ABB MEASUREMENT & ANALYTICS | DATA SHEET

HygienicMaster FEH630

Electromagnetic flowmeter

Measurement made easy

The clean choice for all hygienic applications

Diagnostics for real-life situations

- To keep your process up and running
- Gas bubble, Electrode impedance, conductivity and sensor temperature monitoring
- Clear Text Messages for simplified trouble shooting

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

HygienicMaster series

HygienicMaster is available in two series – HygienicMaster FEH610 the good fit for everyday applications and HygienicMaster FEH630 the clean choice for all hygienic applications delivering best in class functionality and options.

Applicability	FEH610 series	FEH630 series
	Good fit for everyday applications	**The clean choice for all hygienic applications**
Food & Beverage Hygienic applications	✔	✔
CIP / SIP Cleaning	✔	✔
Filling	–	Yes, (> 3 sec)
Measuring medium minimum conductivity	20 µS/cm	5 µS/cm
Measuring medium temperature	25 ... 130 °C (-13 ... 266 °F)	Flange devices: -25 ... 180 °C (-13 ... 356 °F) Devices with variable process connections: -25 ... 130 °C (-13 ... 266 °F)
Pressure	≤ PN 40 / Cl 300 depending on process connection and sensor size	≤ PN 40 / Cl 300 depending on process connection and sensor size
Hazardous area	–	Yes

Features	FEH610 series	FEH630 series
Accuracy	0.5 %	0.4 %, Option up to 0.2 %
Nominal diameter	DN 3 ... 100 (1/10 ... 4")	DN 1 ... 100 (1/25 ... 4")
Liner material	PFA (vacuum-tight)	PFA (vacuum-tight, from DN 3 (1/10")) PEEK (DN 1 ... 2 (1/25 ... 1/12"))
I/O's	1 x analog, 2 x digital	1 x analog, 2 x digital, Option for add-in modules
Communication	High Speed Infrared Port Communication based on HART DTM	HART, PROFIBUS, Modbus
Process diagnostics	Empty pipe	Empty pipe, Gas bubbles, Electrode Impedance, Conductivity, Sensor temperature
Backwards compatibility	–	Yes

... HygienicMaster series

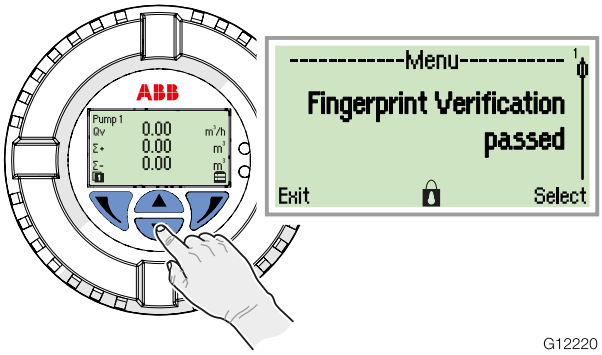
Features and Functions

On-board Health Check

HygienicMaster'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



G12220

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:

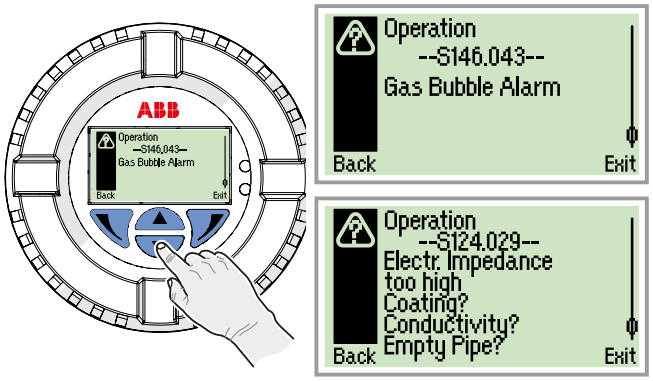
- Drop in replacement
- Same terminal designation I/O's, sensor connections
- No need to change wiring documentation
- Sensor cable stays unchanged
- Identical operating philosophy:
- Easy Set-up and Sensor Set-up
- Common user experience, less training
- Less inventory, less cost

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:

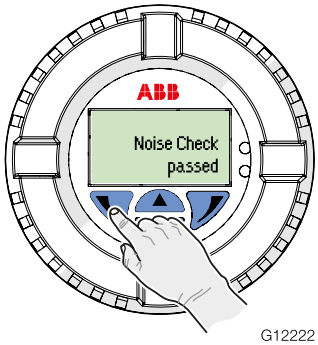
- Peace-of-mind that flowmeter is operating within its specification
- Prioritized alarms to correct most important alarm first
- Through-the-glass operation without the need to open the housing



G12221

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. HygienicMaster's in-built noise / grounding check helps getting the wiring / grounding right from day one without the Need for further Tools.



G12222

Diagnostic functions

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).

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.

Optional diagnostic functions

The extended diagnostics functionality package contains the following functions.

Gasbubble detection

Gas bubbles in the fluid 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 … 300 (3/8 ... 12").
- Conductivity of the measuring medium: 20 ... 20000 µS/cm.

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

Conductivity monitoring

The conductivity of the fluid can be monitored setting minimum / maximum alarm limits.
Once alarm limits are exceeded, the digital output flags an alarm if configured accordingly.
Conductivity is available as a 4 ... 20 mA output (Option card).
Pre-requisites using the functionality:
- Conductivity of the measuring medium: 20 ... 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

A in-house temperature measurement can be triggered.
This enables to check for the temperature inside the transmitter housing.
With the temperature out of spec, the digital output flags an alarm if configured accordingly.

... HygienicMaster series

Batching function

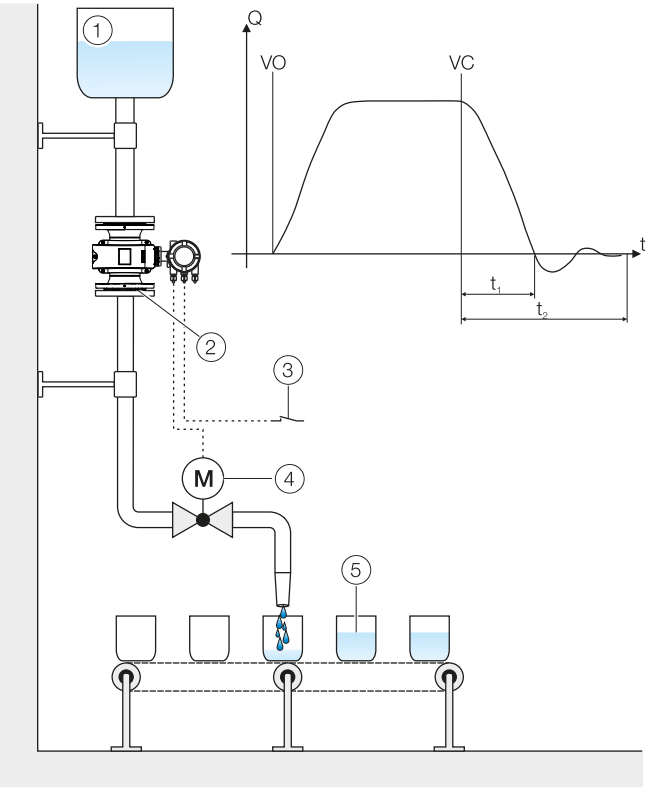


Fig. 1: Fill function (batch)

Pos.	Description
①	Supply tank
②	Flowmeter sensor
③	Start / stop fill operation (digital input with plug-in card)
④	Filling valve
⑤	Container to be filled
VO	Valve open (filling started)
VC	Valve closed (fill quantity reached)
t_1	Valve closing time
t_2	Overrun time

Table 1: Legend

The optional batching functionality allowing for batches with filling times >3 seconds.

Batch quantity is configurable and batch process can be started using the digital input (Option card).

Once batch quantity is reached closing the valve can be triggered using the digital output.

Batch quantity correction is calculated measuring the overrun quantity.

Low flow cut-off can be configured, if required.

Overview – models

Flowmeter sensor

Integral mount design

FEH631

Remote mount design

FEH632

G12161

Fig. 2: Designs (example, devices with variable process connections)

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

Table 2: Legend

Model	HygienicMaster FEH631, FEH632, FET632	
Housing	Integral mount design, remote mount design	
Measuring accuracy for liquids	0.4 % of measured value, option for 0.3 % and 0.2 % of measured value	
Permissible measuring medium temperature T_{medium}	Standard: -25 ... 130 °C (-13 ... 266 °F), DN 1 ... 2 limited to maximum 120 °C (248 °F) Option: -25 ... 180 °C (-13 ... 356 °F), flange devices only	
Minimum conductivity	> 5 µS/cm (> 20 µS/cm for demineralized water), > 20 µS/cm for nominal diameter DN 1 ... 2 (1/25 ... 1/12")	
Nominal pressure	PN 10 ... 40, ASME CL 150, 300, JIS 10K	
Nominal diameter	DN 1 ... 100 (1/25 ... 4 ")	
Process connection	Wafer type design: Flange in acc. with DIN, ASME or JIS: Food Industry Fittings acc. with DIN 11851: Welded spuds: Tri-Clamp in acc. with DIN 32676: Tri-Clamp in acc. with ASME BPE: External thread in acc. with ISO 228 / DIN 2999:	DN 3 ... 100 (1/10 ... 4") DN 3 ... 100 (1/10 ... 4"), PN 10 ... 40 DN 3 ... 100 (1/10 ... 4"), PN 10 ... 40 DN 3 ... 100 (1/10 ... 4"), PN 10 ... 40 DN 3 ... 100 (1/10 ... 4"), PN 10 ... 16 DN 3 ... 100 (1/10 ... 4"), PN 10 DN 3 ... 25 (1/10 ... 1"), PN 16
Process connection material	Flange design: Stainless steel; Variable process connections: 1.4404; Devices with nominal diameter DN 1 ... 2 (1/25 ... 1/12"): Stainless steel 1.4571 (AISI 316 Ti), PVC, POM	
Liner material	PFA (vakuum tight, from DN 3 (1/10")), PEEK (DN 1 ... 2 (1/25 ... 1/12"))	
Electrode material	Stainless steel 1.4571 (AISI 316Ti), 1.4539 [904L], Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium	
IP rating	Integral mount design: IP 65 / IP 67 / NEMA 4X Remote mount design: IP 65 / IP 67 / IP 68 (sensor only) / NEMA 4X	

Table 3: Overview flowmeter sensor

Pressure Equipment Directive 2014/68/EU	Conformity assessment in accordance with category III, fluid group 1
CRN (Canadian Reg.Number)	On request
Hygienic design approvals	3A, FDA-approved materials
Explosion protection (in preparation)	ATEX / IECEx zone 1, 2, 21, 22; FM / cFM Cl 1 Div. 1 (≤ DN 100), Cl 1 Div. 2
Further approvals	At www.abb.com/flow or on request.

Table 4: Approvals

… Overview – models

Transmitter

Fig. 3: Designs

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 … 240 V AC (-15 / +10 %) 50 / 60 Hz, 16,8 … 30 V DC
Outputs	Current output: 4 … 20 mA, active or passive (configurable 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 in the plug-in cards that can be used 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 (in preparation) / Modbus (in preparation)

Table 5: Overview Transmitter

Explosion protection (in preparation)	ATEX / IECEx Zone 1, 2, 21, 22 FM / cFM Cl 1 Div 1, Cl 1 Div 2
Further approvals	At www.abb.com/flow or on request.

Table 6: Approvals

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.

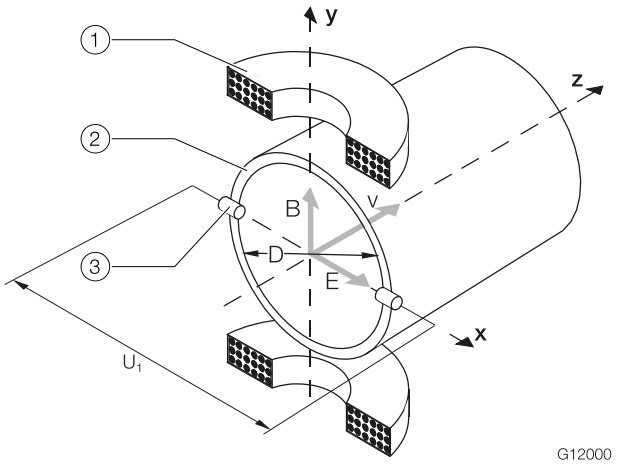


Fig. 4: Electromagnetic flowmeter schematic

Pos.	Description
①	Magnet coil
②	Meter tube in electrode plane
③	Signal electrode

Table 7: Legend

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

This principle is applied to a conductive fluid in the meter tube through which a magnetic field is generated perpendicular to the flow direction (see Fig. 4).
The voltage induced in the fluid is measured by two electrodes located diametrically opposite each other.
This signal voltage is proportional to the magnetic induction, the electrode spacing and the average flow velocity.
Considering that the magnetic induction and the electrode spacing are constant values, a proportionality exists between the signal voltage U_1 and the average flow velocity.
From the equation for calculating the volume flowrate, it follows that the signal voltage is linearly proportional to the volume flowrate.
The induced voltage is converted by the transmitter to standardized, analog and digital signals.

Flowmeter sensor

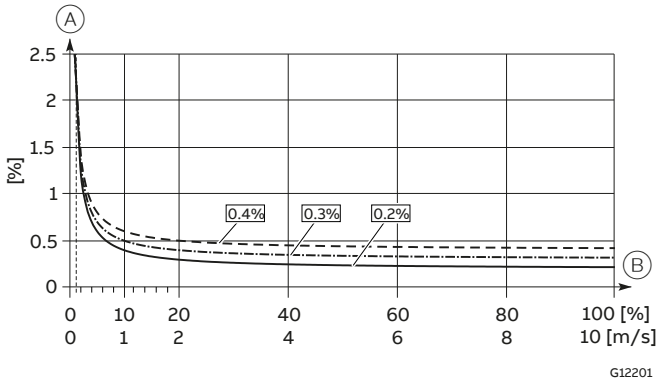
Measuring accuracy

Reference conditions

According to EN 29104	
Measuring medium temperature	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 condition	• Upstream >10 x DN, straight section — Downstream >5 x DN, straight section
Warm-up phase	30 min

Measuring error and repeatability

Measuring error



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

Table 8: Legend

Impulse output
Standard calibration
DN 3 .... 100: ±0.4 % of measured value, ±0.02 % Q_{max}DN[1)]
DN 1 ... 2: ±0.7 % of measured value, ±0.02 % Q_{max}DN[1)]
Optional calibration
DN 10 .... 100: ±0.3 % of measured value, ±0.02 % Q_{max}DN[1)]
Or
DN 10 .... 100: ±0.2 % of measured value, ±0.02 % Q_{max}DN[1)]

Table 9: Measuring error impulse output

1) Q_{max}DN: See table in chapter "Measuring range table" on page 12.

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

Table 10: Measuring error current output

Repeatability, response time

Repeatability	Response time[1)]
≤ 0.11 % of measured value, tmeas = 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 11: Repeatability, response time

1) Of current output with damping of 0.04 seconds

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 inch) in the 10 ... 58 Hz range
- Maximum acceleration: 2 g, in the 58 ... 150 Hz range

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 (Part no. 3KQZ407123U0100).

For marine applications, a certified signal cable is available.

