1 PN100	315 (12.4)	121 (4.76)	—	450 (17.72)						70 (154)	68 (150)
	ASME B16.5, CL 600	330 (12.99)	116 (4.56)	80	400 (15.75)	125 (4.92)	130 (5.12)	311 (12.24)	325 (12,80)	247 (9,72)	70 (154)	68 (150)
	ASME B16.5, CL 900	349 (13.74)	110 (4.33)	120	450 (17.72)						88 (194)	86 (190)
	ASME B16.5, CL 1500	374 (14.72)	97 (3.82)	XXS	500 (19.68)						127 (280)	125 (275)
	ASME B16.5, CL 2500	419 (16.50)	85 (3.34)	—	700 (27.56)						206 (454)	204 (450)
150 (6“)	EN1092-1 PN63	345 (13.58)	151 (5.94)	—	450 (17.72)						94 (207)	92 (203)
	EN1092-1 PN100	355 (13.98)	148 (5.83)	—	450 (17.72)						94 (207)	92 (203)
	ASME B16.5, CL 600	355 (13.98)	140 (5.51)	80	450 (17.72)	166 (6.54)	146 (5.75)	358 (14.09)	294 (11,57)	166 (6.54)	94 (207)	92 (203)
	ASME B16.5, CL 900	381 (15.0)	140 (5.51)	80	500 (19.68)						120 (265)	118 (260)
	ASME B16.5, CL 1500	393 (15.47)	118 (4.64)	XXS	600 (23.62)						168 (370)	166 (366)
	ASME B16.5, CL 2500	482 (18.98)	102 (4.01)	—	800 (31.50)						335 (738)	333 (734)

Tolerance L: DN 25 to 100 +0 / −5 mm (+0 / −0,197 in), DN 150 to 200 +0 / −5 mm (+0 / −0,197 in), DN 250 to 400 +0 / −8 mm (+0 / −0,314 in)
Tolerance Di: ETFE Liner: +1/ −5 mm (+1/ −0,197 in) Hardrubber: +1/ −3 mm (+1/ −0.118 in
All pressure ratings (PN 63, PN 100, Cl 600 to CL 2500 available with Hardrubber and ETFE only

Dimensions - Flange device DN 200 to 400, high pressure design, aluminum sensor housing (shell housing) — Design level 'A'												
Nominal diameter	**Process connection**	**D**	**di**	**Shedule**	**L[1), 2)]**	**A**	**C**	**F[3)]**	**F1[3)]**	**F2[3)]**	**Weight Integral / remote**	
200 (8")	EN1092-1 PN63	415 (16.34)	199 (7.83)	—	500 (19.68)	200 (7.87)	170 (6.69)	399 (15.71)	413 (16,26)	334 (13,15)	150 (331)	148 (326)
	EN1092-1 PN100	430 (16.93)	193 (7.60)	—	500 (19.68)						150 (331)	148 (326)
	ASME B16.5, CL 600	419 (16.50)	188 (7.40)	80	500 (19.68)						150 (331)	148 (326)
	ASME B16.5, CL 900	470 (18.50)	176 (6.93)	120	600 (23.62)						207 (456)	205 (452)
	ASME B16.5, CL 1500	482 (18.98)	163 (6.42)	—	700 (27.56)						290 (639)	288 (635)
	ASME B16.5, CL 2500	552 (21.73)	141 (5.55)	—	950 (37.40)						510 (1124)	508 (1120)
250 (10")	ASME B16.5, CL 600	508 (20.0)	236 (9.29)	80	600 (23.62)							
	ASME B16.5, CL 900	546 (21.5)	224 (8.82)	120	700 (27.56)							
	ASME B16.5, CL 1500	584 (22.99)	203 (7.99)	—	850 (33.46)	235 (9.25)	198 (7.80)	413 (16.26)	427 (16,81)	349 (13,74)	On request	
	ASME B16.5, CL 2500	673 (26.50)	177 (6.97)	—	1200 (47.24)							
300 (12")	ASME B16.5, CL 600	559 (22.01)	283 (11.14)	80	750 (29.53)							
	ASME B16.5, CL 900	609 (23.98)	267 (10.51)	120	800 (31.50)							
	ASME B16.5, CL 1500	673 (26.50)	238 (9.37)	—	950 (37.40)	272 (10.71)	228 (8.98)	436 (17.17)	450 (17,72)	372 (14,62)	On request	
	ASME B16.5, CL 2500	762 (30.00)	214 (8.42)	—	1400 (55.12)							
350 (14")	ASME B16.5, CL 600	603 (23.74)	311 (12.24)	80	750 (29.53)							
	ASME B16.5, CL 900	641 (25.24)	294 (11.57)	120	850 (33.46)	322 (12.68)	265 (10.43)	451 (17.76)	465 (18,31)	416 (16,38)	On request	
	ASME B16.5, CL 1500	749 (29.49)	269 (10.59)	—	1050 (41.34)							
400 (16")	ASME B16.5, CL 600	686 (27.01)	357 (14.05)	80	800 (31.50)							
	ASME B16.5, CL 900	705 (27.76)	338 (13.31)	120	900 (35.43)	322 (12.68)	265 (10.43)	493 (19.41)	507 (19,96)	416 (16,38)	On request	
	ASME B16.5, CL 1500	825 (32.48)	310 (12.20)	—	1100 (43.31)							

Tolerance L: DN 25 to 100 +0 / −5 mm (+0 / −0,197 in), DN 150 to 200 +0 / −5 mm (+0 / −0,197 in), DN 250 to 400 +0 / −8 mm (+0 / −0,314 in)
Tolerance Di: ETFE Liner: +1/ −5 mm (+1/ −0,197 in) Hardrubber: +1/ −3 mm (+1/ −0.118 in
All pressure ratings (PN 63, PN 100, CL 600 to CL 2500 available with Hardrubber and ETFE only

1) Other pressure ratings on request.
2) If a grounding ring is fitted (attached to one side of the flange), dimension L increases as follows: by 3 mm (0.118 in) for DN 3 to 100, and by 5 mm (0.197 in) for DN 125.
3) Depending on the device design, the dimensions change according to the following table:

… Flowmeter sensor

… Dimensions

Dimensions - Flange device DN 200 to 400, high pressure design, aluminum sensor housing (shell housing) — Design level 'A'

Device design		Dimension F, F1	Dimension F2
Without explosion protection	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)
Explosion protection Zone 1, Div. 1	Standard sensor design	+74 mm (+2.91 in)	+47 mm (+1.85 in)
	High-temperature sensor design	+127 mm (+5 in)	+174 mm (+6.85 in)
Explosion protection Zone 2, Div. 2	Standard sensor design	0	0
	High-temperature sensor design	+127 mm (+5 in)	+127 mm (+5 in)

Transmitter

Features

- 4 to 20 mA current output
- Current output in the event of an alarm can be configured to 21 to 22.6 mA (NAMUR NE43)
- Measuring range: Can be configured between 0.02 to 2 x Q_{max}DN
- Operating mode for flow measurement can be configured
- Programmable digital output. Can be configured as frequency output, pulse output or binary output.
- Two slots for optional plug-in cards
- Damping: 0.04 to 100 s configurable (1 τ)
- Low flow cut-off: 0 to 20 % for current and pulse output
- Empty pipe detection*
- Simulation of current and binary output (manual process execution)

* Requirements for Empty Pipe detector function:
  - The conductivity of the fluid must be ≥ 20 µS/cm
  - Nominal diameter must be ≥ DN 10

LCD indicator (option)

- High-contrast LCD indicator
- Display of the current flow rate as well as the total flow rate
- Application-specific visualizations which the user can select. Two operator pages can be configured to display multiple values in parallel.
- Plain text fault diagnostics
- Menu-guided parameterization with four buttons
- 'Easy Set-up' function for fast commissioning
- Parameterization of the device through the front glass with the housing closed

Isolation of outputs

The digital output terminals 41 / 42 and 51 / 52 have a common ground.
The current output and the digital outputs are electrically isolated from each other.

Optional plug-in cards

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

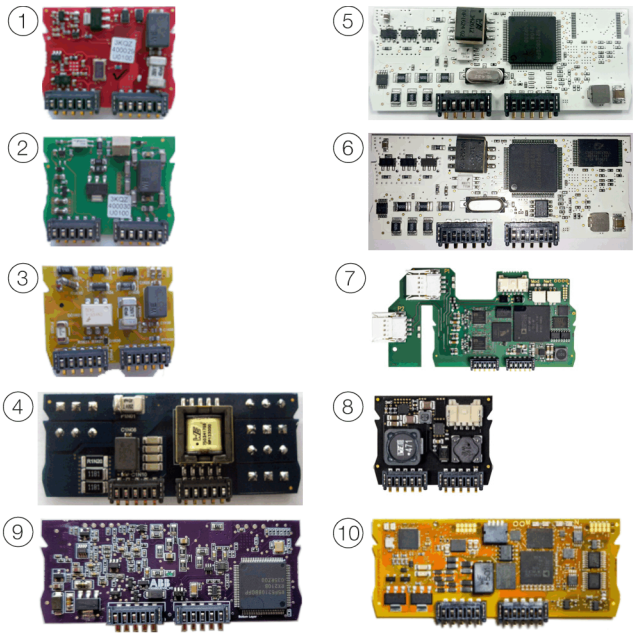


Figure 42: Plug-in cards

Plug-in card		Quantity*
1	Current output, 4 to 20 mA passive (red) Order no.: 3KQZ400029U0100	2
2	Passive digital output (green) Order no.: 3KQZ400030U0100	1**
3	Passive digital input (yellow) Order no.: 3KQZ400032U0100	1
4	24 V DC voltage supply (blue) Order no.: 3KQZ400031U0100	1
5	Modbus RTU® RS485 (white) Order no.: 3KQZ400028U0100	1
6	PROFIBUS DP® (white) Order no.: 3KQZ400027U0100	1
7	Ethernet (various protocols) Order no.: 3KQZ400037U0100	1
8	Power over Ethernet (POE) Order no.: 3KQZ400039U0100	1
9	PROFIBUS PA® (blue) Order no.: 3KQZ400061U0100	1
10	Ethernet APL™ Order No.: 3KQZ400067U0100	1

* The 'Number' column indicates the maximum number of plug-in cards of the same type that can be used.

** Only one plug-in card of the passive digital output type can be inserted in Pos. 2.

… Transmitter

IP rating

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

Vibration

In accordance with EN 60068-2-6

- In the 10 to 58 Hz range, maximum deflection 0.15 mm (0.006 in.)*
- In the range from 58 to 150 Hz, maximum acceleration 2 g*

* Peak load

Temperature data

	Standard	Optional
Ambient temperature	–20 to 60 °C	–40 to 70 °C
	(–4 to 140 °F)	(–40 to 158 °F)
Storage temperature	–20 to 70 °C	—
	(–4 to 158 °F)	

Note

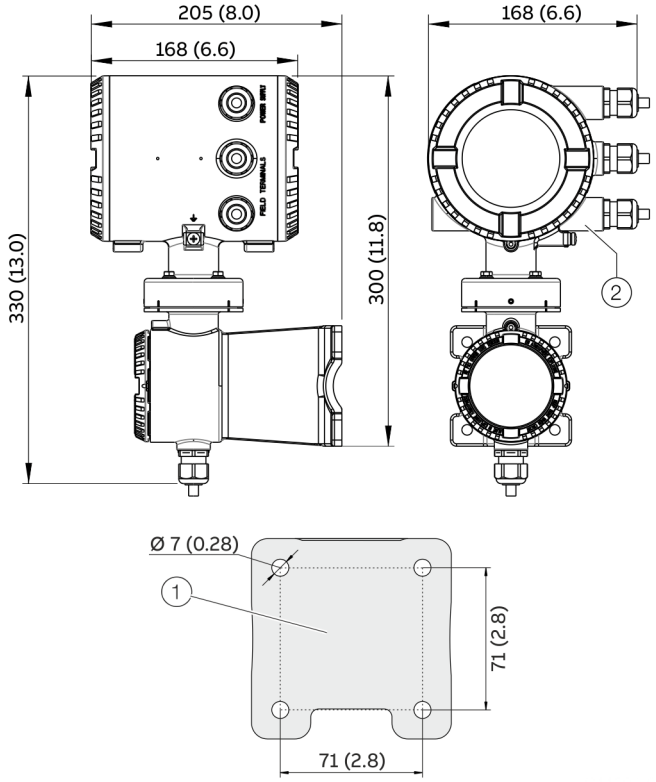
When operating below –20 °C (–4 °F), the LCD display can no longer be read. Full functionality is assured at temperatures above –20 °C (–4 °F).

Integral mount design	
Housing	Cast aluminum, painted
Paint	≥ 80 µm thick, RAL 9002 (gray white)
Cable gland*	Polyamide, M20 x 1.5 or ½ in. NPT
	Stainless steel**, M20 x 1.5 or ½ in. NPT
Remote mount design	
Housing	Cast aluminum, painted
Paint	≥ 80 µm thick, RAL 9002 (gray white)
Cable gland*	Polyamide, M20 x 1.5 or ½ in. NPT
	Stainless steel**, M20 x 1.5 or ½ in. NPT
Weight	4.5 kg (9.92 lb)

* Cable gland with M 20 x 1.5 or NPT thread, to be selected via the order number.

** On explosion-proof design for ambient temperature of –40 °C (–40 °F).

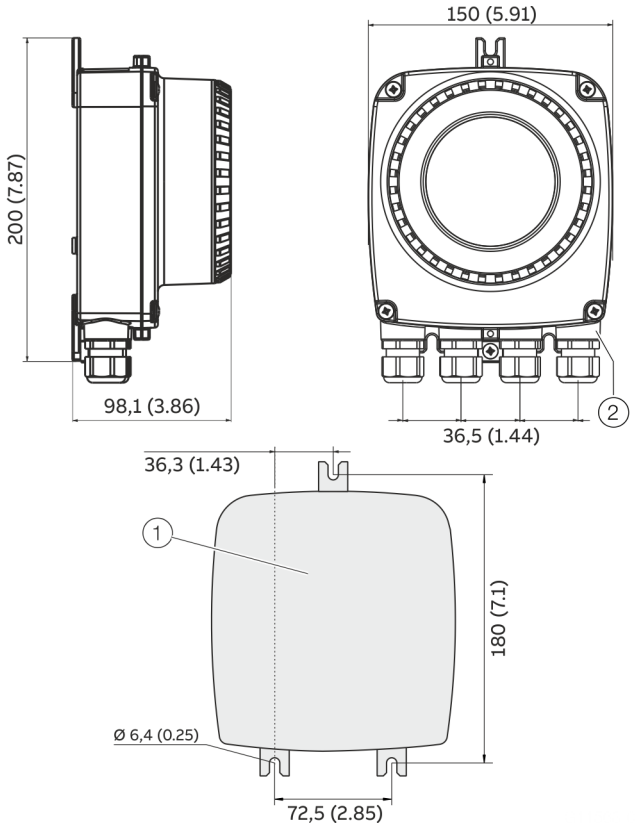
Dimensions



(1) Hole pattern for mounting holes

(2) Female thread (either ½ in NPT or M20 × 1.5), see model coding. In the case of a ½ in NPT, there is a plug instead of a cable gland.

