

fill level

water level

pressure

temperature

flow

regis-
trationvisual-
izationsignal
convertersensor
technic

UPS



Data Sheet db_flowcont_fn_en

Electromagnetic Flowmeter Flowcont FN

■ Intuitive operation

- The "Easy Set-up" function guides you through the menu step by step, enabling easy, quick, and reliable parameterization. The softkey-based functionality makes handling a breeze - it's just like using a cell phone.

■ Non-contact buttons

- Enable the device to be parameterized without the need to open the housing

■ Diagnostics for real-life situations

- Operational reliability monitoring for the device and the industrial process. Status messages are classified in accordance with NAMUR recommendations. Diagnostics-related help text on the display facilitates troubleshooting.

■ Maximum measuring accuracy

- A high excitation frequency and modern filtering methods allow maximum accuracy (max. measuring error: 0.2 % of measured value).

■ Universal transmitter

- Reduces spare parts inventory costs and storage costs

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

- Prevents errors and enables quick and reliable commissioning

■ Approvals for explosion protection

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



The process industry's first choice

ACS-CONTROL-SYSTEM
know how mit System

Your partner for measuring technology and automation



The Company

We are an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications. As part of ACS, a world leader in process automation, we offer customers application expertise, service and support worldwide. We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support. The quality, accuracy and performance of the company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology. Over ten flow calibration plants are operated by ACS, which is indicative of our dedication to quality and accuracy.

Introduction

Setting the Standard

Flowcont FN is designed specifically for the process industry. It meets the stringent demands for enhanced metering, allowing more efficient and cost effective operation and compliance with increasing requirements.

Flowcont FN's modular design offers the industry's widest range of liners, electrodes and sizes to meet the needs of even the most demanding applications.

State-of-the-art Diagnostics and Simplified Troubleshooting

Flowcont FN monitors its own operability and your process.

The diagnostic parameters can be set to a limit value and an alarm can be activated as soon as the limit is exceeded.

The infrared port makes the export of recorded data for further analysis and evaluation very easy. This enables the identification and elimination of critical factors at an early stage. As a result, the process can be optimized for greater productivity and less downtime.

In accordance with NAMUR NE107, alarms and warnings are classified with the status classifications such as 'maintenance required,' 'function check,' 'failure,' and 'outside of specification.'

In an alarm situation, the display simplifies troubleshooting by indicating the steps to be taken to solve the problem.

Superior control through advanced sensor design

Revolutionary self-cleaning and double sealed electrodes enhance reliability and performance. Using a higher excitation frequency combined with advanced filtering, Flowcont FN improves accuracy by separating the noise from the electrode signal. This leads to an accuracy of up to $\pm 0.2\%$.

All Data is stored in the right place – the Sensor

Advanced data storage inside the sensor eliminates the need to match sensor and transmitter in the field. The on-board sensor memory eliminates the opportunity for errors.

On initial installation, the self-configuration sequence automatically replicates all data into the transmitter leading to increased speed of start-up. The redundant data in both the sensor and the transmitter memory is continually updated during all operations to ensure total integrity of the measurement.

Intuitive navigation and configuration

The user-friendly interface allows quick and simple data entry for all parameters. „Easy Set-up“ guides the operator step-by-step through the menu to set parameters as fast as possible, thereby simplifying the commissioning phase.

With the softkey functionality, the configuration is as simple as using a mobile phone.

Powerful and flexible transmitter

The backlit, graphical display can be easily rotated through 270 degrees without the need for any tools.

'Through-the-glass' control allows access to the meter in hazardous areas without the need to remove the cover.

The ACS universal Human Machine Interface (HMI) simplifies operation, maintenance and training; thereby reducing cost of ownership and providing one common user experience.

All product versions utilize a common electronics cartridge to simplify installation and reduce the number of spare parts. The same cartridge is used in both integral and remote installations and features active/passive current and pulse outputs. Standard HART protocol enables online modification and monitoring of parameters.

Flowcont FN sets the standard for the process industry. The product line meets the various requirements of NAMUR, such as NE21, NE43, NE70, NE80...

Flowcont FN is a universal device according to the pressure equipment directive.

In compliance with the requirements of NAMUR, the devices are categorized under category III for pipelines. This means that they can be used anywhere. This reduces inventory stock costs and increases safety.