Temperature data

Storage temperature range

-40 ... 70 °C (-40 ... 158 °F)

The temperature range offered depends on a number of different factors.
These factors include the measuring medium temperature T_{medium}, the ambient temperature $T_{amb.}$, the operating pressure P_{medium}, the liner material and the approvals for the explosion protection.

Maximum permissible cleaning temperature

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

- The specified cleaning temperature applies for a maximum ambient temperature of 25 °C (77 °F).
- If the ambient temperature is > 25 °C (> 77 °F), the difference to the actual ambient temperature must be subtracted from the maximum cleaning temperature.
- The specified cleaning temperature may be applied for a maximum of 60 minutes.

Maximum permissible temperature shock

- Maximum temperature shock temperature difference in °C: Any
- Temperature gradient °C/min: Any

... Flowmeter sensor

Ambient temperature as a function of measuring medium temperature Integral and remote mount design.

Standard flowmeter sensor design				
Process connection	**Ambient temperature range ($T_{amb.}$)**		**Measuring medium temperature range (T_{medium})**	
	Minimum[1)]	**Maximum**	**Minimum**	**Maximum[2)]**
Flange	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	100 °C (112 °F)
	-20 °C (-4 °F)	40 °C (104 °F)	-25 °C (-13 °F)	130 °C (266 °F)[3)]
Variable process connections	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	100 °C (112 °F)
	-20 °C (-4 °F)	40 °C (104 °F)	-25 °C (-13 °F)	130 °C (266 °F)[3)]

High temperature design – from size DN 10 (3/8")				
Process connection	**Ambient temperature range ($T_{amb.}$)**		**Measuring medium temperature range (T_{medium})**	
	Minimum[1)]	**Maximum**	**Minimum**	**Maximum**
Flange	-20 °C (-4 °F)	60 °C (140 °F)	-25 °C (-13 °F)	180 °C (356 °F)

1) There is an option for a low temperature design with minimum ambient temperature -40°C (-40°F).
2) For CIP/SIP cleaning, higher temperatures are permitted for limited time periods; refer to chapter "Maximum permissible cleaning temperature" on page 11.
3) For devices with nominal diameter of DN 1 ... 2 the maximum measuring medium temperature is limited to 120 °C (248 °F).

Measuring range table

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

Nominal diameter		**Minimum flow range end value**	**QmaxDN**	**Maximum flow range end value**
DN	**inch**	**0.02 x Q_{max}DN (≈ 0.2 m/s)**	**0 ... ≈ 10 m/s**	**2 x Q_{max}DN (≈ 20 m/s)**
1	1/25	0.012 l/min (0.00032 US gal/min)	0.6 l/min (0.16 US gal/min)	1.2 l/min (0.32 US gal/min)
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	3/8	0.9 l/min (0.24 US gal/min)	45 l/min (11.9 US gal/min)	90 l/min (23.78 US gal/min)
15	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)

Process connections

For an overview of the available process connection variants, see the chapter entitled ”Overview – models” on page 7.

Materials

Wetted parts		
Part	**Standard**	**Option**
Liner material	PFA, from DN 3 (1/10") PEEK, for DN 1 ... 2 (1/25 ... 1/12")	
Measurement and grounding electrode	SST 1.4539 (AISI 904L)	SST 1.4571 (AISI 316Ti), Hastelloy C-4 (2.4610), Hastelloy B-3 (2.4600), titanium, tantalum, platinum-iridium
Gaskets for welded spuds, threaded connection, Tri-Clamp, external threads	EPDM (Ethylene-Propylene) with FDA approval, silicone with FDA approval (CIPresistant, no oils or grease)	Silicone with FDA approval (option, oil or grease resistant) PTFE with FDA approval (DN 3 ... 8)
Gaskets for 1/8" sanitary connector	PTFE	Viton (only in combination with PVC process connection)
Process connection		
Welded spuds, Tri-Clamp, etc.	SST 1.4404 (AISI 316L)	–
OD tubing	SST 1.4435 (AISI 316L)	–
1/8" sanitary connector	SST 1.4571 (AISI 316Ti)	PVC, POM

Non-wetted parts (process connection)		
Part	**Standard**	**Option**
Process connection	SST 1.4571 (AISI 316Ti)	–

Sensor housing	
Part	**Material**
Housing	Deep-drawn housing SST 1.4301 (AISI 304), 1.4308
Meter tube	Stainless steel
Terminal box	Plastic, gray white, RAL 9002
Cable gland[1)]	Polyamide

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

Material loads for process connections

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

Minimum permissible operating pressure

The following tables show the minimum permissible operating pressure (P_{medium}) depending on measuring medium temperature (T_{medium}) and the liner material.

Liner material	**Nominal diameter**	**P_{medium} [mbar abs]**	**T_{medium}** [1)]
PFA	DN 3 ... 100 (1/10 ... 4")	0	< 130 °C (266 °F)
PEEK	DN 1 ... 2 (1/25 ... 1/2")	0	< 120 °C (248 °F)

1) For CIP/SIP cleaning, higher temperatures are permitted for limited time periods; refer to the chapter ”Maximum permissible cleaning temperature” on page 11.

Liner approvals on request, please contact ABB.

... Flowmeter sensor

Material load

Overview – Material load

Process connection	DN	P_{medium} max.	T_{medium}
Wafer type	DN 3 ... 50 (1/10 ... 2")	40 bar (580 psi)	-25 ... 130 °C (-13 ... 266 °F)
	DN 65 ... 100 (2 1/2 ... 4")	16 bar (232 psi)	
Welded spuds DIN 2463, ISO 1127, DIN 11850	DN 3 ... 40 (1/10 ... 1 1/2")	40 bar (580 psi)	-25 ... 130 °C (-13 ... 266 °F)
	DN 50, DN 80 (2", 3")	16 bar (232 psi)	
	DN 65, DN 100 (2 1/2", 4")	10 bar (145 psi)	
Welded spuds SMS 1145	DN 25, DN 40 ... 100 (1",1,5 ... 4")	6 bar (87 psi)	-25 ... 130 °C (-13 ... 266 °F)
Threaded pipe connection DIN 11851	DN 3 ... 40 (1/10 ... 1 1/2")	40 bar (580 psi)	-25 ... 130 °C (-13 ... 266 °F)
	DN 50, DN 80 (2", 3")	16 bar (232 psi)	
	DN 65, DN 100 (2 1/2", 4")	10 bar (145 psi)	
Tri-Clamp DIN 32676	DN 3 ... 50 (1/10 ... 2")	16 bar (232 psi)	-25 ... 130 °C (-13 ... 266 °F)
	DN 65 ... 100 (2 1/2 ... 4")	10 bar (145 psi)	
Tri-Clamp ASME BPE	DN 3 ... 80 (1/10 ... 3")	10 bar (145 psi)	-25 ... 121 °C (-13 ... 250 °F)
	DN 100 (4")	8,6 bar (124,7 psi)	
External thread ISO 228, DIN 2999	DN 3 ... 25 (1/10 ... 1")	16 bar (232 psi)	-25 ... 130 °C (-13 ... 266 °F)
Welded spuds OD tubing	DN 3 ... 50 (1/10 ... 2")	10 bar (145 psi)	-25 ... 130 °C (-13 ... 266 °F)
1/8" sanitary connector	DN 1 ... 2 (1/25 ... 1/12")	10 bar (145 psi)	-10 ... 120 °C (-14 ... 248 °F)

Table 12: Overview – Material load

Flange devices

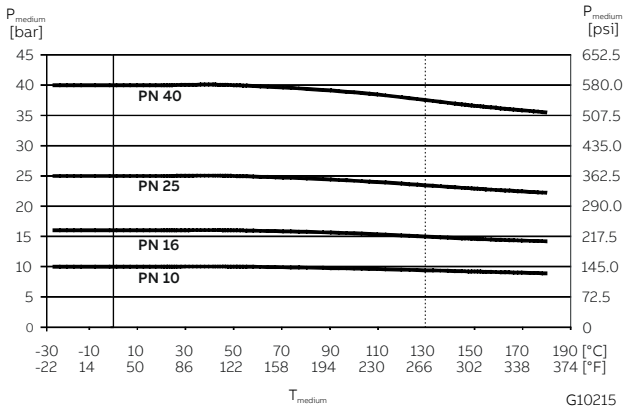


Fig. 6: DIN flange stainless steel to DN 100 (4")

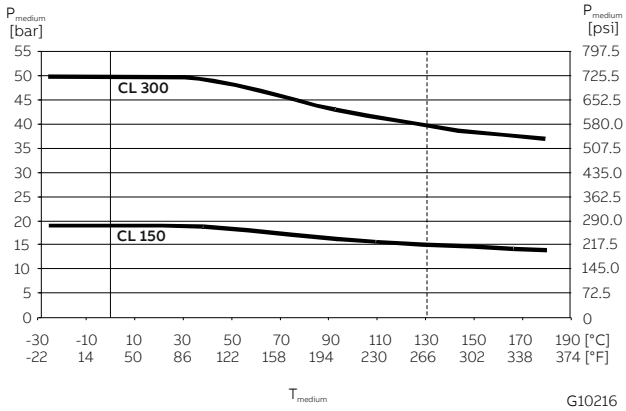


Fig. 7: ASME flange, stainless steel, up to DN 100 (4") (CL 150 / CL 300)

DN	Material	PN	T_{medium}	P_{medium}
DN 25 ... 100 (1 ... 4")	Stainless steel	10	-25 ... 130 °C (-13 ... 266 °F)	10 bar (145 psi)

Table 13: JIS 10K-B2210 flange

Wafer type devices

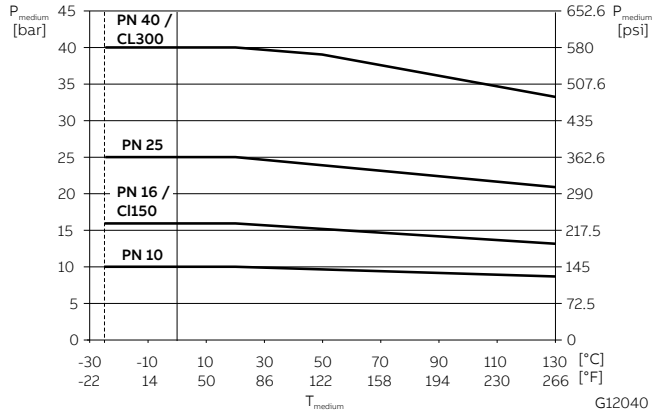


Fig. 8: Wafer type design

DN	Material	PN	T_{medium}	P_{medium}
DN 32 ... 100 (1 1/4 ... 4")	1.4404 1.4435 1.4301	10	25 ... 130 °C (-13 ... 266 °F)	10 bar (145 psi)

Table 14: JIS 10K-B2210 wafer type design

Installation conditions

General information

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 the 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.
- Only gaskets made from a material that is compatible with the measuring medium and measuring medium temperature may be used.
- Gaskets must not extend into the flow area, since possible turbulence could influence the accuracy of the device.
- The piping may not exert any inadmissible forces or torques on the device.
- Make sure temperature limits are not exceeded operating 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 gasket 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.
- 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 further information read and observe chapter ”Diagnostic functions” on page 5.

... Flowmeter sensor

Gaskets

The following points must be observed when installing gaskets:

- For achieve the best results, ensure the gaskets fit concentrically with the meter tube
- To ensure that the flow profile is not distorted, the gaskets must not protrude into the piping.
- The use of graphite with the flange or process connection gaskets is prohibited, because an electrically conductive coating may form on the inside of the meter tube.

Devices with a PFA liner

- In principle, devices with a PFA liner do not require additional gaskets.

Devices with a wafer-type design

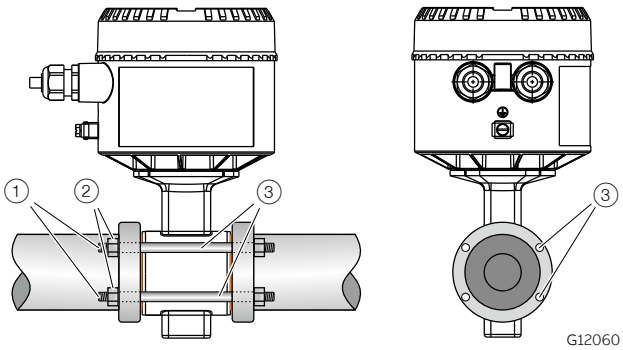


Fig. 9: Installation set for wafer-type installation (example)

For devices with a wafer-type design, ABB offers an installation set as an accessory that comprises threaded rods ①, nuts with washers ② and centering sleeves ③ for installation.

Flow direction

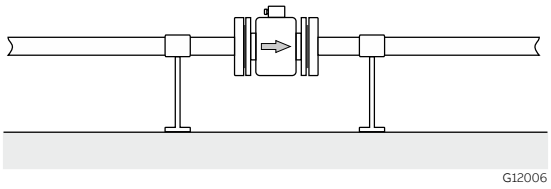


Fig. 1: Flow direction

The device measures the flowrate in both directions. Forward flow is the factory setting, as shown in Fig. 1.

Elektrode axis

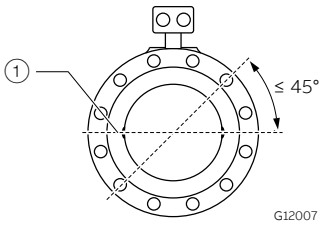


Fig. 10: Orientation of the electrode axis

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

Mounting position

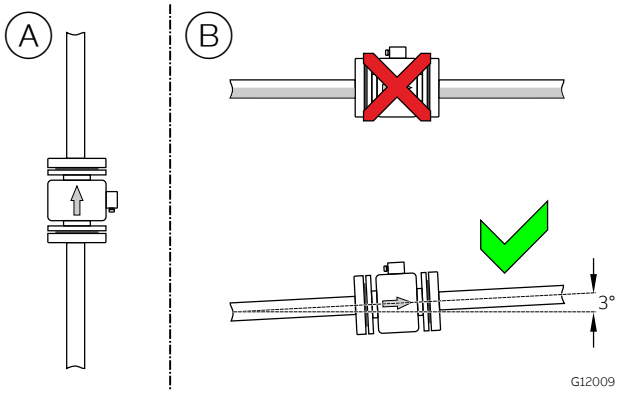


Fig. 11: Mounting position

Ⓐ Vertical installation for measuring abrasive fluids, preferably with flow in upward direction.
Ⓑ In case of horizontal installation, the Meter tube must always be completely full. Provide for a slight incline of the connection for degassing.

NOTICE
Prefer vertical installation in hygienic applications! With horizontal installation assure the sensor is self-drainable.

Minimum distance

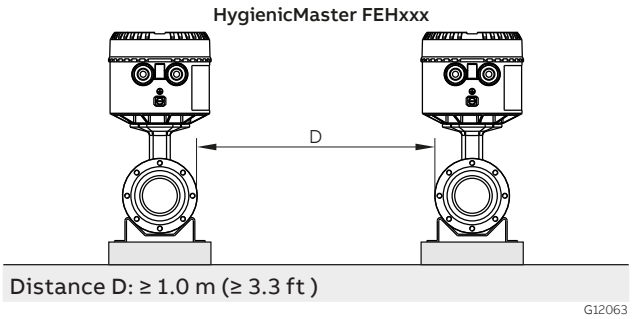


Fig. 2: Minimum distance

- In order to prevent the devices from interfering with each other, a minimum distance as shown in Fig. 2 must be maintained between the devices.
- The flowmeter sensor may 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) should be maintained.
- For installation on or to steel parts (e.g. steel brackets), a minimum spacing of approx. 100 mm (3.94 inch) should be maintained (based on IEC801-2 and IECTC77B.