Figure 43: Mounting dimensions dual-compartment housing



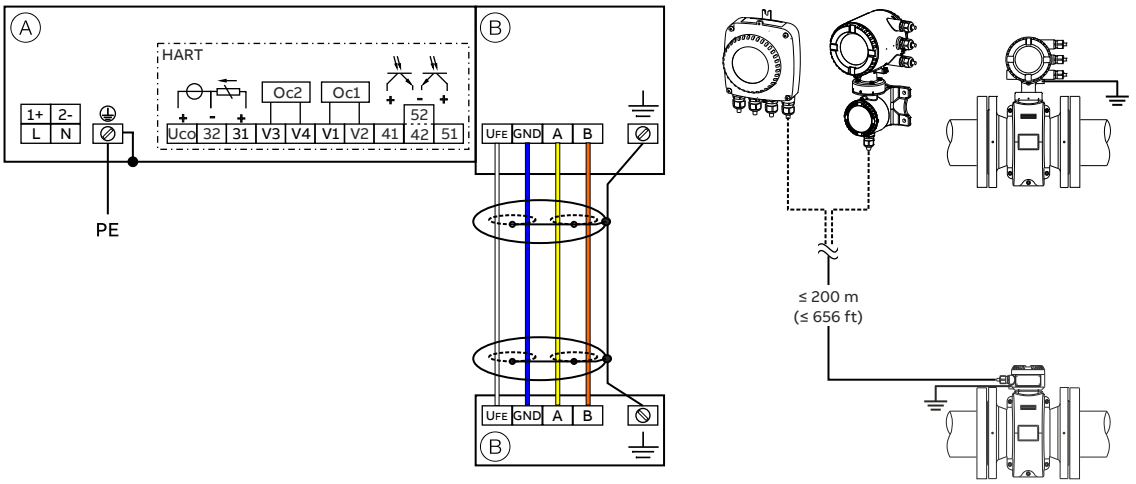
(1) Hole pattern for mounting holes

(2) Female thread (either ½ in NPT or M20 × 1.5), see model coding. In the case of a ½ in NPT, there is a plug instead of a cable gland.

Figure 44: Mounting dimensions single-compartment housing

Electrical connections

Connection diagram



(A) Connections for power supply and inputs / outputs

(B) Connections for signal cable (remote mount design only)

Figure 45: Electrical connections

Note

For detailed information about grounding the transmitter and the flowmeter sensor, please refer to chapter 'Grounding' in the Commissioning instruction or the operating instruction.

Connections for the power supply

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

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

Connections for inputs and outputs

Terminal	**Function / comments**
Uco / 32	**Current output 4 to 20 mA- / HART® output, active**
	or
31 / 32	**Current output 4 to 20 mA- / HART® output, passive**
41 / 42	**Passive digital output DO1**
51 / 52	**Passive digital output DO2**
V1 / V2	**Plug-in card, slot OC1**
V3 / V4	**Plug-in card, slot OC2**
	For details, see **Optional plug-in cards** on page 55.

Connecting the signal cable

Only for remote mount design.

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

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

Electrical data for inputs and outputs

Power supply

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

DC voltage supply	
Terminals	1+ / 2–
Operating voltage	16.8 to 30 V DC
Ripple	< 5 %
Power consumption	P_{max}: < 20 W
Power-up current	21 A, t < 10 ms

HART communication

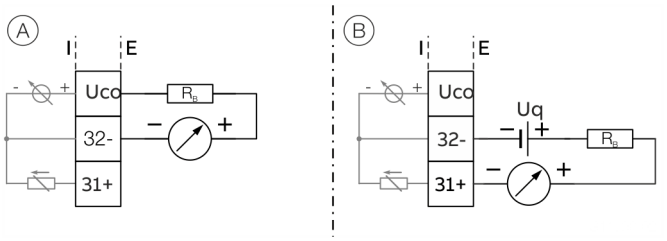
A HART DTM in accordance with FDT1.2 standards is available. HART protocol based Integrations in other Tools or systems (e.g., Emerson AMS/Siemens PCS7) are available on request. The DTM, the DD and EDD is available for download from www.abb.com/flow.

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

For information on communication via the HART protocol, refer to HART® communication in Operating Instruction OI/FEP630/FEH630.

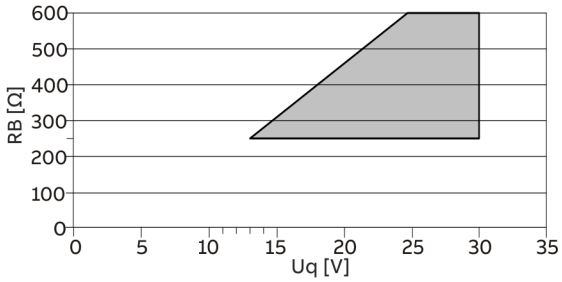
Current output Uco / 32, 31 / 32

Can be configured for outputting mass flow and volume flow via the on-site software.



Ⓐ Current output Uco / 32, active Ⓑ Current output 31 / 32, passive

Figure 46: (I = internal, E = external, R_B = load)



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

Figure 47: Source voltage for passive outputs

Current output	**Active**	**Passive**
Terminals	Uco / 32	31 / 32
Output signal	4 to 20 mA or 4 to 12 to 20 mA switchable	4 to 20 mA
Load R_B	250 Ω ≤ R_B ≤ 300 Ω	250 Ω ≤ R_B ≤ 600 Ω
Source voltage U_q*	—	13 V ≤ U_q ≤ 30 V
Measuring error	< 0.1 % of measured value	
Resolution	0.4 µA per digit	
Insulation	The current output and digital outputs are electrically isolated.	

* Source voltage U_q depends on the load R_B and must be within the permissible range.

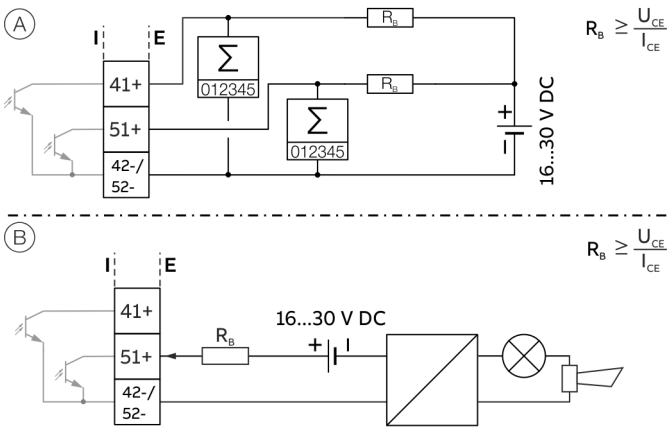
For information on communication via the HART protocol, refer to **HART® Communication** on page 65.

… Electrical connections

… Electrical data for inputs and outputs

Digital output 41 / 42, 51 / 52 (basic device)

Can be configured as pulse, frequency or binary output via on-site software.



(A) Digital output 41 / 42, 51 / 52 passive as a pulse or frequency output

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

Figure 48: (I = internal, E = external, R_B = load)

Pulse / frequency output (passive)	
Terminals	41 / 42, 51 / 52
Output 'closed'	0 V ≤ U_{CEL} ≤ 3 V For f < 2.5 kHz: 2 mA < I_{CEL} < 30 mA For f > 2.5 kHz: 10 mA < I_{CEL} < 30 mA
Output 'open'	16 V ≤ U_{CEH} ≤ 30 V DC 0 mA ≤ I_{CEH} ≤ 0.2 mA
f_{max}	10.5 kHz
Pulse width	0.05 to 2000 ms

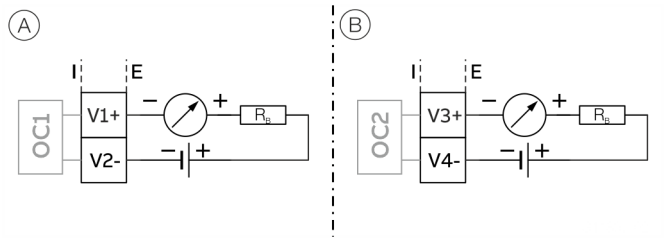
Binary output (passive)	
Terminals	41 / 42, 51 / 52
Output 'closed'	0 V ≤ U_{CEL} ≤ 3 V 2 mA ≤ I_{CEL} ≤ 30 mA
Output 'open'	16 V ≤ U_{CEH} ≤ 3 V DC 0 mA ≤ I_{CEH} ≤ 0.2 mA
Switching function	Can be configured using software.

Note

- Terminals 42 / 52 have common grounding. Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other. An electrically isolated digital output can be made using a plug-in module.
- If using a mechanical counter, it is advisable to set a pulse width of ≥ 30 ms and a maximum frequency of f_{max} ≤ 3 kHz.

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

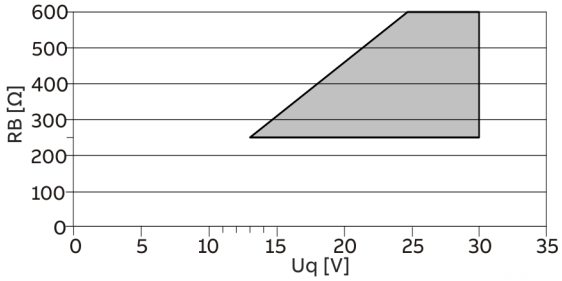
Up to two additional plug-in modules can be implemented via the 'Passive current output (red)' option module.



(A) Current output V1 / V2, passive (B) Current output V3 / V4, passive

Figure 49: (I = internal, E = external, R_B = load)

The plug-in module can be used in slot OC1 and OC2.



Permissible source voltage U_q for passive outputs in relation to load resistance R_B where Imax = 22 mA. ▒▒▒ = Permissible range

Figure 50: Source voltage for passive outputs

Passive current output	
Terminals	V1 / V2, V3 / V4
Output signal	4 to 20 mA
Load R_B	250 Ω ≤ R_B ≤ 600 Ω
Source voltage U_q*	13 V ≤ U_q ≤ 30 V
Measuring error	< 0.1 % of measured value
Resolution	0.4 µA per digit

* The source voltage U_q is dependent of the load R_B and must be placed in an additional area.

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

The 'digital output passive (green)' plug-in card can be used to create **one** additional binary output.

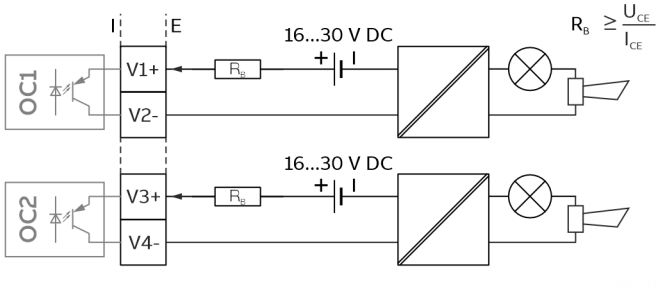


Figure 51: Plug-in card as binary output (I = internal, E = external, R_B = load)

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

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

Note

I_{CEL} < 30 mA; Rb = U_{CEH} / I_{CEL}

- Rb depends in the inner resistance of the DCS Input Card. Rb must be installed in case the inner resistance of the DCS Input Card does not limit I_{CE} to max. 30 mA.
- With the NAMUR switch set to 'On' Rb is not required.

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

A digital input can be implemented via the 'Passive digital input (yellow)' plug-in card.

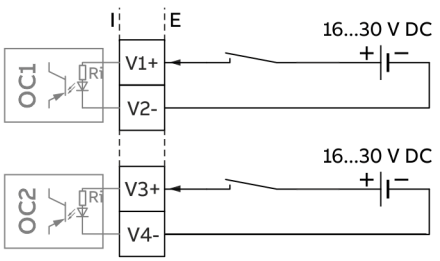


Figure 52: Plug-in card as digital input (I = internal, E = external)

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

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

… Electrical connections

… Electrical data for inputs and outputs

24 V DC loop power supply (plug-in card)

Use of the 'loop power supply (blue)' plug-in card allows a passive output on the transmitter to be used as an active output. See also **Connection examples** on page 63.

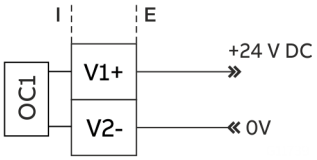


Figure 53: (I = Internal, E = External)

The plug-in card can only be used in slot OC1.

Loop power supply 24 V DC	
Terminals	V1 / V2
Function	For active connection of passive outputs
Output Voltage	24 V DC at 0 mA,
	17 V DC at 25 mA
Load rating I_{max}	25 mA, permanently short circuit-proof

Note

If the device is used in potentially explosive atmospheres, the plug-in card for the loop power supply may only be used to supply a passive output. It is not allowed, to connect it to multiple passive outputs!

Modbus® / PROFIBUS DP/PA® interface V1 / V2 (plug-in card)

A Modbus or PROFIBUS DP/PA interface can be implemented by using the 'Modbus RTU, RS485 (white)' or 'PROFIBUS DP, RS485 (white)' or 'PROFIBUS PA, RS485 (blue) plug-in cards.

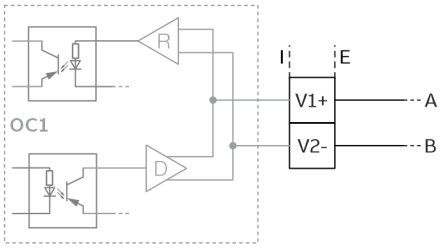


Figure 54: Plug-in card as a Modbus / PROFIBUS DP/PA interface (I = internal, E = external)

The corresponding plug-in card can only be used in slot OC1.