Assured Quality

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

Contents

1 Flowcont FN - Overview of technology	4
2 Performance specifications	5
2.1 General.....	5
2.2 Reproducibility, response time	5
2.3 Transmitter	5
2.4 Flowmeter sizes, flow range.....	6
3 Functional specifications	7
3.1 Flowmeter sensor.....	7
4 Ex relevant specifications	15
4.1 General.....	15
4.2 Electrical data.....	15
4.3 Temperature values	15
5 Installation requirements	18
5.1 Grounding.....	18
5.2 Mounting.....	18
6 Dimensions	20
6.1 Flange, DN 3 ... 125 (1/10 ... 5")	20
6.2 Flange DN 150 ... 400 (6 ... 16")	22
6.3 Flange DN 450 ... 1000 (18 ... 40")	24
6.4 Flange DN 15 ... 200 (1/2 ... 8"), high-pressure versions PN 63 and PN 100	26
6.5 Flange DN 15 ... 200 (1/2 ... 8"), high-pressure version CL 600	27
6.6 Transmitter housing and suggested installation method.....	28

1 Flowcont FN - Overview of technology

Overview of models		
Compact design	Design with remote transmitter	
<p>FN--A (without explosion protection) FN--A Ex (with explosion protection)</p>  <p>G00487</p>	<p>FN--G (without explosion protection) : N--G Ex (with explosion protection)</p>  <p>G00489</p> <p>Flowmeter sensor</p>	<p>AI : B6 &&& (without explosion protection) AI : B6 &&& 91 (with explosion protection)</p>  <p>G00490</p> <p>Transmitter</p>
<p>ATEX II 3 G Ex nA nC IIC T4 ... T3 II 2 D Ex tD A21 IP6X T70 °C ... T_{medium}</p>	<p>ATEX II 3 G Ex nA IIC T6 ... T3 II 2 D Ex tD A21 IP6X T85 °C ... T_{medium}</p>	
<p>IEC Ex nA nC IIC T4 ... T3 Ex tD A21 IP6X T70 °C ... T_{medium}</p>	<p>IEC Ex nA IIC T6 ... T3 Ex tD A21 IP6X T85 °C ... T_{medium}</p>	
<p>FM Ni: CL I, II / DIV2 / GP ABCDFG / T4 ... T3 CL III / DIV1, 2 / T4 ... T3 CL I ZN2 AEx nA nC IIC T4 ... T3 DIP: CL II, III / DIV1 / GP EFG / T70 °C ... T_{medium} AEx tD 21 T70 °C ... T_{medium}</p> <p>cFM Ni: CL I, II / DIV2 / GP ABCDFG / T4 ... T3 CL III / DIV1, 2 / T4 ... T3 CL I ZN2 Ex nA nC IIC T4 ... T3 DIP: CL II, III / DIV1 / GP EFG / T70 °C ... T_{medium} DIP A21 T_A T70 °C ... T_{medium}</p>	<p>FM NI: CL I, II / DIV2 / GP ABCDFG / T6 ... T3 CL III / DIV1, 2 / T6 ... T3 CL I ZN2 AEx nA nC IIC T4 ... T3 DIP: CL II, III / DIV1 / GP EFG / T85 °C ... T_{medium} AEx tD 21 T70 °C ... T_{medium}</p> <p>cFM NI: CL I, II / DIV2 / GP ABCDFG / T6...T3 CL III / DIV1, 2 / T6...T3 CL I ZN2 Ex nA nC IIC T4 ... T3 DIP: CL II, III / DIV1 / GP EFG / T85 °C ... T_{medium} DIP A21 T_A 85 °C ... T_{medium}</p>	<p>FM NI: CL I, II / DIV2 / GP ABCDFG / T4 CL III / DIV1, 2 / T4 DIP: CL II, III / DIV1 / GP EFG / T70 °C</p> <p>cFM NI: CL I, II / DIV2 / GP ABCDFG / T4 CL III / DIV1, 2 / T4 DIP: CL II, III / DIV1 / GP EFG / T70 °C</p>

Model number	FN--A, FN--A Ex, FN--G, FN--G Ex, AI : B6 &&&, AI : B6 &&& 91
Measured value error	Standard: 0.4 % of measured value Option: 0.2 % of measured value
Nominal size range	DN 3 ... 2000 (1/10 ... 80 ")
Process connection	Flange in accordance with DIN 2501/EN 1092-1, ASME B16.5/B16.47, JIS 10K
Nominal pressure	PN 10 ... 100, ASME CL 150, 300, 600
Lining	Hard rubber (DN 15 ... 2000), soft rubber (DN 50 ... 2000), PTFE (DN 10 ... 600), PFA (DN 3 ... 200), ETFE (DN 25 ... 1000)
Conductivity	> 5 µS/cm (20 µS/cm for demineralized water)
Electrodes	Stainless steel 1.4571 [316Ti], 1.4539 [904L], Hastelloy B, Hastelloy C, platinum-iridium, tantalum, titanium
Process connection material	Steel, stainless steel 1.4571 [316Ti]
Protection type	IP 65, IP 67, IP 68, (NEMA 4X)
Medium temperature	-25 ... 180 °C (-13 ... 356 °F)
Approvals	
Explosion protection approvals	ATEX/IECEx Zone 2, 21, 22 FM/cFM Div 2
Pressure Equipment Directive 97/23/EC	Conformity assessment in accordance with category III, fluid group 1
CRN (Canadian Reg. Number)	On request
Transmitter	
Supply power	100 ... 230 V AC (-15/+10 %), 24 V AC (-30/+10 %), 24 V DC (-30/+30 %)
Current output	4 ... 20 mA, active or passive
Pulse output	Can be configured locally as active or passive using software
Contact output	Optocoupler, programmable function
Contact input	Optocoupler, programmable function
Display	Graphical display, configurable
Housing	Compact design or design with separate transmitter
Communication	HART protocol (standard)