Grounding

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

... Flowmeter sensor

Inlet and outlet sections

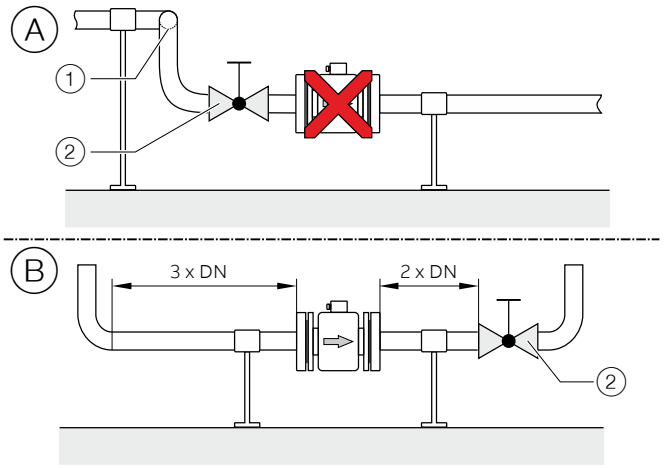


Fig. 14: In- and outlet section, turn-off component

Pos.	Description
①	Double elbow
②	Turn-off device

Table 15: Legend

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

Ⓐ Do not install fittings, manifolds, valves, etc., directly in front of the flowmeter sensor.

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

Free inlet or outlet

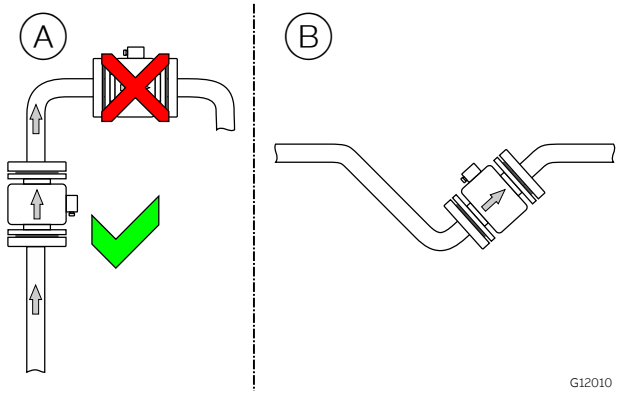


Fig. 15: Free inlet or outlet

Ⓐ Do not install the flowmeter at the highest point or in the draining off side of the pipeline, flowmeter runs empty, air bubbles can form.

Ⓑ Provide for a siphon fluid intake for free inlets or outlets so that the pipeline is always full.

Strongly contaminated measuring media

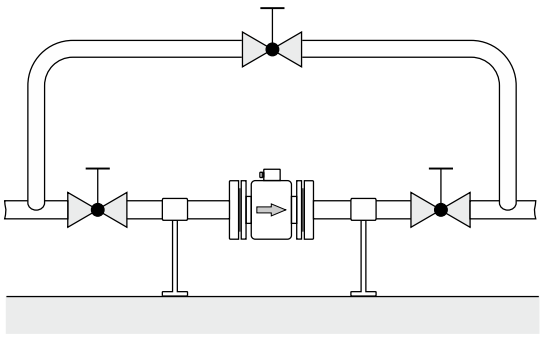


Fig. 16: Bypass connection

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

Installation in the vicinity of pumps

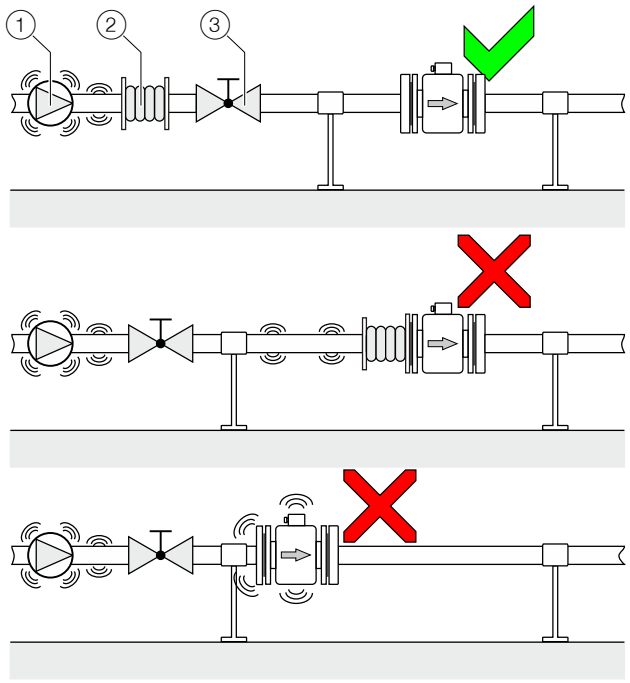


Fig. 14: Vibration damping

Pos.	Description
①	Pump
②	Damping device
③	Shut-off device

Table 16: Legend

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 pipelines with larger nominal diameters

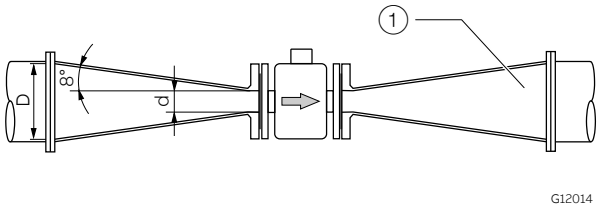


Fig. 15: Using reduction pieces

Determine the resulting pressure loss when using transition pieces ①:
1. Calculate the diameter ratio d/D.
2. Determine the flow velocity based on the flow rate nomogram (Fig. 4).
3. Read the pressure drop on the Y-axis in Fig. 4.

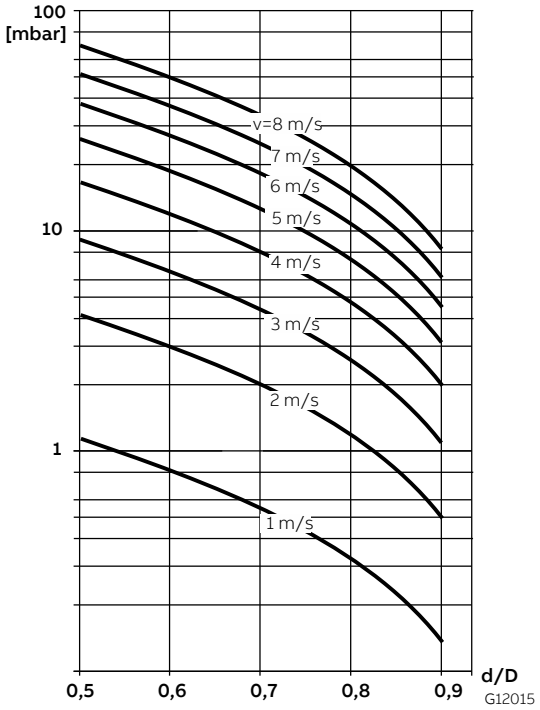


Fig. 4: Flow rate nomogram for pressure drop calculations for flange transition piece with α/2 = 8°

... Flowmeter sensor

Installation in 3A-compliant installations

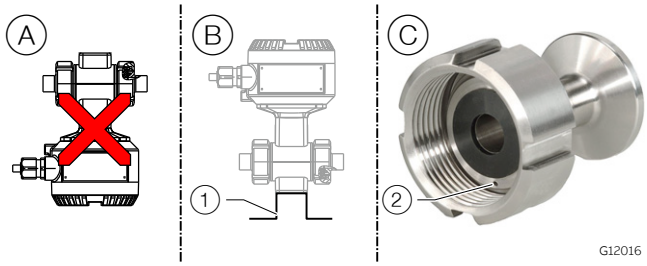


Fig. 16: 3A-compliant installation

Please observe the following points:

Ⓐ Do not install the device horizontally with the terminal box or transmitter housing pointing downward.

Ⓑ The "mounting bracket ① " option is not 3A-compliant.

Ⓒ Please ensure that the leakage hole ② of the process connection is located at the deepest point of the installed device.

- Prefer vertical installation. With horizontal installation make sure the sensor is self-drainable
- Make sure the sensor terminal compartment cover and / or the transmitter housing cover is tightened properly to ensure there is no gap between the base of the housing and the cover.

Only devices with following process connections are 3A-compliant:

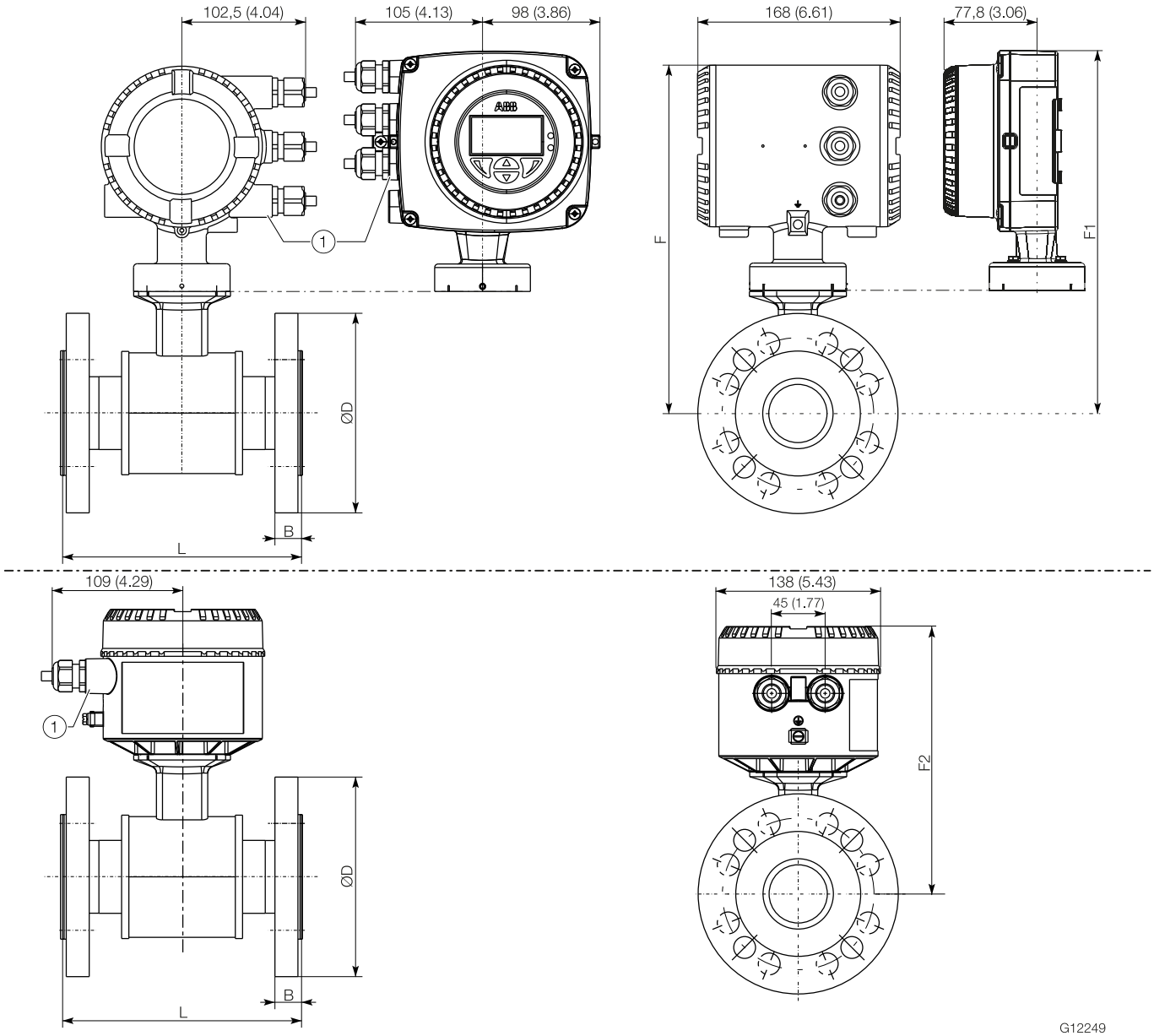
- Welded spuds
- Tri-Clamp

Dimensions

Flange DN 3 ... 100 (1/10 ... 4")

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



Integral 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.

Fig. 17

... Flowmeter sensor

Dimensions – Flange DN 3 ... 100 (1/10 ... 4")

Nominal diameter	Process connection	D	B	L[3]	F	F1	F2	Weight
DN 3 ... 8[1] (1/8 ... 5/16"[2])	EN 1092-1 PN 40	90 (3.54)	19 (0.75)	130 (5.12)	254 (10.0)	268 (10.55)	190 (7.56)	5 (11.02)
	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 10[1] (1/8 ... 3/8"[2])	EN 1092-1 PN 40	90 (3.54)	19 (0.75)	200 (7.84)	254 (10.0)	268 (10.55)	190 (7.56)	5 (11.02)
	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 PN 40	95 (3.74)	19 (0.75)	200 (7.84)	254 (10.0)	268 (10.55)	190 (7.56)	8 (17.64)
	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	95 (3.74)	15 (0.59)					
DN 20 (3/4")	EN 1092-1 PN 40	105 (4.13)	21 (0.83)	200 (7.84)	263 (10.35)	277 (10.91)	199 (7.83)	8 (17.64)
	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 PN 40	115 (4.53)	21 (0.83)	200 (7.84)	269 (10.59)	283 (11.14)	205 (8.07)	9 (19.84)
	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 PN 40	140 (5.51)	21 (0.83)	200 (7.84)	274 (10.79)	288 (11.34)	210 (8.27)	11 (24.25)
	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 PN 40	150 (5.91)	21 (0.83)	200 (7.84)	279 (10.98)	293 (11.54)	215 (8.46)	11 (24.25)
	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)					
DN 50 (2")	EN 1092-1 PN 40	165 (6.50)	23 (0.91)	200 (7.84)	289 (11.38)	303 (11.93)	225 (8.86)	11 (24.25)
	ASME B16.5, CL 150	152.4 (6.00)	22.1 (0.87)					
	ASME B16.5, CL 300	165.1 (6.50)	25.4 (1.00)					
	JIS 10K	155 (6.10)	19 (0.75)					

1) Connection flange DN 10
2) Connection flange 1/2"
3) Toleranz für L: +0 / -3 mm (+0 / -0,018 in.)