For information on communication through the Modbus or PROFIBUS DP/PA protocols, refer to chapters **Modbus® communication** on page 65 or **PROFIBUS DP® communication** on page 66 or **Bus topology** on page 68.

PROFIBUS PA connection via M12-Plug

Only in non-hazardous areas!

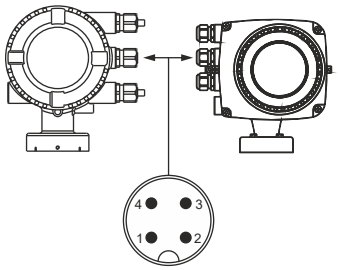


Figure 55: Pin assignment* PROFIBUS PA M12-Plug (option)

Pin assignment*	
Pin	**Function**
1	PA+
2	Not connected
3	PA–
4	Shield

* Front view showing pin insert and pins

Connection examples

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

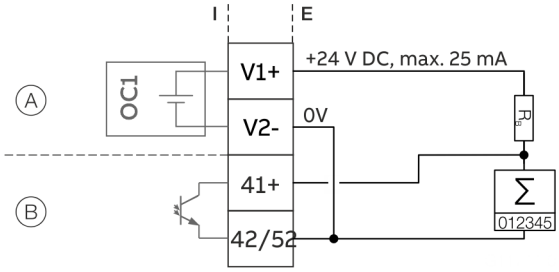
Digital output 41 / 42, 51 / 52, V3 / V4 active

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

Note

Each 'loop power supply (blue)' plug-in card must only power one output.

It must not be connected to two outputs (for example digital output 41 / 42 and 51 / 52)!

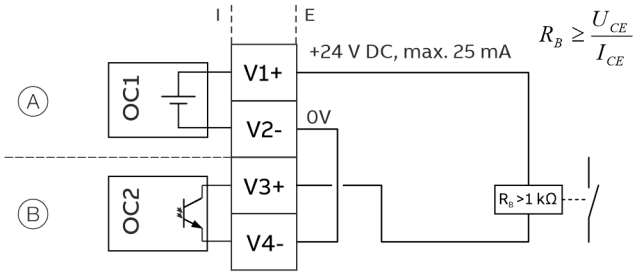


Ⓐ 'Loop power supply (blue)' plug-in card in slot 1

Ⓑ Digital output, digital output 41 / 42

Figure 56: Active digital output 41 / 42 (example)

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

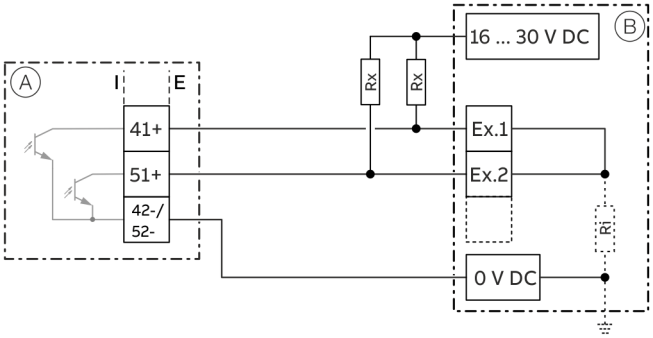


Ⓐ 'Loop power supply (blue)' plug-in card in slot 1

Ⓑ 'Digital output (green)' plug-in card in slot 2

Figure 57: Active digital output V3 / V4 (example)

Digital output 41 / 42, 51 / 52 passive on distributed control system



Ⓐ Transmitter

Ⓑ Distributed control system / Memory programmable controller

Ex. 1 Input 1

Ex. 2 Input 2

R_X Resistor for current limitation

R_I Distributed control system internal resistance

Figure 58: Digital output 41 / 42 on distributed control system (example)

The R_X resistors limit the maximum current through the optoelectronic coupler of the digital outputs in the transmitter.

The maximum permissible current is 25 mA. An R_X value of 1000 Ω / 1 W is recommended at a voltage level of 24 V DC.

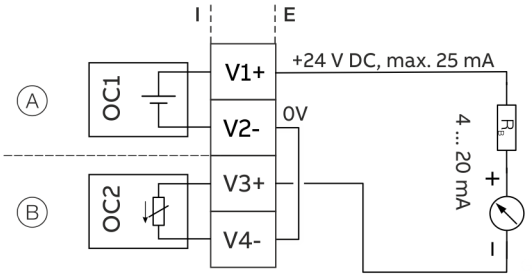
The input on the distributed control system is reduced from 24 V DC to 0 V DC (falling edge) with '1' at the digital output.

… Electrical connections

… Electrical data for inputs and outputs

Current output V3 / V4 active

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



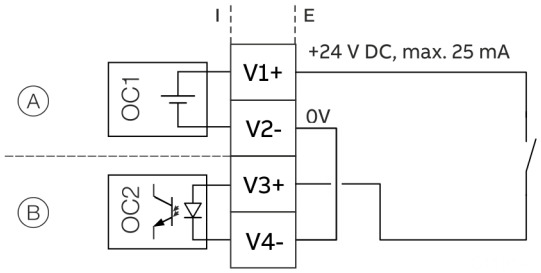
(A) 'Loop power supply (blue)' plug-in card in slot 1

(B) 'Passive current output (red)' plug-in card in slot 2

Figure 59: Active current output V3 / V4 (example)

Digital input V3 / V4 active

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



(A) 'Loop power supply (blue)' plug-in card in slot 1

(B) 'Passive digital input (yellow)' plug-in card in slot 2

Figure 60: Active digital output V3 / V4 (example)

Connection versions digital output 41 / 42, 51 / 52

Depending on the wiring of digital outputs DO 41 / 42 and 51 / 52, they can be used parallel or only individually. The electrical isolation between the digital outputs also depends on the wiring.

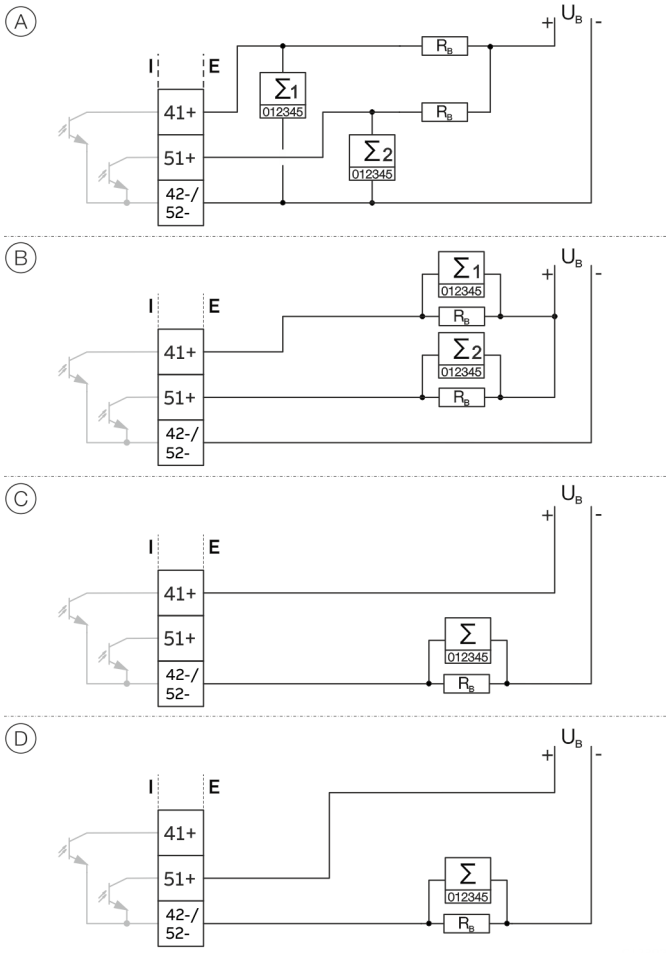


Figure 61: Connection versions digital output 41 / 42 and 51 / 52

	DO 41 / 42 and 51 / 52 can be used parallel	DO 41 / 42 and 51 / 52 electrically isolated
(A)	Yes	No
(B)	Yes	No
(C)	No, only DO 41 / 42 can be used	No
(D)	No, only DO 51 / 52 can be used	No

Digital communication

HART® Communication

Note
The HART® protocol is an unsecured protocol (in terms of IT and cyber security), as such the intended application should be assessed to ensure that this protocol is suitable before implementation.

In connection with the DTM (Device Type Manager) available to the device, communication (configuration, parameterization) can be carried out FDT 0.98 or 1.2.
Other tool or system integrations (e.g. Emerson AMS / Siemens PCS7) on request.

The necessary DTMs and other files can be downloaded from www.abb.com/flow.

HART output	
Terminals	Active: Uco / 32 Passive: 31 / 32
Protocol	HART 7.1
Transmission	FSK modulation on current output 4 to 20 mA in accordance with the Bell 202 standard
Baud rate	1200 baud
Signal amplitude	Maximum 1.2 mAss

Factory setting of the HART process variables	
HART process variable	**Process value**
Primary Value (PV)	Volume Flow in %
Secondary Value (SV)	Massflow in %
Tertiary Value (TV)	Volumeflow Totalizer Forward
Quaternary Value (QV)	Volumeflow Totalizer Reverse

The process values of the HART variables can be set in the device menu.

Modbus® communication

Note
The Modbus® protocol is an unsecured protocol (in terms of IT and cyber security), as such the intended application should be assessed to ensure that this protocol is suitable before implementation.

Modbus is an open standard owned and administrated by an independent group of device manufacturers styled the Modbus Organization (www.modbus.org/).
Using the Modbus protocol allows devices made by different manufacturers to exchange information via the same communication bus, without the need for any special interface devices to be used.

Modbus protocol	
Terminals	V1 / V2
Configuration	Via the Modbus interface or via the local operating interface in connection with a corresponding Device Type Manager (DTM)
Transmission	Modbus RTU - RS485 serial connection
Baud rate	2400, 4800, 9600, 19200, 38400, 56000, 57600, 115200 baud Factory setting: 9600 baud
Parity	None, even, odd Factory setting: odd
Stop bit	One, two Factory setting: One
IEEE format	Little endian (LSB first), Big endian (MSB first) Factory setting: Big endian
Typical response time	< 100 ms
Response delay time	0 to 200 ms Factory setting: 10 ms

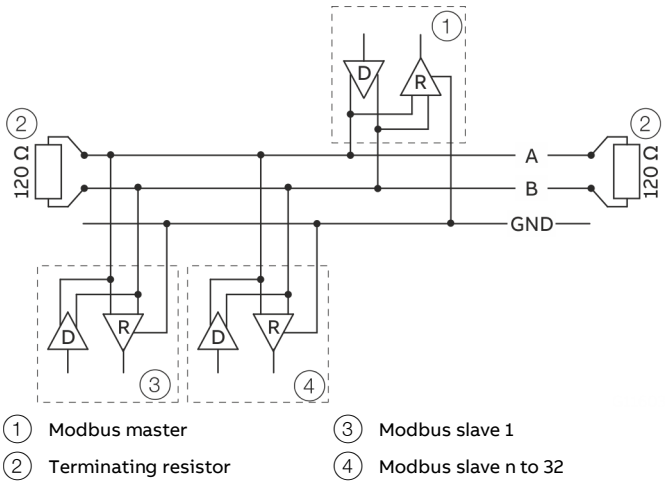


Figure 62: Communication via Modbus protocol

… Digital communication

… Modbus® communication

Cable specification

The maximum permissible length is dependent on the baud rate, the cable (diameter, capacity and surge impedance), the number of loads in the device chain, and the network configuration (2-core or 4-core).

- At a baud rate of 9600 and with a conductor cross-section of at least 0.14 mm^2 (AWG 26), the maximum length is 1000 m (3280 ft).
- When using a 4-core cable as a 2-wire wiring system, the maximum length must be halved.
- The spur lines must be short, a maximum of 20 m (66 ft).
- When using a distributor with 'n' connections, each branch must have a maximum length of 40 m (131 ft) divided by 'n.'

The maximum cable length depends on the type of cable used. The following standard values apply:

- Up to 6 m (20 ft):
  cable with standard shielding or twisted-pair cable.
- Up to 300 m (984 ft):
  double twisted-pair cable with overall foil shielding and integrated earth cable.
- Up to 1200 m (3937 ft):
  double twisted-pair cable with individual foil shielding and integrated earth cables. Example: Belden 9729 or equivalent cable.

A category 5 cable can be used for Modbus RS485 up to a maximum length of 600 m (1968 ft). For the symmetrical pairs in RS485 systems, a surge impedance of more than 100 Ω is preferred, especially at a baud rate of 19200 and above.

PROFIBUS DP® communication

Note

The PROFIBUS DP® protocol is an unsecured protocol (in terms of IT and cyber security), as such the intended application should be assessed to ensure that this protocol is suitable before implementation.

PROFIBUS DP interface	
Terminals	V1 / V2
Configuration	Via the PROFIBUS DP interface or via the local operating interface in connection with a corresponding Device Type Manager (DTM)
Transmission	Based on IEC 61158-2
Baud rate	9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps The baud rate is automatically detected and does not need to be configured manually
Device profile	PA Profile 3.02
Bus address	Address range 0 to 126 Factory setting: 126
Number of DP nodes	≤ 32, Node = Devices with / without PROFIBUS address
Bus termination	Bus termination required at the beginning and end of each DP segment!

For commissioning purposes, you will need a device driver in EDD (Electronic Device Description) or DTM (Device Type Manager) format plus a GSD file.

You can download EDD, DTM and GSD from www.abb.com/flow.

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

ABB provides three different GSD files which can be integrated in the system.

ID number	GSD file name	
0x9740	PA139740.gsd	1xAI, 1xTOT
0x9700	PA139700.gsd	1AI
0x3432	ABB_3432.gsd	6xAI, 2xTOT, 1xAO, 1xDI, 1xDO

Users decide at system integration whether to install the full range of functions or only part. Switching is made using the 'Ident Nr. Selector' parameter.

See also Parameter description in the operating instruction.

General Information

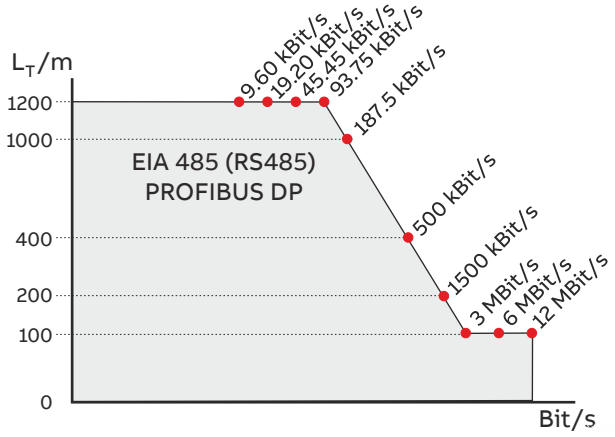


Figure 63: Bus cable length depends on the transmission rate

Pro PROFIBUS Line

(Line = Starts at DP Master and goes to last DP/PA Slave)

- Approximately 4 to 8 DP segments through the repeater (see repeater data sheets)
- Recommended DP transfer rate 500 to 1500 kBit/s
- The slowest DP node determines the transfer rate of the DP line
- Number of PROFIBUS DP and PA nodes ≤ 126 (addresses 0 to 125)

Per PROFIBUS DP segment

- Number of DP nodes ≤ 32
  (Node = Devices with / without PROFIBUS address)
- Bus termination required at the beginning and end of each DP segment!
- Trunk cable length (L_T) see diagram (length dependent on transfer rate)
- Cable length of at least 1 m between two DP nodes at ≥ 1500 kBit/s!
- Spur cable length (L_S), at ≤ 1500 kBit/s: LS ≤ 0.25 m, at > 1500 kBit/s: LS = 0.00 m!
- At 1500 kBit/s and ABB DP cable type A:
  - Sum of all spur cable lengths (L_S) ≤ 6.60 m, trunk cable length (L_T) > 6.60 m, total length = L_T+ (Σ L_S) ≤ 200 m, maximum 22 DP nodes (= 6.60 m / (0.25 m + 0.05 m spare))

PROFIBUS PA® communication

Note

The PROFIBUS PA® protocol is an unsecured protocol (in terms of IT and cyber security), as such the intended application should be assessed to ensure that this protocol is suitable before implementation.

PROFIBUS PA interface	
Terminals	V1 (PA+) / V2 (PA–)
Configuration	Via Device HMI or PROFIBUS PA-DTM or FDI package
Transmission	Based on IEC 61158-2
Device profile	The interface conforms to profile 3.02 (PROFIBUS standard, EN 50170, DIN 19245 [PRO 91])
PROFIBUS PA ID no	0x3438
Alternative standard ID no	0x9700 or 0x9740
Bus 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 be within 9 to 32 V DC

Short circuit protection / reverse polarity protection

The Device Terminals V1 and V2, Profibus connects to, are short-circuit protected and have a reverse polarity protection.

System integration

ABB provides three different GSD files which can be integrated in the system.

ID number	**GSD file name**
0x9700	PA139700.gsd
0x9740	PA139740.gsd
0x3438	ABB_3438.gsd

Users decide at system integration whether to install the full range of functions or only part. Switching is made using the ‘Ident Nr. Selector’ parameter.

See also Parameter description in the operating instruction.

You can download the GSD files from www.abb.com/flow.

For additional information, see separate interface documentation.

EtherNet/IP™ and PROFINET® communication

Standard Ethernet 10/100 BASE-T/TX (IEEE802.3)
Connection via twisted-pair cable (Cat. 5-cable).

With the standard Ethernet plug-in card, the transmitter features 2 Ethernet connections.
The network can be implemented using the ring, star or daisy chain topology.

In addition to the standard Ethernet plug-in card, a plug-in card for 'Power over Ethernet' is available.
Using this card, the 24 V DC version of the flowmeter can be operated via PoE without any additional power supply.

Note
You will find detailed information regarding the "Ethernet interface" in the interface description "COM/FEP630/FEH630/E/MB".

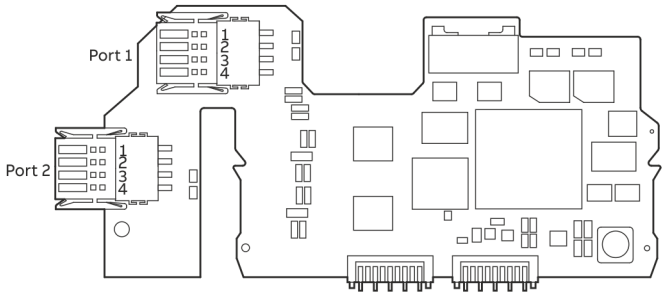


Figure 64: Plug-in card for standard Ethernet communication

Single port connection without Power over Ethernet

Standard Ethernet 10/100 BASE-T/TX (IEEE802.3) Single port connection.

Terminal designation:

Connection	Pin	Function	Color codes
1	Pin 1	RD+	White / Orange
	Pin 2	RD–	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD–	Green

Single port connection with Power over Ethernet

Standard Ethernet 10/100 BASE-T/TX (IEEE802.3) Single port connection.

Terminal designation:

Connection	Pin	Function	Color codes
1	Pin 1	RD+	White / Orange
	Pin 2	RD–	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD–	Green
2	Pin 1	PWR+	White / Blue
	Pin 2	PWR+	Blue
	Pin 3	PWR–	White / Brown
	Pin 4	PWR–	Brown

Dual port connection without Power over Ethernet

Terminal designation:

Connection	Pin	Function	Color codes
1	Pin 1	RD+	White / Orange
	Pin 2	RD–	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD–	Green
2	Pin 1	RD+	White / Orange
	Pin 2	RD–	Orange
	Pin 3	TD+	White / Green
	Pin 4	TD–	Green

… Digital communication

… EtherNet/IP™ and PROFINET® communication

Ethernet APL™ interface V1 / V2 (plug-in card)

An Ethernet APL interface can be implemented using the 'Ethernet APL (yellow)' plug-in cards.

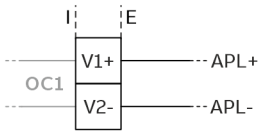


Figure 65: Plug-in card as an Ethernet APL interface (I = internal, E = external)

The corresponding plug-in card can only be used in slot OC1.

Properties of the Ethernet APL interface

- 10 Mbit/s full duplex, 2-wire Ethernet based on IEEE 802.3cg 10BASE-T1L.
- System integration with PROFINET®, Modbus TCP®, Webserver.
- Reliability, long-term stability, high precision and advanced diagnostic functions in critical processes
- APL port classification: SLAA (Spur, Power Load, Power Class: A, intrinsic safety IP rating: A)

Ethernet APL interface	
Terminals	V1 (APL+) / V2 (APL−)
APL Power Class	Power Load, Power Class A
Supply voltage	9 to 15 V DC
Power consumption	540 mW

EtherNet/IP™ and PROFINET® protocol

Note

The EtherNet/IP™ or PROFINET® protocols are unsecured protocols (in terms of IT or cyber security), as such the intended application should be assessed to ensure that these protocols are suitable before implementation.

The EtherNet/IP and PROFINET protocol supports cyclic communication. Process Variables, Diagnostic Data and Device Status Information can be accessed cyclically.

With PROFINET communication, the DHCP (**D**ynamic **H**ost **C**onfiguration **P**rotocol) function is not supported and PROFINET DCP (**D**iscovery and **C**onfiguration **P**rotocol) is used instead.

For Device Configuration a Webserver is available providing full access to all parameter and diagnostic data.

EtherNet/IP Interface	
Available for	Standard Ethernet communication
Configuration	Through the Webserver or the local operating Interface (Display).
EtherNet / IP ProductCode	5002
EDS file	FEW530_FEPFEH630_01_01.eds
Device profile	Profile 0x43, Generic Device, (keyable).
Supporte standards and protocols	Common Industrial Protocol (CIP™) Vol1, Ed 3.25
	EtherNet/IP™ Adaptation of CIP™, Vol2, Ed 1.23
Cable	Cat 5

PROFINET Interface	
Available for	• Standard Ethernet communication • Ethernet APL™ communication
Configuration	Through the Webserver or the local operating Interface (Display).
Device profile	PA Profile 4.01 Specification
GSDML File	GSDML-V2.42-ABB_001A-3437_FLOW_EL_MAGNETIC-20220713.xml
GSD File	ABB 0x3437 or PNO 0xB332
Supporte standards and protocols	Common Industrial Protocol (CIP™) Vol1, Ed 3.25
	EtherNet/IP™ Adaptation of CIP™, Vol2, Ed 1.23
	PROFINET PNIO_Version V2.42

Further communication protocols

Note

The device supports following security modes:

Secured Protocols	**Unsecured protocols**
Webserver https	**EtherNet/IP, Modbus TCP and PROFINET**
• Used ports by Webserver: TCP 443 • Security is based on .x509 Certificates	• Used ports by EtherNet/IP: TCP 44818, UDP 2222 • Used ports by Modbus/TCP: TCP 502 • Used ports by PROFINET: UDP 34964, 49152

All protocols can be enabled / disabled in the HMI Menu.

Ethernet-APL™ network topology

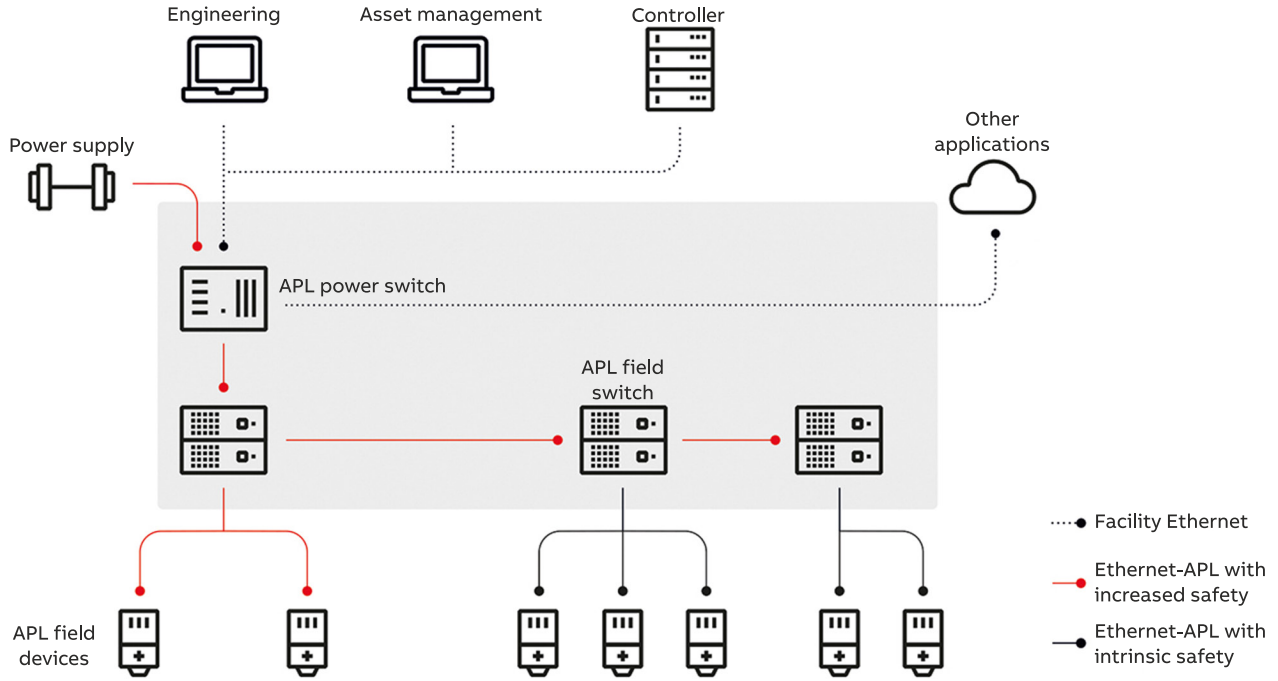


Figure 66: Exemplary Ethernet-APL topology

Ethernet APL is designed to support various installation topologies with optional redundancy or fail-safe concepts and trunk-and-spur.

The trunk line provides high power and signal levels for long cable lengths of up to 1000 m (3281 feet).

The spur line, on the other hand, is equipped with lower power and optional intrinsic safety for lengths of up to 200 m (656 feet).

Ethernet APL explicitly specifies only point-to-point connections, where each connection between communication partners represents a segment. Ethernet APL switches therefore isolate communication between the segments.

The implemented Ethernet APL field switch/device must be certified for use in the designated explosion protection zone.

You can find more network topologies that can be used in potentially explosive atmospheres in the 'Ethernet-APL Engineering Guideline'. See www.ethernet-apl.org for additional information.

Connection to an SPE Switch (Single Pair Ethernet)
Outside of potentially explosive atmospheres, the device can be connected to a suited SPE field switch.

The device can be connected to an SPE field switch with a maximum voltage of 30 V DC and a minimum output of 1.85 watts.