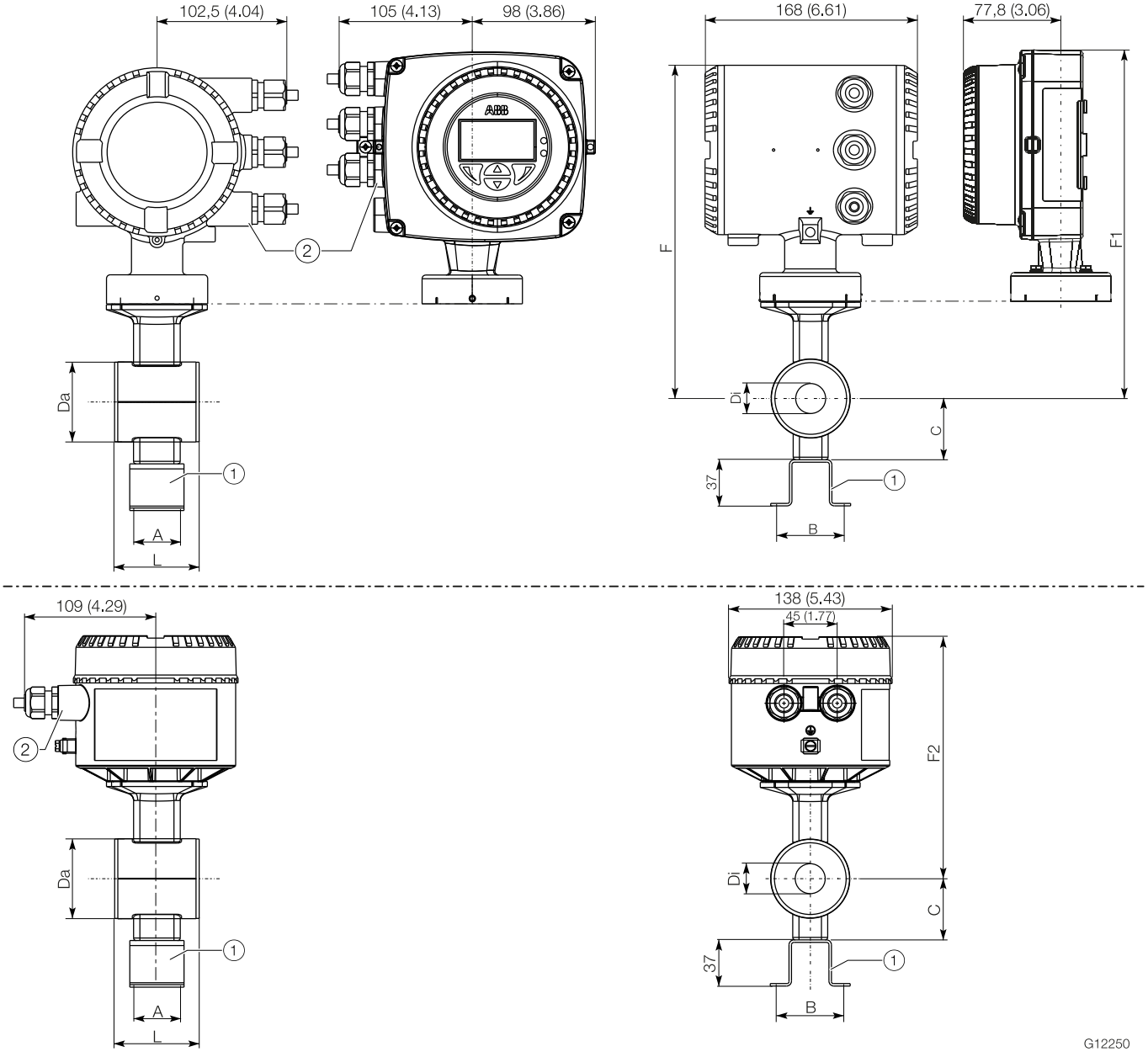
Dimensions – Flange DN 3 ... 100 (1/10 ... 4")								
Nominal diameter	**Process connection**	**D**	**B**	**L[3)]**	**F**	**F1**	**F2**	**Weight**
DN 65 (2 1/2")	EN 1092-1 PN 40	185 (7.28)	22 (0.87)	200 (7.84)	297 (11.69)	311 (12.24)	233 (9.17)	15 (33.07)
	EN 1092-1 PN 40	185 (7.28)	26 (1.02)					
	ASME B16.5, CL 150	177.8 (7.00)	25.4 (1.00)					
	ASME B16.5, CL 300	190.5 (7.50)	28.4 (1.12)					
	JIS 10K	175 (6.89)	21 (0.83)					
DN 80 (3")	EN 1092-1 PN 40	200 (7.87)	28 (1.10)	200 (7.84)	306 (12.05)	320 (12.60)	242 (9.53)	18 (39.68)
	ASME B16.5, CL 150	190.5 (7.50)	26.9 (1.06)					
	ASME B16.5, CL 300	209.6 (8.25)	31.4 (1.24)					
	JIS 10K	185 (7.28)	21 (0.83)					
DN 100 (4")	EN 1092-1 PN 40	220 (8.66)	24 (0.94)	200 (7.84)	320 (12.60)	334 (13.15)	256 (10.08)	21 (46.30)
	EN 1092-1 PN 40	235 (9.25)	28 (1.10)					
	ASME B16.5, CL 150	228.6 (9.00)	27.4 (1.08)					
	ASME B16.5, CL 300	254 (10.00)	35.8 (1.41)					
	JIS 10K	210 (8.27)	21 (0.83)					

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

... Flowmeter sensor

Wafer type, DN 3 ... 40 (1/10 ... 1 1/2")

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



① Bracket (optional), not available for 3A approval; For dimensions see Table: "Installation hole spacing for angle bracket"
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.

Fig. 18

Dimensions – Wafer type DN 3 ... 40 (1/10 ... 1 1/2")									
Nominal diameter	**Nominal pressure**	**Da**	**Di**	**C**	**L**	**F**	**F1**	**F2**	**Weight**
DN 3 ... 8 (1/8" ... 5/16")	See chapter "Material load" on page 14	45 (1.77)	3 ... 8 (0.12 ... 0.31)	39 (1.54)	68 (2.68)	254 (10.0)	268 (10.55)	190 (7.48)	3.5 (7.72)
DN 10 (3/8")			10 (0.39)						
DN 15 (1/2")			13 (0.51)						
DN 20 (3/4")		54 (2.13)	18 (0.71)	44 (1.73)	78 (3.07)	263 (10.35)	277 (10.91)	199 (7.83)	4 (8.82)
DN 25 (1")		63.4 (2.50)	24 (0.94)	48 (1.89)	90 (3.54)	269 (10.59)	283 (11.14)	205 (8.07)	4.5 (9.92)
DN 32 (1 1/4")		73 (2.87)	30 (1.18)	53 (2.09)	98 (3.86)	274 (10.79)	288 (11.34)	210 (8.27)	4.5 (9.92)
DN 40 (1 1/2")		82 (3.23)	36 (1.42)	57 (2.24)	103 (4.06)	279 (10.98)	293 (11.54)	215 (8.46)	5 (11.02)

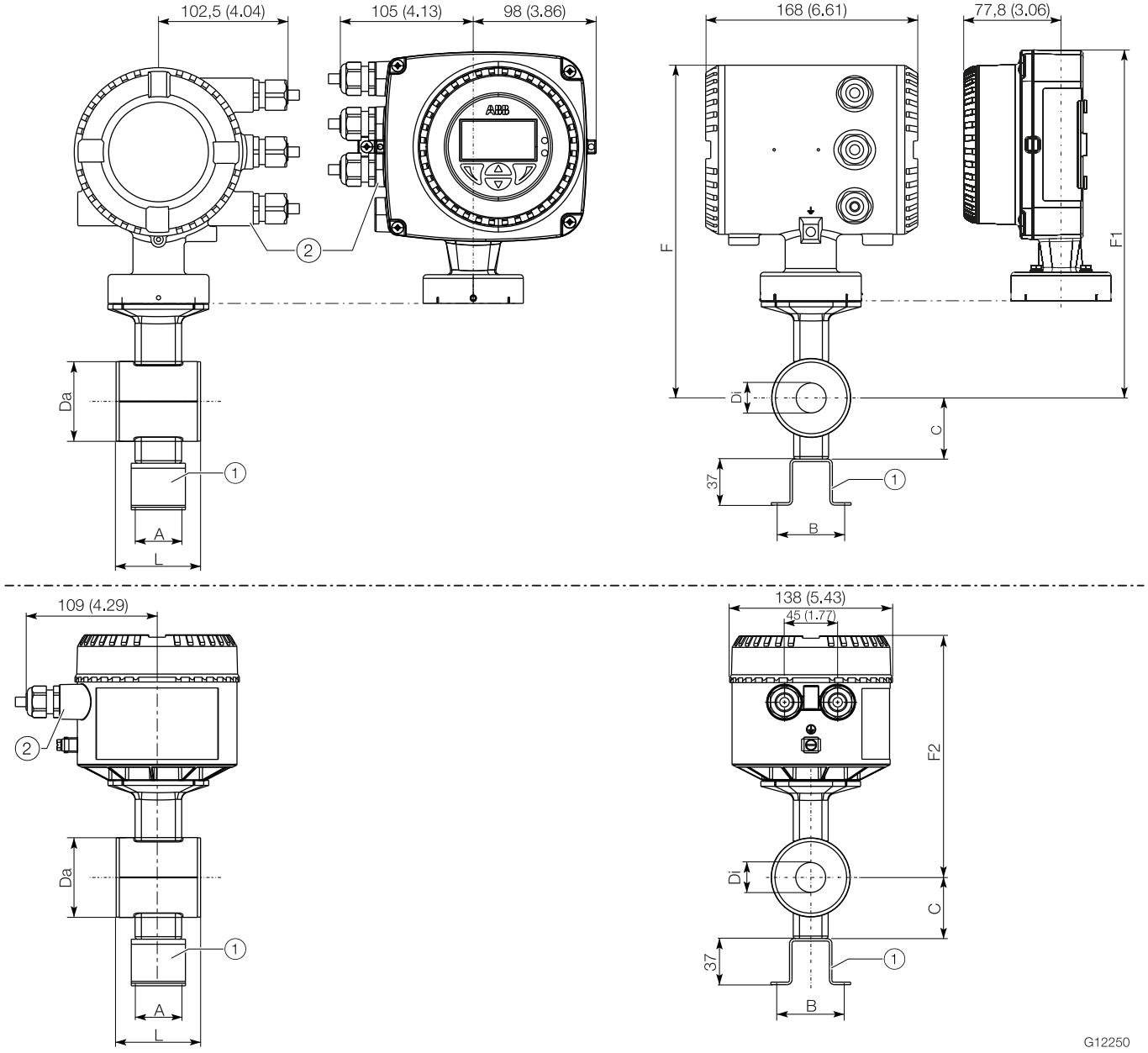
Tolerance for L: +0 / -3 mm (+0 / -0.018 in.)

Installation hole spacing for angle bracket		
Nominal diameter	**A**	**B**
DN 3 ... 20 (1/8" ... 3/4")	37 (1.46)	50 (1.97)
DN 25 ... 40 (1" ... 1 1/2")	42 (1.65)	70 (2.76)

... Flowmeter sensor

Wafer type. DN 50 ... 100 (2 ... 4")

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



① Bracket (optional), not available for 3A approval
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.

Fig. 19

Dimensions – Wafer type DN 50 ... 100 (2 ... 4")										
Nominal diameter	**Nominal pressure**	**Da**	**Di**	**C**	**L**	**L[1)]**	**F**	**F1**	**F2**	**Weight**
DN 50 (2")	See chapter "Material load" on page 14	99.6 (3.92)	47 (1.85)	62 (2.44)	117 (4.61)	117 (4.61)	289 (11.38)	303 (11.93)	225 (8.86)	5.5 (12.13)
DN 65 (2 1/2")		116 (4.57)	62 (2.44)	74 (2.91)	103 (4.06)	200 (7.87)	297 (11.69)	311 (12.24)	233 (9.17)	6 (13.23)
DN 80 (3")		133 (5.24)	74 (2.91)	86 (3.39)	103 (4.06)	200 (7.87)	306 (12.05)	320 (12.60)	242 (9.53)	7 (15.43)
DN 100 (4")		160.4 (6.31)	96 (3.78)	105 (4.13)	133 (5.24)	250 (9.84)	320 (12.60)	334 (13.15)	256 (10.08)	9 (19.84)

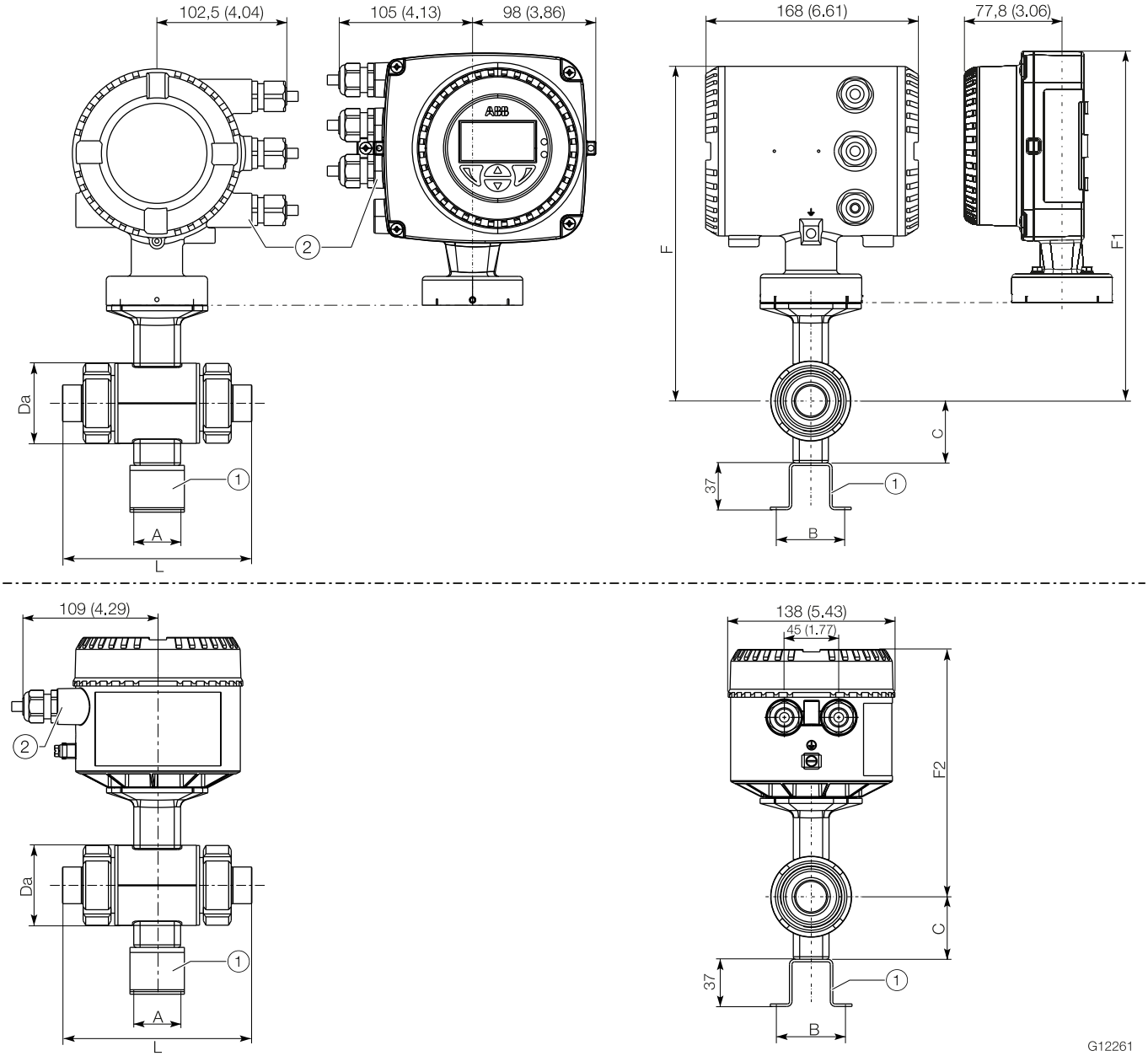
1) New Lay Length

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

... Flowmeter sensor

Variable process connections, DN 3 ... 40 (1/10 ... 1 1/2")

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



① Bracket (optional), not available for 3A approval; For dimensions see Table: "Installation hole spacing for angle bracket"
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.