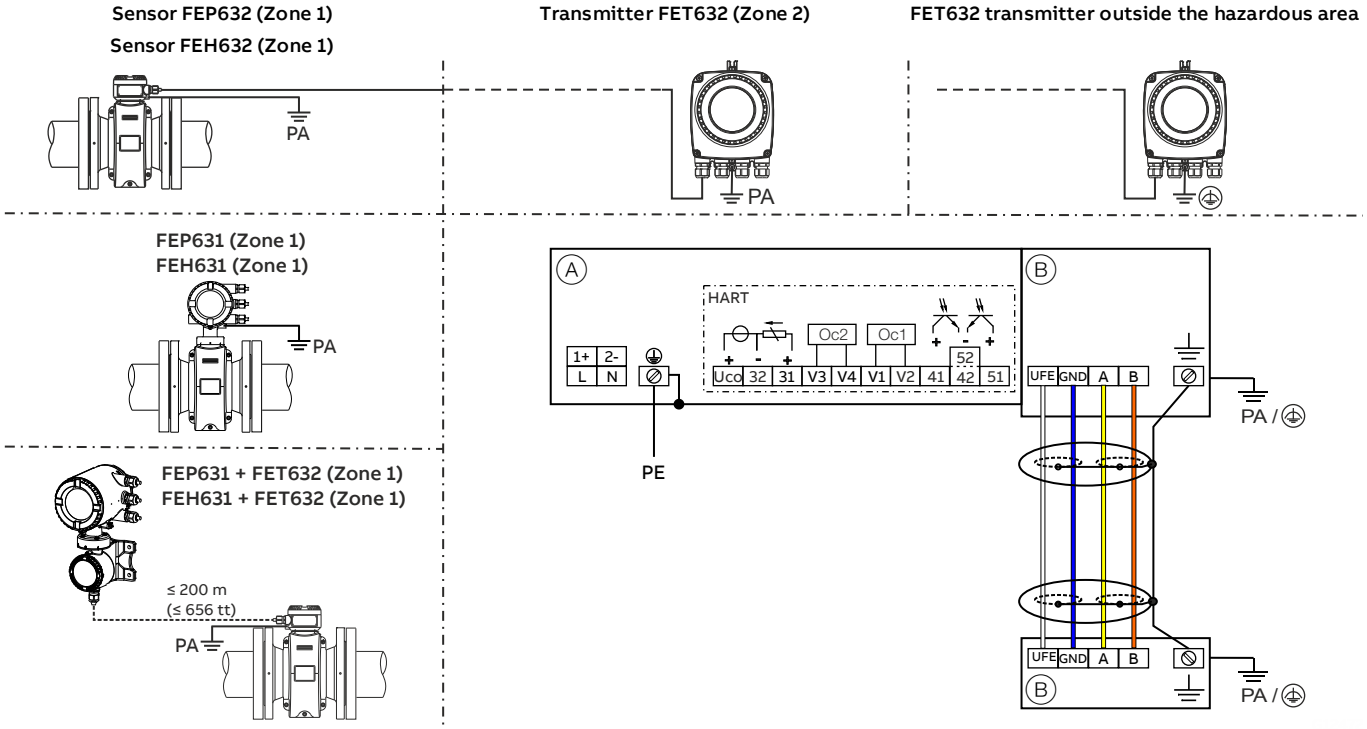
The SPE field switch must support the 10BASE-T1L Standard and the PoDL power classes 10, 11 or 12 as well detect SPE field devices without an integrated PoDL module (without handshake).

Ethernet APL cable specifications

- Symmetrical, shielded twisted-pair cable with a characteristic impedance of 100 Ω, ±20 % and a frequency range of 100 kHz to 20 Mhz, such as the PROFIBUS PA cable.
- Wire cross-section 0.14 to 2.5 mm^2 (26 to 14 AWG), either as a solid wire conductor or a strand.
- The outside diameter of the cable must be from 6 to 12 mm (0.24 to 0.47in) to guarantee the seal integrity required in the cable gland.
- The reference cable type is the fieldbus cable type A, MAU type 1 and 3 specified in IEC 61158-2.
  This cable meets the requirements for intrinsically safe applications as described in IEC TS 60079-47, but can also be used in non-intrinsically safe applications.

Operation in Zone 1, 21

Electrical connections



Ⓐ Transmitter

Ⓑ Sensor

Figure 67: Electrical connections

Note

For detailed information about grounding the transmitter and the flowmeter sensor, please refer to chapter ‘Grounding’ in the Commissioning instruction or the operating instruction.

Connections for the power supply

AC power supply	
Terminal	**Function / comments**
L	Phase
N	Neutral conductor
PE / ⏚	Protective earth (PE)
⏚	Functional earth / shielding

DC voltage supply	
Terminal	**Function / comments**
1+	+
2–	–
PE / ⏚	Protective earth (PE)
⏚	Functional earth / shielding

Connections for inputs and outputs

Terminal	**Function / comments**
Uco / 32	**Current output 4 to 20 mA- / HART output, active**
	or
31 / 32	**Current output 4 to 20 mA- / HART output, passive**
41 / 42	**Passive digital output DO1**
51 / 52	**Passive digital output DO2**
V1 / V2	**Plug-in card, slot OC1**
V3 / V4	**Plug-in card, slot OC2**
	Plug-in cards may not be retrofitted in devices with explosion protection on-site – loss of Ex Approval.

Optional plug-in cards
See **Optional plug-in cards** on page 55.

Configuring the current output
Current output terminals 31 / 32 / Uco can be operated on-site in active or passive mode through appropriate switching.

Terminal Uco / 32	Current output 4 to 20 mA- / HART output, active
Terminal 31 / 32	Current output 4 to 20 mA- / HART output, passive

Configuring the digital outputs
In the case of the device version suited for operation in Ex Zone 1 (dual-compartment housing), digital outputs DO1 (41 / 42) and DO2 (51 / 52) can be configured for connection to a NAMUR switching amplifier.
On leaving the factory, the device is configured with the standard wiring (non-NAMUR).

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

Special connection conditions
The output circuits are designed so that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits.
- Combining intrinsically safe and non-intrinsically safe circuits is not permitted.
- On intrinsically safe circuits, potential equalization should be established along the entire length of the cable used for the signal outputs.
- The rated voltage of the non-intrinsically safe circuits is U_M = 30 V.
- Intrinsic safety is preserved If the rated voltage U_M = 30 V is not up-scaled when connections are established to non-intrinsically safe external circuits.

Electric data for operation in Zone 1, 21

Devices with HART protocol
When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter.
Current output terminals 31 / 32 / Uco can be operated on-site in active or passive mode through appropriate switching.

Model: FEP631, FEH631 or FET632	Type of protection													
Outputs on basic device	'e' / 'XP'		'ia' / 'IS'											
	U_M [V]	I_M [A]	U_O	U_I [V]	I_O [mA]	I_I [mA]	P_O [mW]	P_I [mW]	C_O [nF]	C_I [nF]	C_{OPA} [nF]	C_{IPA} [nF]	L_O [mH]	L_I [mH]
Current / HART output 31 / U_{CO}, active Terminals 31 / U_{CO}	30	0.2	30	30	115	115	815	815	10	10	5	5	0.08	0.08
Current / HART output 31 / 32, passive Terminals 31 / 32	30	0.2	—	30	—	115	—	815	—	27	—	5	0.08	0.08
Digital output 41 / 42, active* Terminals 41 / 42 and V1 / V2*	30	0.1	27.8	30	119	30	826	225	20	20	29	29	0.22	0.22
Digital output 41 / 42, passive Terminals 41 / 42	30	0.1	—	30	—	30	—	225	—	27	—	5	—	0.08
Digital output 51 / 52, active* Terminals 51 / 52 and V1 / V2*	30	0.1	27.8	30	119	30	826	225	20	20	29	29	0.22	0.22
Digital output 51 / 52, passive Terminals 51 / 52	30	0.1	—	30	—	30	—	225	—	27	—	5	—	0.08

All outputs are electrically isolated from each other and from the power supply.
Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other. Terminals 42 / 52 have the same potential.

… Operation in Zone 1, 21

… Electric data for operation in Zone 1, 21

Model: FEP631, FEH631 or FET632	**Type of protection**													
Inputs and outputs with optional plug-in cards	**'e' / 'XP'**		**'ia' / 'IS'**											
	U_M [V]	**I_M [A]**	**U_O**	**U_I [V]**	**I_O [mA]**	**I_I [mA]**	**P_O [mW]**	**P_I [mW]**	**C_O [nF]**	**C_I [nF]**	**C_{OPA} [nF]**	**C_{IPA} [nF]**	**L_O [mH]**	**L_I [mH]**
Current output V3 / V4, active* Terminals V3 / V4 and V1 / V2*	30	0.1	27.8	30	119	30	826	225	29	29	117	117	0.4	0.4
Current output V1 / V2, passive** **Current output V3 / V4, passive**** Terminals V1 / V2** or V3 / V4**	30	0.1	—	30	—	68	—	510	—	45	—	59	—	0.27
Digital output V3 / V4, active* Terminals V3 / V4 and V1 / V2*	30	0.1	27.8	30	119	68	826	225	17	17	31	31	0.4	0.4
Digital output V1 / V2, passive** **Digital output V3 / V4, passive**** Terminals V1 / V2** or V3 / V4**	30	0.1	—	30	—	30	—	225	—	13	—	16	—	0.27
Digital input V3 / V4, active* Terminals V3 / V4 and V1 / V2	30	0.1	27.8	30	119	3.45	826	25.8	17	17	31	31	0.4	0.4
Digital input V1 / V2, passive* **Digital input V3 / V4, passive*** Terminals V1 / V2** or V3 / V4**	30	0.1	—	30	—	3.45	—	25.8	—	13	—	16	—	0.27
Modbus Card (RTU) Terminals V1 / V2	30	0.1	4.2	4.2	150	150	150	150	5300	5300	0.06	0.06	0.09	0.09
PROFIBUS DP Terminals V1 / V2	30	0.1	4.2	4.2	150	150	150	150	5300	5300	0.06	0.06	0.09	0.09
PROFIBUS PA (Non-FISCO) Terminals V1 / V2	30	0.38	—	30	—	100	—	815	—	4	—	—	0	0.008
PROFIBUS PA (FISCO) Terminals V1 / V2	—	—	—	17.5	—	380	—	5320	—	4	—	—	0	0.008

* Only in conjunction with additional '24 V DC loop power supply (blue)' plug-in card in slot OC1.

** The terminal assignment depends on the model number or the slot assignments. For connection examples, refer to **Installation** in the operating instruction.

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

Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631



Nominal diameter	Design	Temperature class	Ambient temperature (−40 °C)* −20 °C to +40 °C	Ambient temperature (−40 °C)* −20 °C to +50 °C	Ambient temperature (−40 °C)* −20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	80°C
	HT		80°C	80°C	80°C

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)
HT high-temperature version, T_{medium} maximum 180 °C (356 °F)
Thermally uninsulated: the sensor is not enclosed with pipe insulation material.
Thermally insulated: the sensor is enclosed with pipe insulation material.

Note
Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 60 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 70 °C

… Operation in Zone 1, 21

… Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632



Nominal diameter	Design	Temperature class	Ambient temperature (−40 °C)* −20 °C to +40 °C	Ambient temperature (−40 °C)* −20 °C to +50 °C	Ambient temperature (−40 °C)* −20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	80°C
	HT		80°C	80°C	80°C

* Low-temperature version (option)

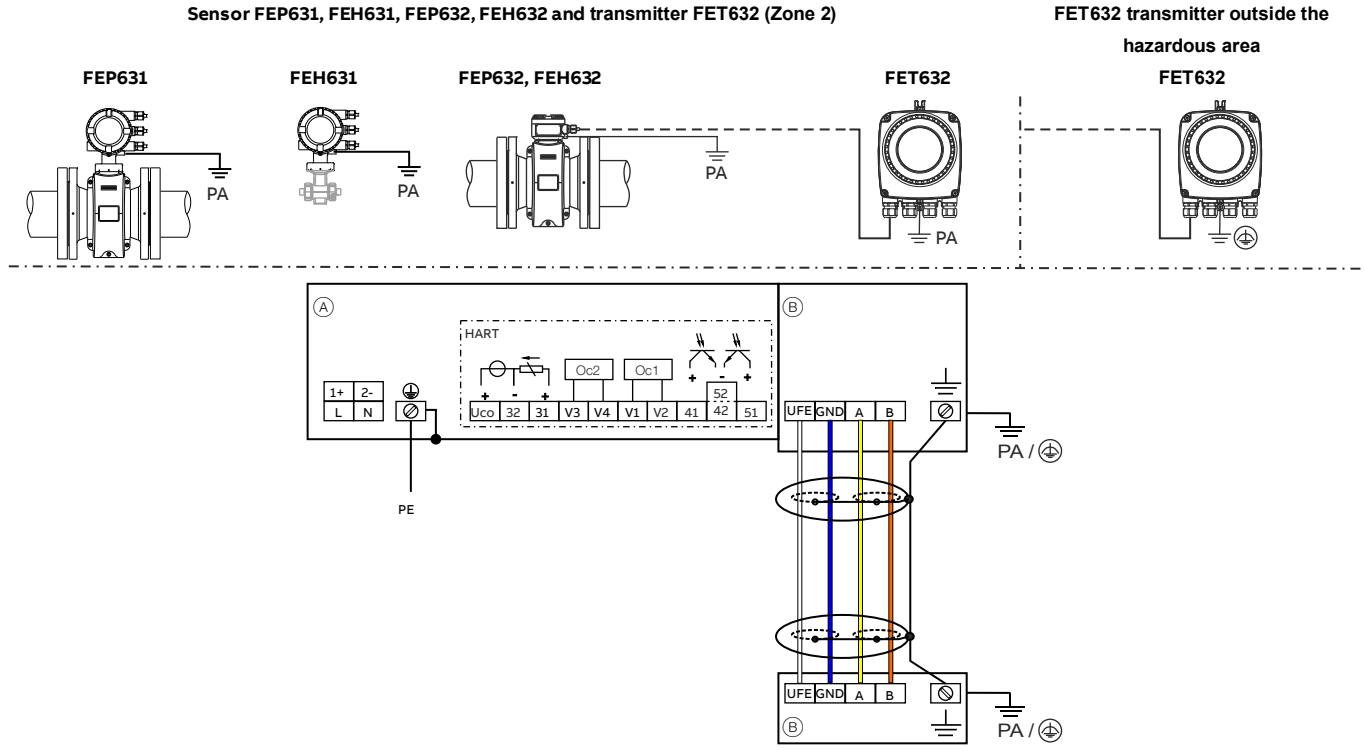
NT standard version, T_{medium} maximum 130 °C (266 °F)
HT high-temperature version, T_{medium} maximum 180 °C (356 °F)
Thermally uninsulated: the sensor is not enclosed with pipe insulation material.
Thermally insulated: the sensor is enclosed with pipe insulation material.

Note
Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 80 °C

Operation in Zone 2, 22

Electrical connections



Ⓐ Transmitter

Ⓑ Sensor

Figure 68: Electrical connections

Note

For detailed information about grounding the transmitter and the flowmeter sensor, please refer to chapter 'Grounding' in the Commissioning instruction or the operating instruction.

Connections for the power supply

AC power supply	
Terminal	**Function / comments**
L	Phase
N	Neutral conductor
PE / ⏚	Protective earth (PE)
⏚	Functional earth / shielding

DC voltage supply	
Terminal	**Function / comments**
1+	+
2–	–
PE / ⏚	Protective earth (PE)
⏚	Functional earth / shielding

Connections for inputs and outputs

Terminal	**Function / comments**
Uco / 32	**Current output 4 to 20 mA- / HART output, active**
	or
31 / 32	**Current output 4 to 20 mA- / HART output, passive**
41 / 42	**Passive digital output DO1**
51 / 52	**Passive digital output DO2**
V1 / V2	**Plug-in card, slot OC1**
V3 / V4	**Plug-in card, slot OC2**
	Plug-in cards may not be retrofitted in devices with explosion protection on-site – loss of Ex Approval.

Connecting the signal cable

Only for remote mount design.

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

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

… Operation in Zone 2, 22

… Electrical connections

Special connection conditions

Note

The AS plug-in card (24 V DC loop power supply) may only be used to power the internal inputs and outputs on the device. It must not be used to power external circuits!

Note

If the protective earth (PE) is connected in the flowmeter's terminal box, you must ensure that no dangerous potential difference can arise between the protective earth (PE) and the potential equalization (PA) in areas with explosion risk.

Note

For devices with a power supply of 16 to 30 V DC, on-site external overvoltage protection must be provided.
It must be ensured that the overvoltage is limited to 140 % (= 42 V DC) of the maximum operating voltage.

Electrical data for operation in Zone 2, 22

Devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter.
Current output terminals 31 / 32 / Uco can be operated on-site in active or passive mode through appropriate switching.

Model: FEP631, FEH631 or FET632

Outputs on basic device	**Operating values (general)**		**Type of protection – 'nA' / 'NI' / 'ec'**	
	U_N	I_N	U_N	I_N
Current / HART output 31 / UCO, active Terminals 31 / UCO	30 V	30 mA	30 V	30 mA
Current / HART output 31 / 32, passive Terminals 31 / 32	30 V	30 mA	30 V	30 mA
Digital output 41 / 42, passive Terminals 41 / 42	30 V	25 mA	30 V	25 mA
Digital output 51 / 52, passive Terminals 51 / 52	30 V	30 mA	30 V	30 mA
Digital output 41 / 42, active* Terminals 41 / 42 and V1 / V2*	30 V	30 mA	30 V	30 mA
Digital output 51 / 52, active* Terminals 51 / 52 and V1 / V2*	30 V	30 mA	30 V	30 mA

* Only in conjunction with additional '24 V DC loop power supply (blue)' plug-in card in slot OC1.

All outputs are electrically isolated from each other and from the power supply.
Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other. Terminals 42 / 52 have the same potential.

Model: FEP631, FEH631 or FET632

Plug-in cards	**Operating values (general)**		**Type of protection – 'nA' / 'NI' / 'ec'**	
	U_N	I_N	U_N	I_N
Current output, active* Terminals V3 / V4 and V1 / V2**	30 V	30 mA	30 V	30 mA
Current output, passive Terminals V1 / V2 or V3 / V4**	30 V	30 mA	30 V	30 mA
Digital output, active* Terminals V3 / V4 and V1 / V2**	30 V	25 mA	30 V	25 mA
Digital output, passive Terminals V1 / V2 or V3 / V4**	30 V	30 mA	30 V	30 mA
Digital input, active* Terminals V3 / V4 and V1 / V2**	30 V	3.45 mA	30 V	3.45 mA
Digital input, passive Terminals V1 / V2 or V3 / V4**	30 V	3.45 mA	30 V	3.45 mA
Modbus Card (RTU) Terminals V1/V2	30 V	30 mA	30 V	30 mA
Profibus DP card Terminals V1/V2	30 V	30 mA	30 V	30 mA
Profibus PA card **Terminals V1/V2**	32 V	30 mA	32 V	30 mA
Ethernet card Port 1: Pin X1 to X4 Port 2: Pin X5 to X8	57 V	417 mA	57 V	417 mA
Ethernet Card in conjunction with Power over Ethernet (POE Card) Port 1: Pin X1 to X4 Port 2: Pin X5 to X8	57 V	417 mA	57 V	417 mA

* Only in conjunction with additional '24 V DC loop power supply (blue)' plug-in card in slot OC1.

** The terminal assignment relates to the Option Card Slot. Slot 1 = Terminals V1/V2. Slot 2 = Terminal V3/V4. For more details, refer to Installation in the operating instruction.

… Operation in Zone 2, 22

Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631

Single-compartment housing



Dual- compartment housing



Nominal diameter	Design	Temperature class	Ambient temperature (−40 °C)* −20 °C to +40 °C thermally uninsulated, thermally insulated Gas & dust	Ambient temperature (−40 °C)* −20 °C to +50 °C thermally uninsulated, thermally insulated Gas & dust	Ambient temperature (−40 °C)* −20 °C to +60 °C thermally uninsulated, thermally insulated Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	Note: The data below does not apply to Flowmeters equipped with the plug-in card for Ethernet communication (model code DR6)!				
	NT	T5	95°C	95°C	40°C** —***
	HT		95°C	95°C	—
	NT	T6	80°C	—	—
	HT		80°C	—	—

* Low-temperature version (option)

** Single-compartment housing

*** Dual-compartment housing

NT standard version, T_{medium} maximum 130 °C (266 °F)
HT high-temperature version, T_{medium} maximum 180 °C (356 °F)
Thermally uninsulated: the sensor is not enclosed with pipe insulation material.
Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

With single-compartment housing

- At an ambient temperature of 50 °C the cable must be suited for at least 80 °C
- At an ambient temperature of 60 °C the cable must be suited for at least 90 °C

With dual-compartment housing

- At an ambient temperature of 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature of 60 °C the cable must be suited for at least 80 °C

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632



Nominal diameter	Design	Temperature class	Ambient temperature (−40 °C)* −20 °C to +40 °C thermally uninsulated, thermally insulated Gas & dust	Ambient temperature (−40 °C)* −20 °C to +50 °C thermally uninsulated, thermally insulated Gas & dust	Ambient temperature (−40 °C)* −20 °C to +60 °C thermally uninsulated, thermally insulated Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	40°C
	HT		80°C	80°C	20°C

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)
HT high-temperature version, T_{medium} maximum 180 °C (356 °F)
Thermally uninsulated: the sensor is not enclosed with pipe insulation material.
Thermally insulated: the sensor is enclosed with pipe insulation material.

Note
Cables for power supply, signal inputs and outputs must meet the following specifications:
- At an ambient temperature ≤ 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 80 °C

Use in areas exposed to combustible dust
When using the device in areas exposed to combustible dusts (dust ignition), the following points must be observed:
- The maximum surface temperature of the device may not up-scale the following values.
  FEP631; FEH631 80 °C (176 °F)
  FEP632; FEH632 80 °C (176 °F)
  FET632 80 °C (176 °F)
- The process temperature of the attached piping may up-scale 80 °C (176 °F).
- Approved dust-proof cable glands must be used when operating in Zone 21, 22 or in Class II, Class III.
- In potentially explosive atmospheres, the signal cable must measure at least 5 m (16.40 ft).

Ordering Information

ProcessMaster FEP631

Electromagnetic Flowmeter system, integral mount

ProcessMaster FEP631	7,8	9,10	11,12,13,14	... 94,95
Explosion Protection Certification				
Without, Flowmeter based on CE Standard	Y0			
ATEX / IECEx (Zone 1 / 21)	A1[1)]			
ATEX / IECEx (Zone 2 / 22)	A2			
cFMus Class 1 Div. 1 (Zone 1 / 21)[30)]	F1[1), 32)]			
cFMus Class 1 Div. 2 (Zone 2 / 22)	F2			
NEPSI (Zone 1)	S1[1)]			
NEPSI (Zone 2)	S2			
Housing Type / Housing Material / Thread for Cable Glands				
Single compartment / Aluminium / M20 x 1.5		S1[4)]		
Single compartment / Aluminium / NPT 1/2 in.		S2[4)]		
Dual compartment / Aluminium / M20 x 1.5		D1[3)]		
Dual compartment / Aluminium / NPT 1/2 in.		D2[3)]		
Meter size				
DN 3 (1/10 in.)			0003	
DN 4 (5/32 in.)			0004	
DN 6 (1/4 in.)			0006	
DN 8 (5/16 in.)			0008	
DN 10 (3/8 in.)			0010	
DN 15 (1/2 in.)			0015	
DN 20 (3/4 in.)			0020	
DN 25 (1 in.)			0025	
DN 32 (1-1/4 in.)			0032	
DN 40 (1-1/2 in.)			0040	
DN 50 (2 in.)			0050	
DN 65 (2-1/2 in.)			0065	
DN 80 (3 in.)			0080	
DN 100 (4 in.)			0100	
DN 125 (5 in.)			0125	
DN 150 (6 in.)			0150	
DN 200 (8 in.)			0200	
DN 250 (10 in.)			0250	
DN 300 (12 in.)			0300	
DN 350 (14 in.)			0350	
DN 400 (16 in.)			0400	
DN 450 (18 in.)			0450	
DN 500 (20 in.)			0500	
DN 600 (24 in.)			0600	
DN 700 (28 in.)			0700	
DN 750 (30 in.)			0750	
DN 800 (32 in.)			0800	
DN 900 (36 in.)			0900	
DN 1000 (40 in.)			1000	
DN 1050 (42 in.)			1050	

Continued on next page

ProcessMaster FEP631	7,8	...	11,12,13,14	15,16	17,18	19	20	...	94,95
Meter size (continuation)									
DN 1100 (44 in.)			1100						
DN 1200 (48 in.)			1200						
DN 1350 (54 in.) – AWWA flange only			1350						
DN 1400 (54 in.)			1400						
DN 1500 (60 in.)			1500						
DN 1600 (66 in.)			1600						
DN 1650 (66 in.) – AWWA flange only			1650						
DN 1800 (72 in.)			1800						
DN 2000 (80 in.)			2000						
Process Connection Type									
Flanges DIN PN 6				D0[7)]					
Flanges DIN PN 10				D1					
Flanges DIN PN 16				D2					
Flanges DIN PN 25				D3					
Flanges DIN PN 40				D4					
Flanges DIN PN 63				D5[6)]					
Flanges DIN PN 100				D6[6)]					
Flanges ASME CL 150; B16.5 up to DN 600, B16.47 series B > DN 600				A1[5)]					
Flanges ASME CL 300; B16.5 up to DN 600, B16.47 series B > DN 600				A3[5)]					
Flanges ASME CL 600 RF				A6[6a)]					
Flanges ASME CL 900 RF				A7[6a)]					
Flanges ASME CL 1500 RF				A8[6b)]					
Flanges ASME CL 2500 RF				A9[6b)]					
Flanges ASME CL 600 RTJ				H6[6b)]					
Flanges ASME CL 900 RTJ				H7[6b)]					
Flanges ASME CL 1500 RTJ				H8[6b)]					
Flanges ASME CL 2500 RTJ				H9[6b)]					
Flanges JIS 5K				J2					
Flanges JIS 7,5K				J0[2)]					
Flanges JIS 10K				J1					
Flanges JIS 20K				J3					
AS 4087 PN16				E1[2)]					
Flange, AS2129 table E				E4[2)]					
Flange, AS2129 table E				E5[2)]					
Flanges AWWA C207 Class B				C1[41)]					
Flanges AWWA C207 Class C				C2[41)]					
Flanges AWWA C207 Class E				C3[41)]					
Liner Material									
Hard rubber					R2[11)]				
Soft rubber					R4[12)]				
ETFE					E1[9)]				
PTFE					T1[13)]				
PFA					P1[10)]				
Thick PTFE					T2[14)]				
Ceramic-Carbide					C1[8)]				
Linatex					R6[2)]				
Others					Z9				

Continued on next page

… Ordering Information

… ProcessMaster FEP631

ProcessMaster FEP631	7,8	…	19	20	21	22	23	24,25	26	27	28,29	30	… 94,95
Process Connection Material													
Carbon steel			B										
Stainless steel			C[15)]										
Others			Z										
Electrode Design													
Standard				1									
Pointed head				5[16)]									
Others				9									
Measuring Electrodes Material													
Hast. C-4 (2.4610)					D								
Titanium					F								
Tantalum					G								
Hast. B-3 (2.4600)					H								
Platinum-Iridium					J								
Stainless steel 316Ti (1.4571)					S								
Double Layer					W[16)]								
Tungsten Carbide, coated					T								
Others					Z								
Grounding Electrode / Full Pipe Detection													
No grounding electrode / No full pipe detection						0							
No grounding electrode / With full pipe detection						1[17)]							
Grounding electrode / No full pipe detection						2[18)]							
Grounding electrode / With full pipe detection						3[19)]							
Others						9							
Grounding Accessories													
Without							A						
Grounding ring (1 off), mounted to flange							B[20)]						
Grounding ring (2 off), mounted to flange							C[20)]						
Others							Z						
Protection Class Transmitter / Protection Class Sensor													
IP 67 / IP 67								70					
Power Supply													
100 … 230 V AC, 50 Hz									A				
24 V DC, 50 Hz									D				
100 … 230 V AC, 60 Hz									C				
24 V DC, 60 Hz									E				
Display													
Without										0			
Display with Keypad										2			
Outputs													
1 Current output (active or passive). 2 Digital Outputs (passive). HART											G0[21)]		
Current output 1 (active or passive), digital output 1 & 2 (passive). HART. MODBUS RTU											M1[34)]		
Current output 1 (active or passive). digital output 1 & 2 (passive). HART. PROFIBUS DP											D1[35)]		
Current output 1 (active or passive), digital output 1 & 2 (passive), HART. 1 port Ethernet											E2[36)]		
Current output 1 (active or passive), digital output 1 & 2 (passive). HART, 2 port Ethernet											E3[36)]		
Current output 1 (active or passive), digital output 1 & 2 (passive), HART. 1 port Ethernet + POE											E4[36)]		
Current output 1 (active or passive), digital output 1 & 2 (passive), HART, PROFIBUS PA											P1		
Current output 1 (active or passive), digital output 1 & 2 (passive), HART, Advanced Physical Layer (APL)											L1[42)]		
Design Level													
Specified by ABB												A[22)]	