Fig. 20

Dimensions – Variable process connections DN 3 ... 40 (1/10 ... 1 1/2")								
Nominal diameter	**Nominal pressure**	**Da**	**C**	**L**	**F**	**F1**	**F2**	**Weight[1)]**
DN 3 ... 8 (1/8" ... 5/16")	See chapter "Material load" on page 14	45 (1.77)	39 (1.54)	Installation length including adapter for process connection see chapter "Adapter for variable process connections DN 3 ... 100 (1/8" ... 4")" on page 32.	254 (10.0)	268 (10.55)	190 (7.48)	3.5 (7.72)
DN 10 (3/8")								
DN 15 (1/2")								
DN 20 (3/4")		54 (2.13)	44 (1.73)		263 (10.35)	277 (10.91)	199 (7.83)	4 (8.82)
DN 25 (1")		63.4 (2.50)	48 (1.89)		269 (10.59)	283 (11.14)	205 (8.07)	4.5 (9.92)
DN 32 (1 1/4")		73 (2.87)	53 (2.09)		274 (10.79)	288 (11.34)	210 (8.27)	4.5 (9.92)
DN 40 (1 1/2")		82 (3.23)	57 (2.24)		279 (10.98)	293 (11.54)	215 (8.46)	5 (11.02)

1) Plus process connection weight: See chapter "Adapter for variable process connections DN 3 ... 100 (1/8" ... 4")" on page 32.

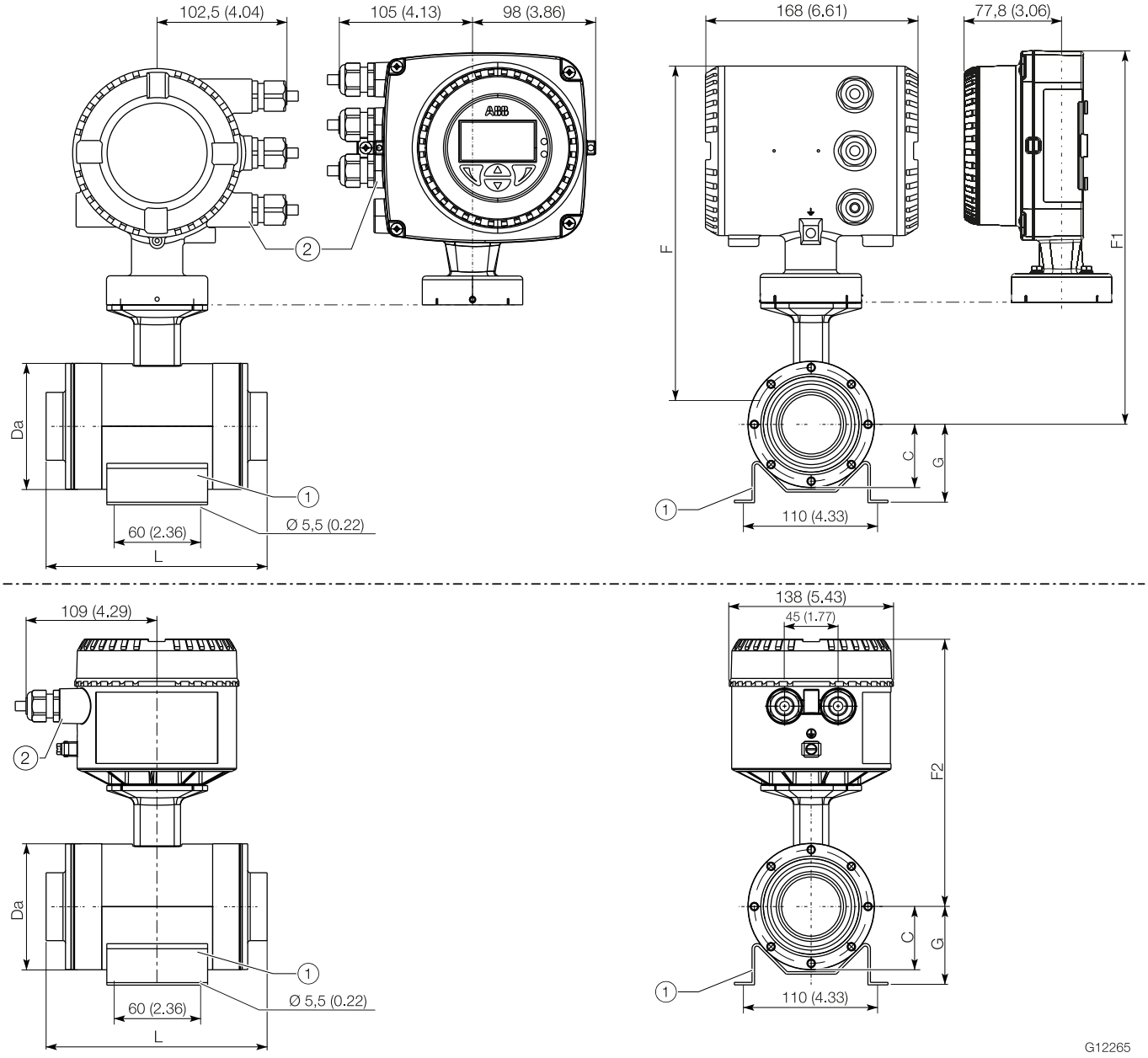
Tolerance for L: +0 / -3 mm (+0 / -0.018 in.)

Installation hole spacing for angle bracket		
Nominal diameter	**A**	**B**
DN 3 ... 20 (1/8" ... 3/4")	28 (1.1)	50 (1.97)
DN 25 ... 40 (1" ... 1 1/2")	46 (1.81)	70 (2.76)

... Flowmeter sensor

Variable process connections, DN 50 ... 100 (2 ... 4")

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



① Bracket (optional), not available for 3A approval
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.

Fig. 21

Dimensions – Variable process connections DN 50 ... 100 (2 ... 4")									
Nominal diameter	**Nominal pressure**	**Da**	**C**	**G**	**L**	**F**	**F1**	**F2**	**Weight[1)]**
DN 50 (2")	See chapter "Material load" on page 14	99.6 (3.92)	62 (2.44)	62 (2.44)	Installation length including adapter for process connection see chapter "Adapter for variable process connections DN 3 ... 100 (1/8" ... 4")" on page 32.	289 (11.38)	303 (11.93)	225 (8.86)	5.5 (12.13)
DN 65 (2 1/2")		116 (4.57)	74 (2.91)	74 (2.91)		297 (11.69)	311 (12.24)	233 (9.17)	6 (13.23)
DN 80 (3")		133 (5.24)	86 (3.39)	86 (3.39)		306 (12.05)	320 (12.60)	242 (9.53)	7 (15.43)
DN 100 (4")		160.4 (6.31)	105 (4.13)	105 (4.13)		320 (12.60)	334 (13.15)	256 (10.08)	9 (19.84)

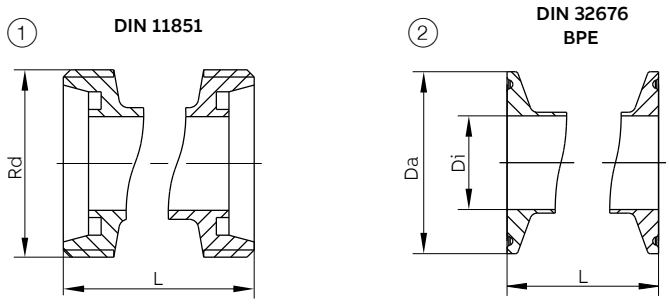
1) Plus process connection weight: See chapter "Adapter for variable process connections DN 3 ... 100 (1/8" ... 4")" on page 32.

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

... Flowmeter sensor

Adapter for variable process connections DN 3 ... 100 (1/8" ... 4")

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



① Food industry fitting acc. to DIN 11851 ② Tri-Clamp

Fig. 22

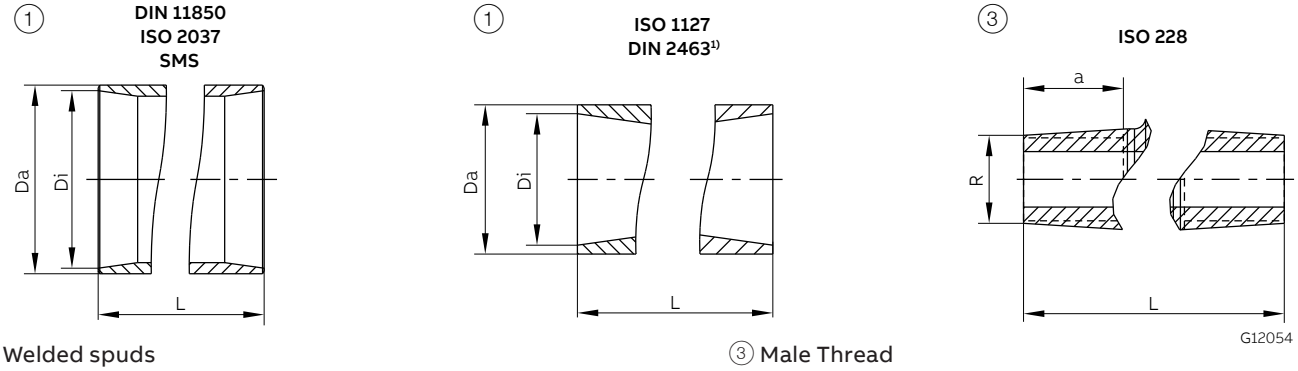
Food industry fitting acc. to DIN 11851						
Nominal diameter	**Nominal pressure**	**L (old[1)])**	**L (new[2)])**	**Thread**	**Ø Di**	**Weight**
DN 3 ... 10 (1/8 ... 3/8")	See chapter "Overview – Material load" on page 14	169 (6.65)	–	28 x 1/8"	10 (0.39)	0.5 (1.1)
DN 15 (1/2")				34 x 1/8"	16 (0.63)	
DN 20 (3/4")		180 (7.09)	–	44 x 1/6"	20 (0.79)	0.9 (2.0)
DN 25 (1")		207 (8.15)	–	52 x 1/6"	26 (1.02)	
DN 32 (1 1/4")		230 (9.06)	–	58 x 1/6"	32 (1.26)	1.4 (3.1)
DN 40 (1 1/2")		237 (9.33)	–	65 x 1/6"	38 (1.50)	
DN 50 (2")		243 (9.57)	–	78 x 1/6"	50 (1.97)	
DN 65 (2 1/2")		245 (9.65)	330.5 (13.01)	96 x 1/6"	66 (2.60)	2.2 (4.9)
DN 80 (3")		259 (10.20)	344.5 (13.56)	110 x 1/4"	81 (3.19)	3.2 (7.1)
DN 100 (4")		307 (12.09)	412.5 (16.24)	130 x 1/4"	100 (3.94)	4.4 (9.7)

1) Old Lay Length for replacement purposes only. Please refer to the model coding.
2) New Lay Length.

Tri-clamp											
		Acc. to DIN 32676					**Acc. to ASME BPE**				
		L	**Ø Da**	**Ø Di**	**Series**	**Weight**	**Process size**	**L**	**Ø Da**	**Ø Di**	**Weight**
DN 3 ... 10 (1/8 ... 3/8")	See chapter "Overview – Material load" on page 14	163 (6.42)	34 (1.34)	10 (0.39)	3	0.5 (1.1)	1/2"	143 (5.63)	25 (0.98)	9.4 (0.37)	0.5 (1.1)
DN 15 (1/2")				16 (0.63)			3/4"			15.7 (0.62)	
DN 20 (3/4")		168 (6.61)		20 (0.79)	3	0.7 (1.5)	1"		50.4 (1.98)	22.1 (0.87)	0.7 (1.5)
DN 25 (1")		192 (7.56)	50.5 (1.99)	26 (1.02)	3	0.8 (1.8)	1 1/2"	277 (34.8)		22.1 (0.87)	1.2 (2.7)
DN 32 (1 1/4")		209 (8.23)		32 (1.26)	3	1.5 (3.3)	–	–	–	–	–
DN 40 (1 1/2")		214 (8.43)		38 (1.50)	3	1.4 (3.1)	1 1/2"	277 (34.8)	50.4 (1.98)	34.8 (1.37)	1.8 (4.0)
DN 50 (2")		216 (8.50)	64 (2.52)	50 (1.97)	3	1.2 (2.7)	2"		63.9 (2.52)	47.5 (1.87)	
DN 65 (2 1/2")		221 (8.70)[1]	91 (3.58)	66 (2.60)	1	1.6 (3.5)	2 1/2"		77.4 (3.05)	60.2 (2.37)	2.0 (4.4)
		306.5 (12.07)[2]									
DN 80 (3")		225 (8.86)[1]	106 (4.17)	81 (3.19)	1	2.4 (5.3)	3"	337 (13.27)	90.9 (3.58)	72.9 (2.87)	3.6 (8.0)
		310.5 (12.22)[2]									
DN 100 (4")		255 (8.86)[1]	119 (4.69)	100 (3.94)	1	3.1 (6.8)	4"		118.8 (4.68)	97.4 (3.83)	4.1 (9.1)
		360.5 (14.19)[2]									

1) Old Lay Length for replacement purposes only. Please refer to the model coding.
2) New Lay Length.

... Flowmeter sensor



① Welded spuds ③ Male Thread

Fig. 23

Welded spuds											
Nominal diameter	**Nominal pressure**	**L**	**Acc. to DIN 11850**			**Acc. to ISO 1127**			**Acc. to SMS**		**Weight**
			Ø Da	**Ø Di**	**Series**	**Ø Da**	**Ø Di**	**Series**	**Ø Da**	**Ø Di**	
DN 3 ... 10 (1/8 ... 3/8")	See chapter "Overview – Material load" on page 14	127 (5.0)	13 (0.51)	10 (0.39)	2	13.5 (0.53)	10.3 (0.41)	1	•	—	0.4 (0.9)
DN 15 (1/2")			19 (0.75)	16 (0.63)		21.3 (0.84)	18.1 (0.71)		•	—	0.4 (0.9)
DN 20 (3/4")		132 (5.2)	23 (0.91)	20 (0.79)		26.9 (1.06)	23.7 (0.93)		•	—	0.7 (1.5)
DN 25 (1")		149 (5.87)	29 (1.14)	26 (1.02)		26.9 (1.06)	23.7 (0.93)		25 (0.98)	22.6 (0.89)	0.7 (1.5)
DN 32 (1 1/4")		166 (6.54)	34 (1.34)	32 (1.26)	1	33.7 (1.33)	30.5 (1.20)		•	—	1.0 (2.2)
DN 40 (1 1/2")		171 (6.73)	41 (1.61)	38 (1.50)	2	42.2 (1.66)	39 (1.54)	1	38 (1.50)	35.6 (1.40)	1.0 (2.2)
DN 50 (2")		173 (6.81)	54 (2.13)	50 (1.97)	3	51 (2.01)	47.8 (1.88)	2	51 (2.01)	48.6 (1.91)	1.0 (2.2)
DN 65 (2 1/2")		165 (6.50)[1)]	70 (2.76)	66 (2.60)	2	70 (2.76)	66 (2.60)	2	63.5 (2.50)	60.3 (2.37)	1.4 (3.1)
		250.5 (9.86)[2)]									
DN 80 (3")		169 (6.65)[1)]	85 (3.35)	81 (3.19)		76.1 (3.00)	72.9 (2.87)	1	76.1 (3.00)	72.9 (2.87)	2.0 (4.4)
		254.5 (10.02)[2)]									
DN 100 (4")		199 (7.83)[1)]	104 (4.09)	100 (3.94)		101.6 (4.00)	97.6 (3.84)	2	104 (4.09)	100 (3.94)	2.6 (5.7)
		304.5 (11.99)[2)]									

1) Old Lay Length for replacement purposes only. Please refer to the model coding.
2) New Lay Length.