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ProcessMaster FEP631 7,8 …	31,32,33	34,35,36	37,38	39,40	41,42,43	44,45,46	47,48,49	50,51	52,53,54	56,57	… 94,95
Option Card 1											
Without	DR0										
1 x Digital Input	DRN										
1 x Digital Output	DRG										
24 V DC transmitter loop power supply	DRT										
1 x Analog Output passive (4…20mA)	DRA										
Modbus RTU	DRM										
PROFIBUS DP	DRD										
Card for Ethernet IP, Modbus TCP, PROFINET	DR6[37)]										
Ethernet-APL (PROFINET; ModbusTCP; Webserver communication)	DR7[42)]										
Option Card 2											
Without		DS0									
1 x Analog Output passive (4…20mA)		DSA									
1 x Digital Input		DSN									
1 x Digital Output		DSG									
Module Power over Ethernet/ Modbus TCP (for Single Comp Hsg)		DS8[38)]									
Usage Certifications											
Without			C0								
Inspection certificate 3.1 acc. EN 10204			C2								
Others			CZ								
SIL Certificate											
SIL2 Certificate				CS[33)]							
Shipping Register Certificate											
Marine approval (DNA)					CL5[33)]						
Calibration Certifications											
ABB Standard						CMA					
3rd party witnessed calibration						CMW					
5-point calibration acc. ISO 17025						CMD[23)]					
Other Usage Certifications											
Meter tube > DN 25 (1") with PED certificate							CRP				
Meter tube without PED certificate							CRA[2)]				
Sensor Length											
ABB Standard								J6			
1,0 x DN length (from DN700 and up)								JH[30)]			
Potable Water and Food&Beverage Approvals											
Without									CWY		
Other Options											
Without										K0	
With Gore-tex membrane										KG	

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… Ordering Information

… ProcessMaster FEP631

ProcessMaster FEP631 7,8 …	58,59	60,61,62	63,64,65	66,67,68	69,70,71	72,73,74	75,76,77	78,79,80	81,82	83,84,85	… 94,95
Documentation Language											
German	M1										
English	M5										
Language package Western Europe / Scandinavia	MW										
Language package Eastern Europe	ME										
Others	MZ										
Pressure Bearing Parts Material Source											
Standard		MS0									
Tests and Reports											
Without			CR0								
Pressure test acc. to DIN			CPD								
Sensorhousing Material											
Standard				SMA							
Configuration Type											
Parameters set to factory defaults					NC1						
Parameters set customer specific					NCC						
Transmitter Software Function Package											
Standard						NFS					
Enhanced diagnostics						NFE					
Batch Functionality						NFB					
Calibration Type											
0,4% Factory Calibration							RCD[25)]				
0,3% Factory Calibration (Option)							RCE[26)]				
0,2% Factory Calibration (Option)							RCB[27)]				
Signal Cable											
Without								SC0			
Device Identification Plate											
Adhesive label									TC		
Stainless steel									T1		
Stainless steel and TAG plate (stainless steel)									TS		
Others									TZ		
Temperature Range of Installation / Ambient Temperature Range											
Standard design / -20 … 60 °C (-4 … 140 °F)										TK1[27)]	
Standard design / -40 … 60 °C (-40 … 140 °F)										TK4[27)]	
High temperature design / -20 … 60 °C (-4 … 140 °F)										TKH[28)]	
High temperature design / -40 … 60 °C (-40 … 140 °F)										TKK[28)]	

Continued on next page

ProcessMaster FEP631 7,8 …	86,87,88	89,90	91,92,93	94,95
Number of Testpoints				
2 Points	TV2			
3 Points	TV3			
5 Points	TV5			
Verification Capability				
disabled		V0		
enabled		V1		
Communication options activated				
Ethernet IP			GCE	
Modbus TCP			GCM	
Webserver			GCW	
PROFINET			GCP	
Connector type				
Without				U0
1 × M 12 Plug for Ethernet 1 Port (4 signal leads)				UE[39)]
2 × M 12 Plug for Ethernet 2 Port (4 signal leads)				UF[39)]
1 × M 12 Plug for Ethernet 1 Port (8 signal leads)				UG[39)]
1 × RJ45 connector with 5 m (15 ft) cable length fitted (4 signal leads)				U5[39)]
2 × RJ45 connector with 5 m (15 ft) cable length fitted (4 signal leads)				UB[39)]
1 × RJ45 connector with 5 m (15 ft) cable lenth fitted (8 signal leads)				UC[39)]
1 × RJ45 connector with 10 m (30 ft) cable length fitted (4 signal leads)				U6[39)]
2 × RJ45 connector with 10 m (30 ft) cable length fitted (4 signal leads)				UD[39)]
1 × RJ45 connector with 10 m 30 ft cable lenth fitted (8 signal leads)				UH[39)]
1 × RJ45 connector with 15 m (49 ft) cable length fitted (4 signal leads)				U7[39)]
2 × RJ45 connector with 15 m (49 ft) cable length fitted (4 signal leads)				UJ[39)]
1 × RJ45 connector with 15 m 49 ft cable lenth fitted (8 signal leads)				UK[39)]
1 × RJ45 connector with 20 m (66 ft) cable length fitted (4 signal leads)				U8[39)]
2 × RJ45 connector with 20 m (66 ft) cable length fitted (4 signal leads)				UN[39)]
1 × RJ45 connector with 20 m (66 ft) cable length fitted (8 signal leads)				UP[39)]
Fieldbus M12x1 (for Profibus PA)				UR

Notes for ProcessMaster FEP631

1) Not available with Single Compartment Housing
2) For China production site only.
3) Not available with Div1 in conjunction with -40°C
4) Not available with Zone 1 / Div 1
5) Flange DN 15 to 600 based on ASME B16.5. Flange > DN 600 based on ASME 16.47 Serie B.
6) DN 25 to 200 (1 to 8 in) Hard Rubber

6a) Available from DN25 to 400 with Hardrubber or ETFE

6b) Upon Request

7) Available from DN 1000 (40 in)
8) Available from DN25 to 1000. With Tungsten-Carbide electrode only
9) Available from DN25 to 1000

… Ordering Information

… ProcessMaster FEP631

Notes for ProcessMaster FEP631

10) Available from DN3 to 200
11) Available from DN 25
12) Available from DN 50
13) Available from DN 10 to 600
14) Available from DN 25 to 300
15) Material: Refer to data sheet. Available with Design Level A
16) Available from DN 10 to 400
17) TFE Electrode for detection of partial filling, available from DN 50 (2 in.)
18) Grounding electrodes, material same as measuring electrodes material
19) Grounding electrodes, material same as measuring electrodes material TFE Electrode for detection of partial filling, available from DN 50 (2 in.)
20) Available with sensor size <= DN 600 (24 in.) and PTFE / Thick-PTFE / ETFE / PFA liner material. For material, refer to data sheet
21) Current output (active or passive) can be configured on site
22) Will be specified by ABB
23) Available with 5points Calibration
24) Not available with size DN 3-8 and > DN900. 0,2% calibration assumes 3 calibration points. If more than 3 calibration points are required, specify 5 points under 'Number of test points'.
25) 2 points calibration is Standard. If more than 2 test points are required, please specify 3 or 5 points with option 'Number of Test points'. Accuracy = 0.4 % of rate with size > DN 3
26) 3 or 5 test points to be specified
27) Maximum fluid temperature with standard sensor design:
    130 °C (266 °F) with PTFE, PFA, ETFE
    80 °C (194 °F / 176 °F) with hard rubber
    60 °C (140 °F) with soft rubber
28) Max. fluid temperature with high temperature sensor design:
    180 °C (356 °F) with PFA, Thick PTFE.
    130 °C (266 °F) with ETFE, PTFE liners.

Thick PTFE available for sensor size DN 25 to 300. PFA available for sensor size DN 10 to 200

29) Not available with calibration acc to ISO17025
30) Available from DN 700 and up from China production site
31) Not available with Ex
32) Available up to DN 300 (12 in)
33) Available with Housing Type Code "D1" or "D2"
34) To be configured in conjunction with Option Card 1 = Mod bus RTU
35) To be configured in conjunction with Option Card 1 = Profibus DP
36) To be configured in conjunction with Option Card 1 = Ethernet IP or Modbus TCP
37) Available with single compartment housing only, Non Ex or Zone 2, Div. 2 only
38) Available with single compartment housing only and with 24 V power supply unit
39) Available with single compartment housing, Ethernet Card, Non-Ex or ATEX Zone 2
40) PROFINET in preparation
41) Available from 30 in onwards
42) Available with dual compartment housing only, Ethernet-APL is in preparation

ProcessMaster FEP632

Electromagnetic Flowmeter system, remote mount design

ProcessMaster FEP632	7,8	9,10	11,12,13,14	... 85,86
Explosion Protection Certification				
Without, Flowmeter based on CE Standard	Y0			
ATEX / IECEx (Zone 1 / 21)	A1			
ATEX / IECEx (Zone 2 / 22)	A2			
cFMus Class 1 Div. 1 (Zone 1 / 21)	F1[32)]			
cFMus Class 1 Div. 2 (Zone 2 / 22)	F2			
NEPSI (Zone 1)	S1			
NEPSI (Zone 2)	S2			
Housing Type / Housing Material / Thread for Cable Glands				
Remote / Plastic / M20 x 1.5		P1		
Remote / Plastic / NPT 1/2 in.		P2		
Remote / Aluminum / M20 x 1.5		A1		
Remote / Aluminum / NPT 1/2 in.		A2		
Meter size				
DN 3 (1/10 in)			0003	
DN 4 (5/32 in)			0004	
DN 6 (1/4 in)			0006	
DN 8 (5/16 in)			0008	
DN 10 (3/8 in)			0010	
DN 15 (1/2 in)			0015	
DN 20 (3/4 in)			0020	
DN 25 (1 in)			0025	
DN 32 (1-1/4 in)			0032	
DN 40 (1-1/2 in)			0040	
DN 50 (2 in)			0050	
DN 65 (2-1/2 in)			0065	
DN 80 (3 in)			0080	
DN 100 (4 in)			0100	
DN 125 (5 in)			0125	
DN 150 (6 in)			0150	
DN 200 (8 in)			0200	
DN 250 (10 in)			0250	
DN 300 (12 in)			0300	
DN 350 (14 in)			0350	
DN 400 (16 in)			0400	
DN 450 (18 in)			0450	
DN 500 (20 in)			0500	
DN 600 (24 in)			0600	
DN 700 (28 in)			0700	
DN 750 (30 in)			0750	
DN 800 (32 in)			0800	
DN 900 (36 in)			0900	
DN 1000 (40 in)			1000	
DN 1050 (42 in)			1050	
DN 1100 (44 in)			1100	

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… Ordering Information

… ProcessMaster FEP632

ProcessMaster FEP632	7,8	…	11,12,13,14	15,16	17,18	19	20	… 85,86
Meter size (continuation)								
DN 1200 (48 in)			1200					
DN 1350 (54 in) – AWWA flange only			1350					
DN 1400 (54 in)			1400					
DN 1500 (60 in)			1500					
DN 1600 (66 in)			1600					
DN 1650 (66 in) – AWWA flange only			1650					
DN 1800 (72 in)			1800					
DN 2000 (80 in)			2000					
Process Connection Type								
Flanges DIN PN 6				D0[4)]				
Flanges DIN PN 10				D1				
Flanges DIN PN 16				D2				
Flanges DIN PN 25				D3				
Flanges DIN PN 40				D4				
Flanges DIN PN 63				D5[3)]				
Flanges DIN PN 100				D6[3)]				
Flanges ASME CL 150; B16.5 up to DN 600, B16.47 series B > DN 600				A1[2)]				
Flanges ASME CL 300; B16.5 up to DN 600, B16.47 series B > DN 600				A3[2)]				
Flanges ASME CL 600 RF				A6[6a)]				
Flanges ASME CL 900 RF				A7[6a)]				
Flanges ASME CL 1500 RF				A8[6b)]				
Flanges ASME CL 2500 RF				A9[6b)]				
Flanges ASME CL 600 RTJ				H6[6b)]				
Flanges ASME CL 900 RTJ				H7[6b)]				
Flanges ASME CL 1500 RTJ				H8[6b)]				
Flanges ASME CL 2500 RTJ				H9[6b)]				
Flanges JIS 5K				J2				
Flanges JIS 7,5K				J0[2)]				
Flanges JIS 10K				J1				
Flanges JIS 20K				J3				
AS 4087 PN16				E1[2)]				
Flange, AS2129 table E				E4[2)]				
Flange, AS2129 table E				E5[2)]				
Flanges AWWA C207 Class B				C1[34)]				
Flanges AWWA C207 Class C				C2[34)]				
Flanges AWWA C207 Class E				C3[34)]				
Liner Material								
Hard rubber					R2[8)]			
Soft rubber					R4[9)]			
ETFE					E1[6)]			
PTFE					T1[10)]			
PFA					P1[7)]			
Thick PTFE					T2[11)]			
Ceramic-Carbide					C1[5)]			
Linatex					R6[1)]			
Others					Z9			
Process Connection Material								
Carbon steel						B		
Stainless steel						C[12)]		
Others						Z		
Electrode Design								
Standard							1	
Pointed head							5[13)]	
Others							9	

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ProcessMaster FEP632	7,8	…	21	22	23	24,25	26	27	28,29	30	…	85,86
Measuring Electrodes Material												
Hast. C-4 (2.4610)			D									
Titanium			F									
Tantalum			G									
Hast. B-3 (2.4600)			H									
Platinum-Iridium			J									
Stainless steel 316Ti (1.4571)			S									
Double Layer			W[13)]									
Tungsten Carbide, coated			T									
Others			Z									
Grounding Electrode / Full Pipe Detection												
No grounding electrode / No full pipe detection				0								
No grounding electrode / With full pipe detection				1[14)]								
Grounding electrode / No full pipe detection				2[15)]								
Grounding electrode / With full pipe detection				3[16)]								
Others				9								
Grounding Accessories												
Without					A							
Grounding ring (1 off), mounted to flange					B[17)]							
Grounding ring (2 off), mounted to flange					C[17)]							
Others					Z							
Protection Class Transmitter / Protection Class Sensor												
IP 67 / IP 67						70						
IP 67 / IP 68						76[18)]						
IP 67 / IP 68, signal cable fitted and potted						77[19)]						
Power Supply												
Without							Y					
Display												
Without								0				
Outputs												
Without									Y0			
Design Level												
Specified by ABB										A[20)]		

Continued on next page

… Ordering Information

… ProcessMaster FEP632

ProcessMaster FEP632	7,8	…	31,32,33	34,35,36	37,38	39,40,41	42,43,44	45,46	47,48	49,50,51	52,53	54,55	… 85,86
Option Card 1													
Without			DR0										
Option Card 2													
Without				DS0									
Usage Certifications													
Without					C0								
Inspection certificate 3.1 acc. EN 10204					C2								
Others					CZ								
Calibration Certifications													
ABB Standard						CMA							
3rd party witnessed calibration						CMW							
5-point calibration acc. ISO 17025						CMD[21)]							
Other Usage Certifications													
Meter tube > DN 25 (1") with PED certificate							CRP						
Meter tube without PED certificate							CRA[1)]						
Power Supply Line Frequency													
50 Hz								F5[22)]					
60 Hz								F6[23)]					
Sensor Length													
ABB Standard									J6				
1,0 x DN length (from DN700 and up)									JH[30)]				
Potable Water and Food&Beverage Approvals													
Without										CWY			
Other Options													
Without											K0		
With Gore-tex membrane											KG		
Documentation Language													
German												M1	
English												M5	
Language package Western Europe / Scandinavia												MW	
Language package Eastern Europe												ME	
Others												MZ	

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ProcessMaster FEP632	7,8	…	56,57,58	59,60,61	62,63,64	65,66,67	68,69,70	71,72,73	74,75,76	…	85,86
Pressure Bearing Parts Material Source											
Standard			MS0								
Tests and Reports											
Without				CR0							
Pressure test acc. to DIN				CPD							
Sensorhousing Material											
Standard					SMA						
Configuration Type											
Parameters set to factory defaults						NC1					
Parameters set customer specific						NCC					
Transmitter Software Function Package											
Standard							NFS				
Enhanced diagnostics							NFE				
Batch Functionality							NFB				
Calibration Type											
0,4% Factory Calibration							25)	RCD			
0,3% Factory Calibration (Option)							26)	RCE			
0,2% Factory Calibration (Option)							24)	RCB			
Signal Cable											
Without									SC0		
5 m (approx. 15 ft)									SC1		
10 m (approx. 30 ft)									SC2		
15 m (approx. 49 ft)									SC3		
20 m (approx. 66 ft)									SC4		
25 m (approx. 82 ft)									SC5		
30 m (approx. 98 ft)									SC6		
35 m (approx. 115 ft)									SC7		
40 m (approx. 131 ft)									SC8		
50 m (approx. 164 ft)									SCA		
60 m (approx. 197 ft)									SCB		
70 m (approx. 230 ft)									SCC		
80 m (approx. 262 ft)									SCD		
100 m (approx. 328 ft)									SCE		
125 m (approx. 410 ft)									SCF		
150 m (approx. 492 ft)									SCG		
175 m (approx. 574 ft)									SCH		
200 m (approx. 656 ft)									SCJ		

Continued on next page

… Ordering Information

… ProcessMaster FEP632

ProcessMaster FEP632	7,8	…	77,78	79,80,81	82,83,84	85,86
Device Identification Plate						
Adhesive label			TC			
Stainless steel			T1			
Stainless steel and TAG plate (stainless steel)			TS			
Others			TZ			
Temperature Range of Installation / Ambient Temperature Range						
Standard design / -20 … 60 °C (-4 … 140 °F)			27)	TK1		
Standard design / -40 … 60 °C (-40 … 140 °F)			27)	TK4		
High temperature design / -20 … 60 °C (-4 … 140 °F)			28)	TKH		
High temperature design / -40 … 60 °C (-40 … 140 °F)			28)	TKK		
Number of Testpoints						
2 Points				29)	TV2	
3 Points				29)	TV3	
5 Points					TV5	
Verification Capability						
disabled						V0
enabled						V1

Notes for ProcessMaster FEP632

1) For China production site only.
2) Flange DN 15 to 600 based on ASME B16.5. Flange > DN 600 based on ASME 16.47 Serie B.
3) DN 25 to 200 (1 to 8 in) Hard Rubber
4) Available from DN 1000 (40 in)
5) Available from DN 25 to 1000. With Tungsten-Carbide electrode only
6) Available from DN 25 to 1000

6a) Available from DN 25 to 400 with Hardrubber or ETFE

6b) Upon Request

7) Available from DN 3 to 200
8) Available from DN 25
9) Available from DN 50
10) Available from DN 10 to 600
11) Available from DN 25 to 300
12) Material: Refer to data sheet. Available with Design Level A
13) Available from DN 10 to 400
14) TFE Electrode for detection of partial filling, available from DN 50 (2 in)
15) Grounding electrodes, material same as measuring electrodes material
16) Grounding electrodes, material same as measuring electrodes material TFE Electrode for detection of partial filling, available from DN 50 (2 in)
17) Available with sensor size <= DN 600 (24 in) and PTFE / Thick-PTFE / ETFE / PFA liner material. For material, refer to data sheet
18) Only available with remote transmitter, sealing compound (optional) D141B038U01
19) Only available with remote transmitter
20) Will be specified by ABB
21) Available with 5 points Calibration
22) 50 Hz (to be specified in case no Tx is ordered)
23) 60 Hz (to be specified in case no Tx is ordered)
24) Not available with size DN 3 to 8 and > DN800. 0,2% calibration assumes 3 calibration points. If more than 3 calibration points are required,
specify 5 points under 'Number of test points'.
25) 2 points calibration is Standard. If more than 2 testpoints are required, please specify 3 or 5 points with option 'Number of Testpoints'. Accuracy = 0.4 % of rate with size > DN 3
26) 3 or 5 testpoints to be specified
27) Max. fluid temperature with standard sensor design:
130 °C (266 °F) with PTFE, PFA, ETFE
80 °C (194 °F / 176 °F) with hard rubber
60 °C (140 °F) with soft rubber
28) Max. fluid temperature with high temperature sensor design:
180 °C (356 °F) with PFA, Thick PTFE. Thick PTFE available for sensor size DN 25 to 300. PFA available for sensor size DN 10 to 200
130 °C (266 °F) with ETFE, PTFE liners.
29) Not available with calibration acc to ISO17025
30) Available from DN 700 and up from China production site
31) Not available with Ex
32) Available up to DN 300 (12 in)
33) Not available with EX Zone 1, Div 1
34) Available from 30 in onwards

Remote transmitter FET632

FET632 Electromagnetic Flowmeter, remote transmitter for ProcessMaster FEP630

Remote transmitter FET632	7,8	9,10	11,12	13	14	15,16	17,18,19	... 46,47
Explosion Protection Certification								
Without, Flowmeter based on CE Standard	Y0							
ATEX / IECEx (Zone 1 / 21)	A1							
ATEX / IECEx (Zone 2 / 22)	A2							
cFMus Class 1 Div. 1 (Zone 1 / 21)	F1							
cFMus Class 1 Div. 2 (Zone 2 / 22)	F2							
NEPSI (Zone 1)	S1							
NEPSI (Zone 2)	S2							
Housing Type / Housing Material / Thread for Cable Glands								
Field-mount / Single compartment / Aluminum / 4 x M20 x 1.5		F1[3)]						
Field-mount / Single compartment / Aluminum / 4 x NPT 1/2 in.		F2[3)]						
Wall-mount / Dual compartment / Aluminum / M20 x 1.5		W1						
Wall-mount / Dual compartment / Aluminum / NPT 1/2 in.		W2						
Protection Class Transmitter / Protection Class Sensor								
IP 67 / IP 67			70					
Power Supply								
100 ... 230 V AC, 50 Hz				A				
24 V DC, 50 Hz				D				
100 ... 230 V AC, 60 Hz				C				
24 V DC, 60 Hz				E				
Display								
Without					0			
Display with Keypad					2			
Outputs								
1 Current output (active or passive). 2 Digital Outputs (passive). HART						G0[4)]		
Current output 1 (active or passive), digital output 1 & 2 (passive). HART. MODBUS RTU						M1[7)]		
Current output 1 (active or passive). digital output 1 & 2 (passive). HART. PROFIBUS DP						D1[8)]		
Current output 1 (active or passive), digital output 1 & 2 (passive), HART. 1 port Ethernet						E2[9)]		
Current output 1 (active or passive), digital output 1 & 2 (passive). HART, 2 port Ethernet						E3[9)]		
Current output 1 (active or passive), digital output 1 & 2 (passive), HART. 1 port Ethernet + POE						E4[9)]		
Current output 1 (active or passive), digital output 1 & 2 (passive), HART, PROFIBUS PA							P1	
Current output 1 (active or passive), digitial output 1 & 2 (passive), HART, Advanced Physical Layer (APL)							L1[14)]	
Option Card 1								
Without							DR0	
1 x Digital Input							DRN	
1 x Digital Output							DRG	
24 V DC transmitter loop power supply							DRT	
1 x Analog Output passive (4…20mA)							DRA	
Modbus RTU							DRM	
PROFIBUS DP							DRD	
Ethernet IP, Modbus TCP, PROFINET							DR6[10)]	
Ethernet-APL (PROFINET; ModbusTCP; Webserver communication)							DR7[14)]	

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… Ordering Information

… Remote transmitter FET632

Remote transmitter FET632	7,8	…	20,21,22	23,24	25,26,27	26,27,28	29,30	31,32	33,34	35,36,37	38,39	40,41,42	… 46,47
Option Card 2													
Without			DS0										
1 x Analog Output passive (4…20mA)			DSA										
1 x Digital Input			DSN										
1 x Digital Output			DSG										
Module Power over Ethernet/ Modbus TCP			DS8[11)]										
SIL Certificate													
SIL Certificate				CS									
Shipping Register Certificate													
Marine approval (DNV)					CL5								
Potable Water and Food & Beverage Approvals													
Without						CWY							
Other Options													
Without							K0						
With Gore-tex membrane							KG						
Documentation Language													
German								M1					
English								M5					
Language package Western Europe / Scandinavia								MW					
Language package Eastern Europe								ME					
Device Identification Plate													
Adhesive label									TC				
Stainless steel									T1				
Stainless steel and TAG plate (stainless steel)									TS				
Others									TZ				
Temperature Range of Installation / Ambient Temperature Range													
Standard design / -20 … 60 °C (-4 … 140 °F)										TK1			
Standard design / -40 … 60 °C (-40 … 140 °F)										TK4			
Remote Transmitter Mounting Kit													
Without											B0		
2" Pipe Mounting Kit for Wall-mount / Dual compartment Housing											B1		
2" Pipe Mounting Kit for Field-mount / Single compartment Housing											B2		
Transmitter Software Function Package													
Standard												NFS	

Continued on next page

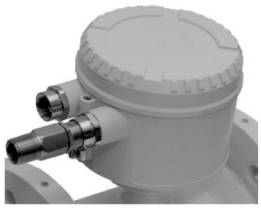
Remote transmitter FET632	7,8	...	43,44,45	46,47
Communication options activated				
Ethernet IP			GCE	
Modbus TCP			GCM	
Webserver			GCW	
PROFINET			GCP[13)]	
Connector type				
Without				U0
1 × M 12 Plug for Ethernet 1 Port (4 signal leads)				UE[12)]
2 × M 12 Plug for Ethernet 2 Port (4 signal leads)				UF[12)]
1 × M 12 Plug for Ethernet 1 Port (8 signal leads)				UG[12)]
1 × RJ45 connector with 5 m (15 ft) cable length fitted (4 signal leads)				U5[12)]
2 × RJ45 connector with 5 m (15 ft) cable length fitted (4 signal leads)				UB[12)]
1 × RJ45 connector with 5 m (15 ft) cable lenth fitted (8 signal leads)				UC[12)]
1 × RJ45 connector with 10 m (30 ft) cable length fitted (4 signal leads)				U6[12)]
2 × RJ45 connector with 10 m (30 ft) cable length fitted (4 signal leads)				UD[12)]
1 × RJ45 connector with 10 m 30 ft cable lenth fitted (8 signal leads)				UH[12)]
1 × RJ45 connector with 15 m (49 ft) cable length fitted (4 signal leads)				U7[12)]
2 × RJ45 connector with 15 m (49 ft) cable length fitted (4 signal leads)				UJ[12)]
1 × RJ45 connector with 15 m 49 ft cable lenth fitted (8 signal leads)				UK[12)]
1 × RJ45 connector with 2O m (66 ft) cable length fitted (4 signal leads)				U8[12)]
2 × RJ45 connector with 2O m (66 ft) cable length fitted (4 signal leads)				UN[12)]
1 × RJ45 connector with 2O m (66 ft) cable length fitted (8 signal leads)				UP[12)]
Fieldbus M12x1 (for Profibus PA)				UR

Notes for Remote transmitter FET632

1) Not available with Single Compartment Housing
2) Not available with -40°C. Not available with Single Compartment Housing
3) Not available with Zone 1 / Div. 1
4) Current output (active or passive) can be configured on site
5) Not available with Ex
6) Available with housing Type Code 'W1' or 'W2'
7) To be configured in conjunction with Option Card 1 = Modbus RTU
8) To be configured in conjunction with Option Card 1 = Profibus DP
9) To be configured in conjuction with Option Card 1 = Ethernet IP or Modbus TCP
10) Available with single compartment housing only, Non Ex or Zone 2, Div. 2 only
11) Available with single compartment housing only and with 24 V power supply unit
12) Available with single compartment housing, Ethernet Card, Non-Ex or ATEX Zone 2
13) PROFINET in preparation
14) Available with dual compartment housing only, Ethernet-APL is in prepartion

… Ordering Information

Accessories

Description	Order code
Infrared service port adapter FZA100	FZA100
	
Installation set for NPT 1/2" cable gland	3KXF081300L0001
For sealing the cable conduit during outdoor installation	
	
Adapter M20x1.5 to 1/2"NPT	D365B269U01
	
Data link cable	3KXS360040L0003*
	
Signal cable	
5 m (approx. 15 ft)	3KQZ407123U0500
10 m (approx. 30 ft)	3KQZ407123U1000
15 m (approx. 49 ft)	3KQZ407123U1500
20 m (approx. 66 ft)	3KQZ407123U2000
25 m (approx. 82 ft)	3KQZ407123U2500
30 m (approx. 98 ft)	3KQZ407123U3000
35 m (approx. 115 ft)	3KQZ407123U3500
40 m (approx. 131 ft)	3KQZ407123U4000
50 m (approx. 164 ft)	3KQZ407123U5000
80 m (approx. 262 ft)	3KQZ407123U8000
100 m (approx. 328 ft)	3KQZ407123U1H00
150 m (approx. 492 ft)	3KQZ407123U1F00
200 m (approx. 656 ft)	3KQZ407123U2H00
ABB Ability Verification Tool	SRV500*

* Available from ABB Service

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