Welded spuds							
Nominal diameter	**Nominal pressure**	**L**	**Acc. to DIN EN ISO 2037**		**Acc. to DIN 2463**		**Weight**
			Ø Da	**Ø Di**	**Ø Da**	**Ø Di**	
DN 3 ... 10 (1/8 ... 3/8")	See chapter "Overview – Material load" on page 14	127 (5.0)	12 (0.47)	10 (0.39)	13.5 (0.53)	10.3 (0.41)	0.4 (0.9)
DN 15 (1/2")			17.2 (0.68)	15.2 (0.60)	21.3 (0.84)	18.1 (0.71)	0.4 (0.9)
DN 20 (3/4")		132 (5.2)	21.3 (0.84)	19.3 (0.76)	26.9 (1.06)	23.7 (0.93)	0.7 (1.5)
DN 25 (1")		149 (5.87)	25 (0.98)	22.6 (0.89)	28 (1.10)	25 (0.98)	0.7 (1.5)
DN 32 (1 1/4")		166 (6.54)	33.7 (1.33)	31.3 (1.23)	35 (1.38)	32 (1.26)	1.0 (2.2)
DN 40 (1 1/2")		171 (6.73)	38 (1.5)	35.6 (1.40)	40 (1.57)	36.8 (1.45)	1.0 (2.2)
DN 50 (2")		173 (6.81)	51 (2.01)	48.6 (1.91)	52 (2.05)	49 (1.93)	1.0 (2.2)
DN 65 (2 1/2")		165 (6.50)[1]	63.5 (2.50)	60.3 (2.37)	70 (2.76)	66 (2.60)	1.4 (3.1)
		250.5 (9.86)[2]					
DN 80 (3")		169 (6.65)[1]	76.1 (3.00)	72.9 (2.87)	85 (3.35)	81 (3.19)	2.0 (4.4)
		254.5 (10.02)[2]					
DN 100 (4")		199 (7.83)1)	101.6 (4.00)	97.6 (3.84)	104 (4.09)	100 (3.94)	3.0 (6.6)
		304.5 (11.99)[2]					

1) Old Lay Length. Please refer to the model coding to specify the lay length (old lay length / new lay length). Old Lay Length for replacement purposes only.
2) New Lay Length.

Male Thread ccc. to ISO 228 / DIN 2999					
Nominal diameter	**Nominal pressure**	**L**	**R**	**a**	**Weight**
DN 3 ... 10 (1/8 ... 3/8")	See chapter "Overview – Material load" on page 14	139 (5.47)	3/8"	18 (0.71)	0.4 (0.9)
DN 15 (1/2")		139 (5.47)	1/2"	18 (0.71)	0.4 (0.9)
DN 20 (3/4")		164 (6.46)	3/4"	25 (0.98)	0.8 (1.8)
DN 25 (1")		179 (7.05)	1"	25 (0.98)	0.8 (1.8)

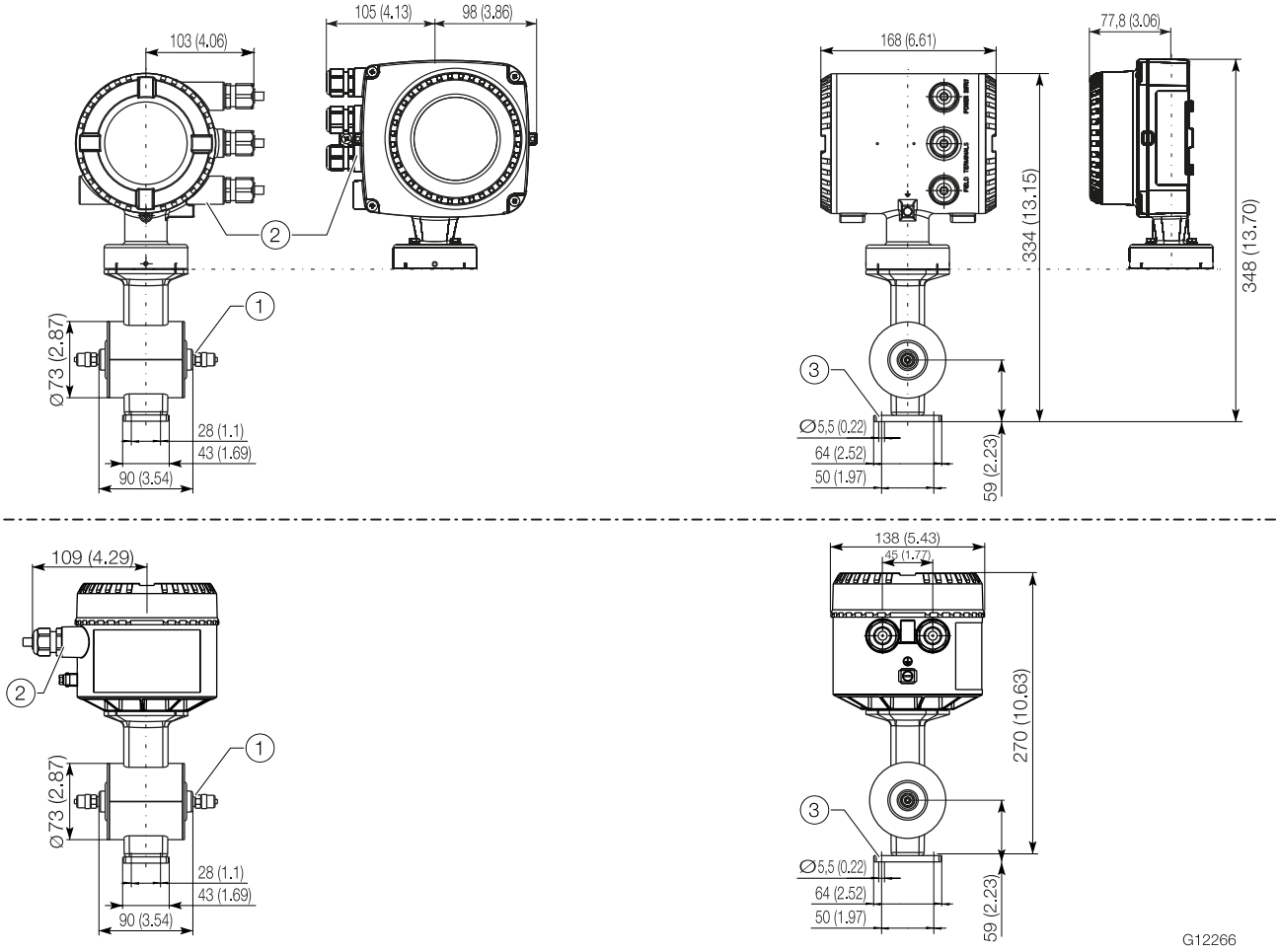
Welded spuds suitable for OD tubing						
Nominal diameter	**Nominal pressure**	**Weld spud size**	**Di**	**Da**	**L**	**Weight**
10 (3/8")	See chapter "Overview – Material load" on page 14	1/2"	9.40 (0.37)	12.70 (0.70)	127 (5.00)	0.4 (0.9)
15 (1/2")		3/4"	15.75 (0.62)	19.05 (0.75)	127 (5.00)	0.4 (0.9)
20 (1")		1"	22.10 (0.87)	25.40 (1.00)	132 (5.20)	0.7 (1.5)
25 (1")		1"	22.10 (0.87)	25.40 (1.00)	149 (5.87)	1.0 (2.2)
40 (1 1/2")		1 1/2"	34.80 (1.37)	38.10 (1.50)	171 (6.73)	
50 (2")		2"	47.50 (1.87)	50.80 (2.00)	173 (6.81)	

... Flowmeter sensor

1/8" sanitary connections DN 1 ... 2 (1/25 ... 3/32")

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



Integral mount design

① Connecting dimensions for gland: G 1/8" female thread
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.
③ Mounting bracket (standard)

Fig. 24

Process connection	PN	Weight
1/8" sanitary connectors – for hose 6 x 4 mm (0.24 x 0.16 in.)	10	5 (11.02)

Transmitter

Features

- 4 ... 20 mA current output
- Current output in the event of an alarm can be configured to 21 ... 22.6 mA (NAMUR NE43)
- Measuring range: Can be configured between 0.02 ... 2 x QmaxDN
- 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 for retrofitting additional current / digital outputs or a digital input.
- Damping: 0.04 ... 100 s configurable (1 τ)
- Low flow cut-off: 0 ... 20 % for current and pulse output
- Parameterization by means of HART communication
- Empty pipe detection[1)]
- Simulation of current and binary output (manual process execution)

1) 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)

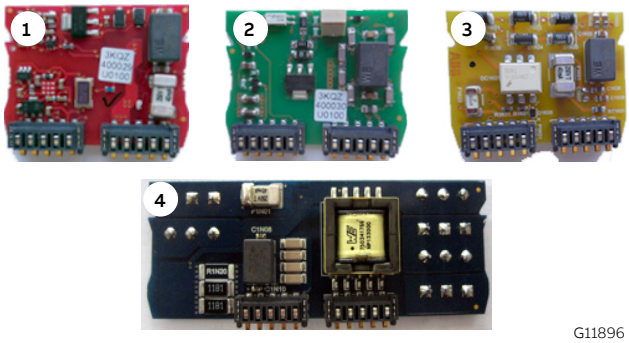
- High-contrast LCD indicator
- Display of the current flow rate as well as the total flow rate
- Application-specific visualizations which the user can select. Two operator pages can be configured to display multiple values in parallel.
- Plain text fault diagnostics
- Menu-guided parameterization with 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) in which plug-in cards can be inserted to provide additional inputs and outputs.
The slots are located on the transmitter motherboard and can be accessed after removing the front housing cover.



G11896

Fig. 25: Optional plug-in cards

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

Table 17: Available plug-in cards

NOTICE

For an overview of possible plug-in card combinations, please refer to chapter ”Optional plug-in cards” on page 37.

... Transmitter

IP rating

In accordance with EN60529: IP 65 / IP 67, NEMA 4X

Vibration

In accordance with EN 60068-2

- In the 10 ... 58 Hz range, max. deflection 0.15 mm (0.006 inch)[1)]
- In the range of 58 ... 150 Hz, max. acceleration 2 g[1)]

1) Peak load

Temperature data

	Standard	Optional
Ambient temperature	-20 ... 70 °C (-4 ... 158 °F)	-40 ... 70 °C (-40 ... 158 °F)
Storage temperature	-40 ... 70 °C (-40 ... 158 °F)	•

NOTICE

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).

Housing design

Integral mount design	
Housing	Cast aluminum, painted
Paint	≥ 80 µm thick, RAL 9002 (gray white)
Cable gland[1)]	Polyamide
	Stainless steel[2)]

Remote mount design	
Housing	Cast aluminum, painted
Paint	≥ 80 µm thick, RAL 9002 (gray white)
Cable gland[1)]	Polyamide Stainless steel[2)]
Weight	4.5 kg (9.92 lb)

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

Dimensions

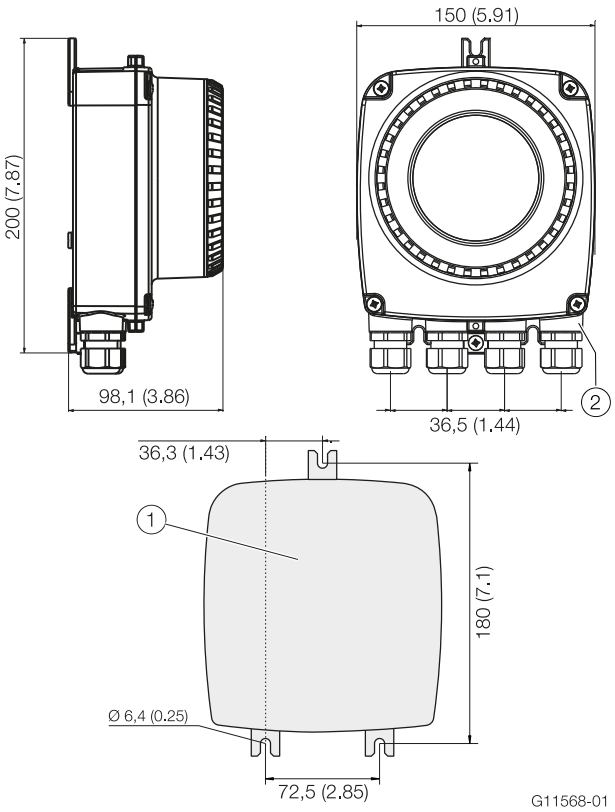


Fig. 26: Mounting dimensions single-compartment housing

Pos.	Description
①	Hole pattern for mounting holes
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

Table 18: Legend

Electrical connections

Connection diagram

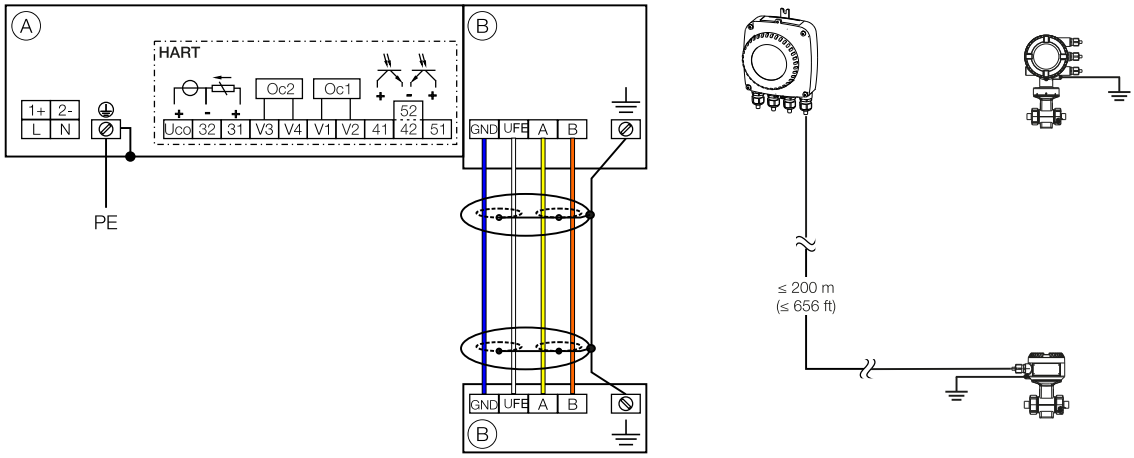


Fig. 27: Electrical connections

Pos.	Description
Ⓐ	Connections for power supply and inputs / outputs
Ⓑ	Connections for signal cable (remote mount design only)

Table 19: Legend

NOTICE
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)
⏚	Potential equalization

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

Connections for inputs and outputs

Terminal	Function / comments
Uco / 32 31 / 32	**Active 4 ... 20 mA current output / HART** or **Passive 4 ... 20 mA current output / HART**
41 / 42	**Passive digital output DO1**
51 / 52	**Passive digital output DO2**
V1 / V2 V3 / V4	**Plug-in card, slot Oc1** **Plug-in card, slot Oc2** For details, see chapter ”Optional plug-in cards” on page 37.

Connecting the signal cable

Only for remote mount design.
The sensor housing and transmitter housing must be connected to potential equalization.

Terminal	Function / comments
UFE	Sensor power supply
GND	Ground
A	Data line
B	Data line
⏚	Functional earth / Shielding

... Electrical connections

Electrical data for inputs and outputs

Power supply

AC power supply	
Terminals	L / N
Operating voltage	100 ... 240 V AC (-15 % / +10 %), 47 ... 64 Hz
Power consumption	Smax: < 20 VA
Switch-on current	18.4 A, t < 3 ms

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

HART communication

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

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

Current output U_{co} / 32, 31 / 32

Can be configured for outputting mass flow and volume flow.

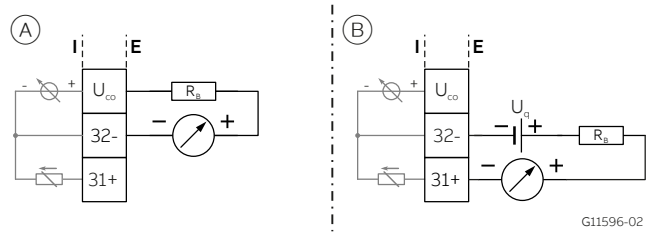
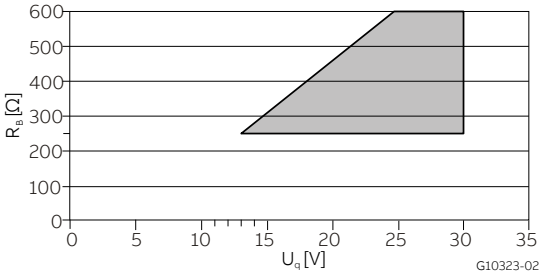


Fig. 28: (I = internal, E = external, R_B = load, U_q = Source voltage)

Ⓐ Active current output U_{co} / 32
Ⓑ Passive current output 31 / 32



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

Fig. 29: Source voltage for passive outputs

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

Table 20: Electrical data current output Uco / 32, 31 / 32

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

Digital output 41 / 42, 51 / 52

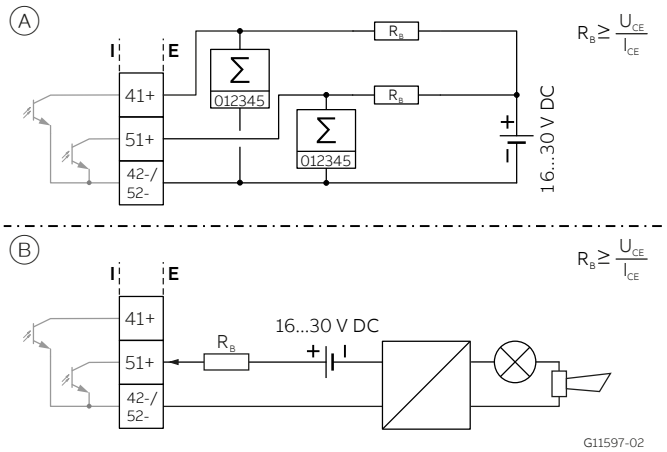


Fig. 30: (I = internal, E = external, R_B = load)

Ⓐ Passive digital output 41 / 42, 51 / 52 as pulse or frequency output
Ⓑ Passive digital output 51 / 52 as binary output

Pulse / frequency output (passive)	
Terminals	41 / 42, 51 / 52
Output "closed"	0 V ≤ U_{CEL} ≤ 3 V For f < 2.5 kHz: 2 mA < I_{CEL} < 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	0.1 … 2000 ms

Binary output (passive)	
Terminals	41 / 42, 51 / 52
Output "closed"	0 V ≤ U_{CEL} ≤ 3 V 2 mA ≤ I_{CEL} ≤ 30 mA
Output "open"	16 V ≤ U_{CEH} ≤ 30 V DC 0 mA ≤ I_{CEH} ≤ 0.2 mA
Switching function	Configurable

Table 21: Electrical data digital output 41 / 42, 51 / 52

NOTICE

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

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

Up to **two additional** current outputs can be implemented via the "Passive current output (red)" plug-in card.
The plug-in card can be used in slot OC1 **or** in OC2.

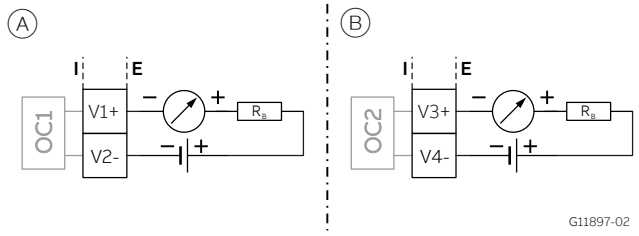
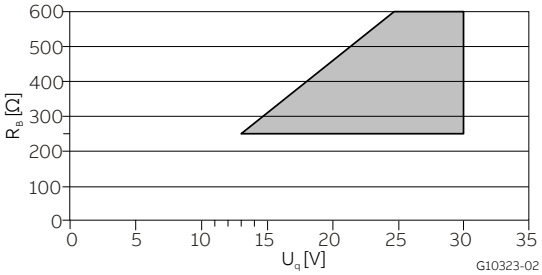


Fig. 31: (I = internal, E = external, R_B = load)

Ⓐ Passive current output V1 / V2
Ⓑ Passive current output V3 / V4



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

Fig. 32: Source voltage for passive outputs

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

Table 22: Electrical data current output V1 / V2, V3 / V4

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

... Electrical connections

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

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

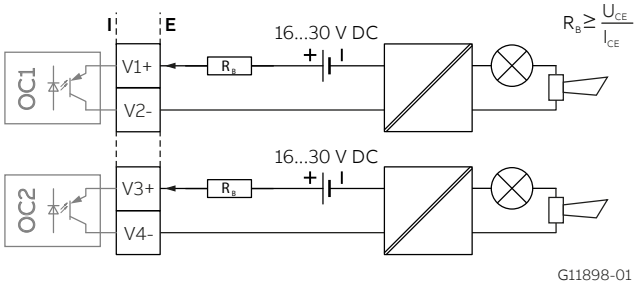


Fig. 33: Plug-in card as binary output (I = internal, E = external, R_B = load)

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

Table 23: Electrical data digital output V1 / V2, V3 / V4

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

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

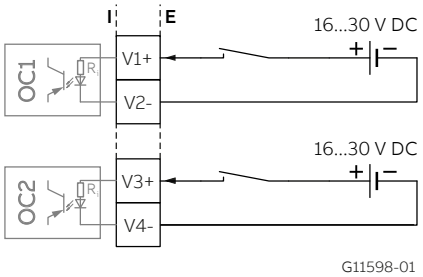


Fig. 34: Plug-in card as digital input (I = internal, E = external)

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

Table 24: Electrical data digital input V1 / V2, V3 / V4

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

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

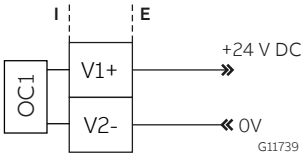


Fig. 35: (I = Internal, E = External)

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

Table 25: Electrical data plug-in card 24 V DC power supply V1 / V2

NOTICE

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

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

Active digital output 41 / 42, 51 / 52, V3 / V4
When the "24 V DC power supply (blue)" plug-in card is used, the digital outputs on the basic device and on the plug-in cards can also be wired as active digital outputs.

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

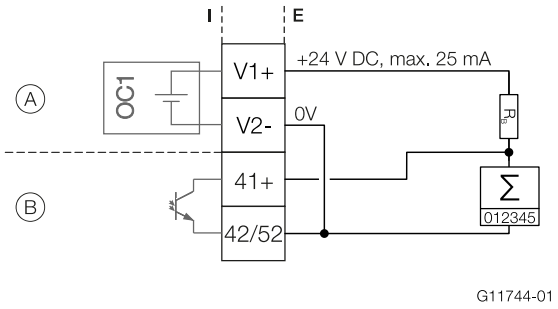


Fig. 36: Active digital output 41 / 42 (example)

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

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

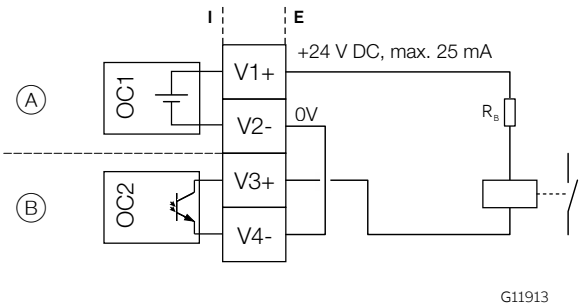


Fig. 37: Active digital output V3 / V4 (example)

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

Digital output 41 / 42, 51 / 52 passive connected to a Process Control System

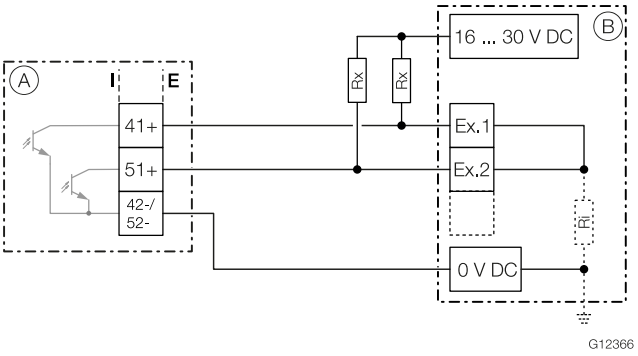


Fig. 38: Digital output 41 / 42, 51 / 52 passive connected to a Process Control System (Example)

Pos.	Description
Ⓐ	Transmitter
Ⓑ	Process Control System
Ex. 1	Input 1
Ex. 1	Input 2
R_x	Resistor limiting the current
R_i	Inner Resistor wit

Table 26 Legend

Resistor R_x limits the current of the transmitter's Optocoupler output. The max. current is 25 mA. With 24 V DC voltage R_x should be 1000 Ω / 1 W.
With „1“ (high state) at the digital output of the transmitter, the Input of the Process Control System will switch from 24 V DC to 0 V (low state).

... Electrical connections

Active current output V3 / V4

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

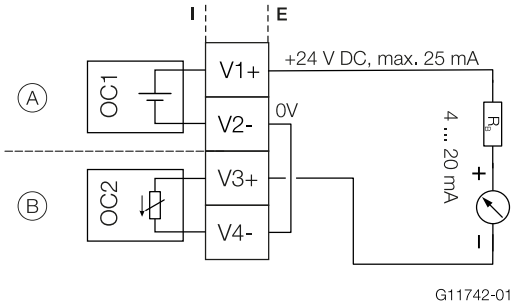


Fig. 39: Active current output V3 / V4 (example)

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

Active digital input V3 / V4

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

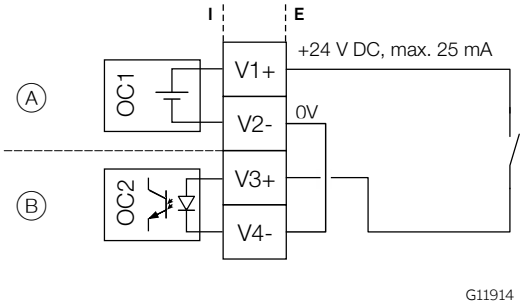


Fig. 40: Active digital input V3 / V4 (example)

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

Ordering Information

HygienicMaster FEH631

Electromagnetic Flowmeter system, integral mount, sensor housing stainless steel

HygienicMaster FEH631	7,8	9,10	11,12,13,14	15,16	...	77,78
Explosion Protection Certification						
Without	Y0					
Housing Type / Housing Material / Thread for Cable Glands						
Single compartment / Aluminium / M20 x 1.5	4)	S1				
Single compartment / Aluminium / NPT 1/2 in.	4)	S2				
Dual compartment / Aluminium / M20 x 1.5	3)	D1				
Dual compartment / Aluminium / NPT 1/2 in.	3)	D2				
Meter size						
DN 1 (1/25 in.)		5)	0001			
DN 1.5 (1/16 in.)		5)	9015			
DN 2 (1/12 in.)		5)	0002			
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			
Process Connection Type						
Flanges DIN PN 16				6)	D2	
Flanges DIN PN 40				7)	D4	
Flanges ASME CL150 B16.5					A1	
Flanges ASME CL300 B16.5					A3	
Flanges JIS 10K					J1	
Male Thread acc. to ISO 228				9)	M1	
1/8 in. Sanitary Connection				10)	M3	
Food industry fittings acc. DIN 11851				8)	F1	

Continued on next page

Ordering Information

HygienicMaster FEH631	7,8	...	15,16	17,18	19	20	21	...	77,78
Process Connection Type									
Weld stubs acc. ISO 2037		8)	R1						
Weld stubs acc. DIN 2463		8)	R2						
Weld stubs acc. DIN 11850		8)	R3						
Weld stubs acc. ISO 1127		8)	R4						
Weld stubs acc. OD tubing		11)	R5						
Weld stubs acc. SMS		12)	R6						
Tri-Clamp acc. DIN 32676		8)	T1						
Tri-Clamp acc. BPE		13)	T3						
Wafer		8)	W1						
Without adapter		14)	Y0						
Liner Material									
PFA				P1					
PEEK			10)	G1					
Others				Z9					
Process Connection Material									
Stainless steel				15)	C				
316L (1.4404) stainless steel with EPDM gasket					E				
316L (1.4404) stainless steel with EPDM gasket + mounting bracket				16)	F				
316L (1.4404) stainless steel with silicone gasket					**G**				
316L (1.4404) stainless steel with silicone gasket + mounting bracket				16)	H				
PVC with PTFE gasket + mounting bracket				17)	P				
POM with PTFE gasket + mounting bracket				17)	M				
Without process connection, without gasket, with mounting bracket				18)	W				
Without process connection, without gasket, without mounting bracket				19)	Y				
Others					Z				
Electrode Design									
Standard						1			
Pointed head					20)	5			
Others						9			
Measuring Electrodes Material									
Stainless steel 904 (1.4539)							A		
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		
Others							Z		

Continued on next page

HygienicMaster FEH631	7,8	...	22	23	24,25	26	27	28,29	30	31,32,33	34,35, 36	37,38	39,40,41	42,43,44	...	77,78
Grounding Electrode / Full Pipe Detection																
No grounding electrode / No full pipe detection			0													
Grounding electrode / No full pipe detection		21)	2													
Others			9													
Grounding Accessories																
Without				A												
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							22)	G0								
Design Level																
(Specified by ABB)								23)	A							
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						
Option Card 2																
Without											DS0					
1 x Analog Output passive (4...20mA)											DSA					
1 x Digital Input											DSN					
1 x Digital Output											DSG					
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. DAKKS												24)	CMD			
Other Usage Certifications																
Meter tube with PED certificate														CRP		

Continued on next page

Ordering Information

HygienicMaster FEH631	7,8	...	45,46,47	48,49	50,51	52,53	54,55,56	57,58,59	60,61,62	63,64,65	66,67,68	...	77,78
Potable Water and Food & Beverage Approvals													
3-A			CWG										
Without			CWY										
Sensor Length													
Old HygienicMaster Lay length for DN 65, DN 80, DN 100			25)	J4									
New HygienicMaster Lay length for DN 65, DN 80, DN 100			26)	J5									
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							
Tests and Reports													
Without							CR0						
Pressure test acc. to DIN							CPD						
Others							CRZ						
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										28)	RCD		
0,3% Factory Calibration (Option)										29)	RCE		
0,2% Factory Calibration (Option)										27)	RCB		
Signal Cable													
Without											SC0		

Continued on next page

HygienicMaster FEH631	7,8	...	69,70	71,72,73	74,75,76	77,78
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)			30)	TK1		
Standard design / -40 ... 60 °C (-40 ... 140 °F)			30)	TK4		
High temperature design / -20 ... 60 °C (-4 ... 140 °F)			31)	TKH		
High temperature design / -40 ... 60 °C (-40 ... 140 °F)			31)	TKK		
Number of Testpoints						
2 Points				32)	TV2	
3 Points				32)	TV3	
5 Points					TV5	
Verification Capability						
Disabled						V0
Enabled						V1

1) Not available with Single Compartment Housing
2) Not available with -40°C. Not available with Single Compartment Housing
3) Not available with Div1 in conjunction with -40°C
4) Not available with Zone 1 / Div. 1
5) Available with `1/8 in. Sanitary Connection and PEEK Liner
6) Available with DN 100 (4 in.) only
7) Available with DN 3 ... 80 (1/10 ... 3 in.)
8) For sizes and pressure rating available, refer to data sheet
9) Available for DN 3 ... DN 25
10) Available for DN 1 ... DN 2
11) Available for DN 3 ... DN 50
12) Available for DN 25, DN 40 ... DN 100
13) Not available for DN 32
14) For replacement purposes only
15) To be specified in case of process connection "flange"
16) No 3-A conformity
17) Available with sensor size DN 1 ... 2
18) No 3-A conformity. To be specified in case of Process Connection "Wafer" or Process Connection "Without Adapter"
19) To be specified in case of Process Connection "Wafer" or Process Connection "Without Adapter"
20) Available from DN 10
21) Grounding electrodes, material same as measuring electrodes material
22) Current output (active or passive) can be configured on site
23) Will be specified by ABB
24) Available with sensor size DN 50 ... DN 600 (2 ... 24 in.) / DN 800 (32 in.) and 5points Calibration
25) For replacement purposes
26) Not available for flange type sensors
27) Not available with size DN 1 ... 8. 0,2% calibration assumes 3 calibration points. If more than 3 calibration points are required, specify 5 points under "Number of test points".
28) 2 points calibration is Standard. If more than 2 testpoints are required, please specify 3 or 5 points with option "Number of Testpoints". Accuracy = 0.7 % of rate with size DN 1 ... 2. Accuracy = 0.4 % of rate with size > DN 3
29) Not available with size DN 1 ... 2. 3 or 5 testpoints to be specified
30) Max. fluid temperature with standard sensor design: 130 °C (266 °F) with Liner Material PFA
31) Max. fluid temperature with high temperature sensor design: 180 °C (356 °F) with PFA. High temperature sensor design available with Process Connection Type "Flange" only
32) Not available with Dakks calibration

Ordering Information

HygienicMaster FEH632

Electromagnetic Flowmeter system, remote mount, sensor housing stainless steel

HygienicMaster FEH632	7,8	9,10	11,12,13,14	15,16	...	79,80
Explosion Protection Certification						
Without	Y0					
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 1 (1/25 in.)		1)	0001			
DN 1.5 (1/16 in.)		1)	9015			
DN 2 (1/12 in.)		1)	0002			
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			
Process Connection Type						
Flanges DIN PN 16				2) D2		
Flanges DIN PN 40				3) D4		
Flanges ASME CL150 B16.5				A1		
Flanges ASME CL300 B16.5				A3		
Flanges JIS 10K				J1		
Male Thread acc. to ISO 228				5) M1		
1/8 in. Sanitary Connection				6) M3		
Food industry fittings acc. DIN 11851				4) F1		

Continued on next page

HygienicMaster FEH632	7,8	...	15,16	17,18	19	20	21	...	79,80
Process Connection Type									
Weld stubs acc. ISO 2037		4)	R1						
Weld stubs acc. DIN 2463		4)	R2						
Weld stubs acc. DIN 11850		4)	R3						
Weld stubs acc. ISO 1127		4)	R4						
Weld stubs acc. OD tubing		7)	R5						
Weld stubs acc. SMS		8)	R6						
Tri-Clamp acc. DIN 32676		4)	T1						
Tri-Clamp acc. BPE		9)	T3						
Wafer		4)	W1						
Without adapter		10)	Y0						
Liner Material									
PFA				P1					
PEEK			6)	G1					
Others				Z9					
Process Connection Material									
Stainless steel				11)	C				
316L (1.4404) stainless steel with EPDM gasket					E				
316L (1.4404) stainless steel with EPDM gasket + mounting bracket				12)	F				
316L (1.4404) stainless steel with silicone gasket					**G**				
316L (1.4404) stainless steel with silicone gasket + mounting bracket				12)	H				
PVC with PTFE gasket + mounting bracket				13)	P				
POM with PTFE gasket + mounting bracket				13)	M				
Without process connection, without gasket, with mounting bracket				14)	W				
Without process connection, without gasket, without mounting bracket				15)	Y				
Others					Z				
Electrode Design									
Standard						1			
Pointed head					16)	5			
Others						9			
Measuring Electrodes Material									
Stainless steel 904 (1.4539)							A		
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		
Others							Z		

Continued on next page

... Ordering Information

HygienicMaster FEH632	7,8	...	22	23	24,25	26	27	28,29	30	31,32,33	34,35, 36	37,38	39,40,41	42,43,44	...	79,80
Grounding Electrode / Full Pipe Detection																
No grounding electrode / No full pipe detection			0													
Grounding electrode / No full pipe detection		17)	2													
Others			9													
Grounding Accessories																
Without				A												
Protection Class Transmitter / Protection Class Sensor																
IP 67 / IP 67					70											
IP 67 / IP 68				18)	76											
IP 67 / IP 68, signal cable fitted and potted				19)	77											
Power Supply																
Without						Y										
Display																
Without							0									
Outputs																
Without								Y0								
Design Level																
(Specified by ABB)								20)	A							
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. DAKKS												21)	CMD			
Other Usage Certifications																
Meter tube with PED certificate														CRP		

Continued on next page

HygienicMaster FEH632	7,8	...	45,46,47	48,49	50,51	52,53	54,55	56,57,58	59,60,61	62,63,64	65,66,67	...	79,80
Potable Water and Food & Beverage Approvals													
3-A			CWG										
Without			CWY										
Power Supply Line Frequency													
50 Hz			22)	F5									
60 Hz			23)	F6									
Sensor Length													
Old HygienicMaster Lay length for DN 65, DN 80, DN 100				25)	J4								
New HygienicMaster Lay length for DN 65, DN 80, DN 100				26)	J5								
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						
Tests and Reports													
Without								CR0					
Pressure test acc. to DIN								CPD					
Others								CRZ					
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										28)	RCD		
0,3% Factory Calibration (Option)										29)	RCE		
0,2% Factory Calibration (Option)										27)	RCB		

Continued on next page

HygienicMaster FEH632	7,8	...	68,69,70	71,72	73,74,75	76,77,78	79,80
Signal Cable							
Without SC0			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				
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)					29) TK1		
Standard design / -40 ... 60 °C (-40 ... 140 °F)					29) TK4		
High temperature design / -20 ... 60 °C (-4 ... 140 °F)					30) TKH		
High temperature design / -40 ... 60 °C (-40 ... 140 °F)					30) TKK		
Number of Testpoints							
2 Points						31) TV2	
3 Points						31) TV3	
5 Points						TV5	
Verification Capability							
Disabled							V0
Enabled							V1

Notes for FEH632

1) Available with `1/8 in. Sanitary Connection and PEEK Liner
2) Available with DN 100 (4 in.) only
3) Available with DN 3 ... 80 (1/10 ... 3 in.)
4) For sizes and pressure rating available, refer to data sheet
5) Available for DN 3 ... DN 25
6) Available for DN 1 ... DN 2
7) Available for DN 3 ... DN 50
8) Available for DN 25, DN 40 ... DN100
9) Not available for DN 32
10) For replacement purposes only
11) To be specified in case of process connection "flange"
12) No 3-A conformity
13) Available with sensor size DN 1 ... 2
14) No 3-A conformity. To be specified in case of Process Connection "Wafer" or Process Connection "Without Adapter"
15) To be specified in case of Process Connection "Wafer" or Process Connection "Without Adapter"
16) Available from DN10
17) Grounding electrodes, material same as measuring electrodes material
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 sensor size DN 50 ... DN 600 (2 24 in.) / DN 800 (32 in.) and 5points 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) For replacement purposes
25) Not available for flange type sensors
26) Not available with size DN 1 ... 8. 0,2% calibration assumes 3 calibration points. If more than 3 calibration points are required, specify 5 points under "Number of test points".
27) 2 points calibration is Standard. If more than 2 testpoints are required, please specify 3 or 5 points with option "Number of Testpoints". Accuracy = 0.7 % of rate with size DN 1 ... 2. Accuracy = 0.4 % of rate with size > DN 3
28) Not available with size DN 1 ... 2; 3 or 5 testpoints to be specified
29) Max. fluid temperature with standard sensor design: 130 °C (266 °F) with Liner Material PFA
30) Max. fluid temperature with high temperature sensor design: 180 °C (356 °F) with PFA. High temperature sensor design available with Process Connection Type "Flange" only
31) Not available with Dakks calibration

… Ordering Information

Remote transmitter FET632

FET632 Electromagnetic Flowmeter, remote transmitter for HygienicMaster FEH630

Remote transmitter FET632	7,8	9,10	11,12	13	14	15,16	17,18,19	20,21,22	…	37,38,39
Explosion Protection Certification										
Without	Y0									
Housing Type / Housing Material / Thread for Cable Glands										
Field-mount / Single compartment / Aluminum / 4 x M20 x 1.5	3)	F1								
Field-mount / Single compartment / Aluminum / 4 x NPT 1/2 in.	3)	F2								
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						4) G0				
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			
Option Card 2										
Without								DS0		
1 x Analog Output passive (4…20mA)								DSA		
1 x Digital Input								DSN		
1 x Digital Output								DSG		

Continued on next page

Remote transmitter FET632	7,8	...	23,24,25	26,27	28,29	30,31	32,33,34	35,36	37,38,39
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									
Legacy support / Backward compatibility									NFL

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

Ordering Information

Accessories

Wafer type accessories

Wafer type accessories is for mounting purposes and include Bolts, nuts, lockwashers.

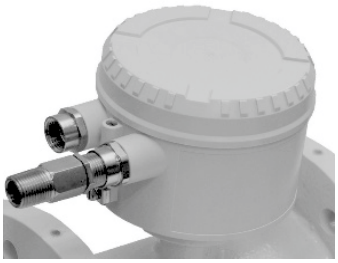
Nominal size	Nominal pressure	Order code
DN 3 ... DN 10 (1/10 ... 3/8 in.)	PN 10 ... PN 40	D614L265U03
	ASME CL 150	D614L265U03
	ASME CL 300	D614L265U04
DN 15 (1/2 in.)	PN 10 ... PN 40	D614L265U03
	ASME CL 150	D614L266U05
	ASME CL 300	D614L266U06
DN 20 (3/4 in.)	PN 10 ... PN 40	D614L267U04
	ASME CL 150	D614L267U05
	ASME CL 300	D614L267U06
DN 25 (1 in.)	PN 10 ... PN 40	D614L268U04
	ASME CL 150	D614L268U05
	ASME CL 300	D614L268U06
DN 32 (1-1/4 in.)	PN 10 ... PN 40	D614L269U04
	ASME CL 150	D614L269U05
	ASME CL 300	D614L269U06
DN 40 (1-1/2 in.)	PN 10 ... PN 40	D614L270U04
	ASME CL 150	D614L270U05
	ASME CL 300	D614L270U06
DN 50 (2 in.)	PN 10 ... PN 40	D614L296U04
	ASME CL 150	D614L296U05
	ASME CL 300	D614L296U06
DN 65 (2-1/2 in.) Old lay length	PN 10 ... PN 16	D614L297U08
	PN 25 ... PN 40	D614L297U09
	ASME CL 150	D614L297U10
	ASME CL 300	D614L297U11
DN 65 (2-1/2 in.) New lay length	PN 10 ... PN 16	D614L297U15
	PN 25 ... PN 40	D614L297U16
	ASME CL 150	D614L297U17
	ASME CL 300	D614L297U18
DN 80 (3 in.) Old lay length	PN 10 ... PN 40	D614L298U08
	ASME CL 150	D614L298U09
	ASME CL 300	D614L298U10
DN 80 (3 in.) New lay length	PN 10 ... PN 40	D614L298U15
	ASME CL 150	D614L298U17
	ASME CL 300	D614L298U18
DN 100 (4 in.) Old lay length	PN 10 ... PN 16	D614L299U07
	PN 25 ... PN 40	D614L299U08
	ASME CL 150	D614L299U09
DN 100 (4 in.) New lay length	PN 10 ... PN 16	D614L299U15
	PN 25 ... PN 40	D614L299U16
	ASME CL 150	D614L299U17

Welding adapter

The welding adapter is a tool for flowmeter sensors that feature welded spuds as the process connection type. It enables these welded spuds to be welded into the pipeline in a coplanar manner.
The welding adapter is made from stainless steel AISI 304 (1.4301)

Nominal size	Order code
DN 3 ... DN 10 (1/10 ... 3/8 in.)	D413C470U01
DN 15 (1/2 in.)	D413C471U01
DN 20 (3/4 in.)	D413C472U01
DN 25 (1 in.)	D413C473U01
DN 32 (1-1/4 in.)	D413C474U01
DN 40 (1-1/2 in.)	D413C475U01
DN 50 (2 in.)	D413C488U03
DN 65 (2-1/2 in.), old lay length	D413C461U09
DN 65 (2-1/2 in.), new lay length	D413C461U11
DN 80 (3 in.), old lay length	D413C496U03
DN 80 (3 in.), new lay length	D413C496U05
DN 100 (4 in.), old lay length	D413C498U03
DN 100 (4 in.), new lay length	D413C498U05

... Ordering Information

Description	Order code
Infrared service port adapter FZA100	FZA100
 G10788	
Installation set for NPT 1/2" cable gland. For sealing the cable conduit during outdoor installation.	3KXF081300L0001
 G12058	
Adapter M20x1.5 to 1/2"NPT	D365B269U01
 G12059	
Signal cable	D173D031U01

Sales

Service

Trademarks

® LINATEX is a registered trademark of LINATEX Ltd.
™ Hastelloy C is a trademark of Haynes International
™ Viton is a DuPont de Nemours trademark

Notes

Notes

ABB Limited
Measurement & Analytics
Oldends Lane
Stonehouse
Gloucestershire GL10 3TA
UK
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

ABB Automation Products GmbH
Measurement & Analytics
Dransfelder Str. 2
37079 Goettingen
Germany
Tel: +49 551 905-0
Fax: +49 551 905-777
Mail: vertrieb.messtechnik-produkte@de.abb.com

ABB Inc.
Measurement & Analytics
125 E. County Line Road
Warminster, PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Engineering (Shanghai) Ltd.
Measurement & Analytics
No. 4528, Kangxin Highway, Pudong New District
Shanghai, 201319,
P.R. China
Tel: +86(0) 21 6105 6666
Fax: +86(0) 21 6105 6677
Mail: china.instrumentation@cn.abb.com

abb.com/flow

3KXF232601R1001

DS/FEH630-EN Rev. C 02.2018