For food and beverage and pharmaceutical applications, refer to the Flowcont LN data sheet

2 Performance specifications

2.1 General

2.1.1 Reference conditions according to EN 29104

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

2.1.2 Maximum measuring error

Pulse output

- Standard calibration:
 $\pm 0.4 \%$ of measured value, $\pm 0.02 \%$ Q_{maxDN}
- Optional calibration:
 $\pm 0.2 \%$ of measured value, $\pm 0.02 \%$ Q_{maxDN}

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

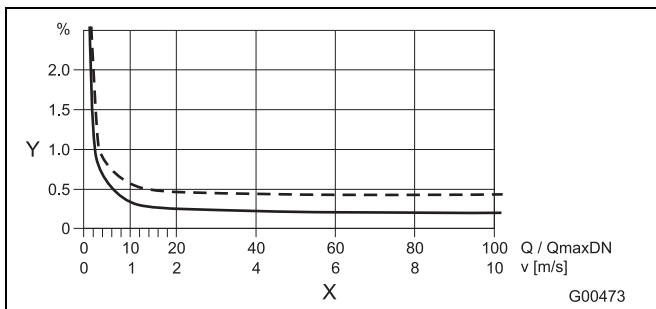


Fig. 1

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

Analog output effects

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

2.2 Reproducibility, response time

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

2.3 Transmitter

2.3.1 Electrical properties

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

2.3.1.1 Inputs/outputs

Isolation of input/outputs

The current output, digital outputs DO1 and DO2, and digital input are electrically isolated from the flowmeter sensor input circuit and from each other.

2.3.1.2 Empty pipe detection

The "empty pipe detection" function requires:

Conductivity $\geq 20 \mu\text{S/cm}$, signal cable length ≤ 50 m (164 inch), DN \geq DN 10

2.3.2 Mechanical properties

Compact design (transmitter mounted directly on the flowmeter sensor)	
Housing	Cast aluminum, painted
Paint	Paint coat 60 μm thick, RAL 9002 (light gray)
Cable gland	Polyamide
Design with external transmitter	
Housing	Cast aluminum, painted
Paint	Paint coat 60 μm thick, mid-section RAL 7012 (dark gray), front cover/rear cover RAL 9002 (light gray)
Cable gland	Polyamide
Weight	4.5 kg (9.92 lb)

2.3.2.1 Storage temperature, ambient temperature

Ambient temp.

-20 ... 60 °C (-4 ... 140 °F) standard
-40 ... 60 °C (-40 ... 140 °F) Advanced mode

Storage Temperature

-20 ... 70 °C (-4 ... 158 °F)

2.3.2.2 Protection class for transmitter housing

IP 65 / IP 67, NEMA 4X

2.3.2.3 Vibration according to EN 60068-2

Transmitter

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

* = Peak load

2.4 Flowmeter sizes. flow range

Meter size		Min. flow range end value	Q _{max} _{DN}
DN	"	0.02 x Q _{max} DN (≈ 0.2 m/s)	0 ... ≈ 10 m/s
3	1/10	0.08 l/min (0.02 US gal/min)	4 l/min (1.06 US gal/min)
4	5/32	0.16 l/min (0.04 US gal/min)	8 l/min (2.11 US gal/min)
6	1/4	0.4 l/min (0.11 US gal/min)	20 l/min (5.28 US gal/min)
8	5/16	0.6 l/min (0.16 US gal/min)	30 l/min (7.93 US gal/min)
10	3/8	0.9 l/min (0.24 US gal/min)	45 l/min (11.9 US gal/min)
15	1/2	2 l/min (0.53 US gal/min)	100 l/min (26.4 US gal/min)
20	3/4	3 l/min (0.79 US gal/min)	150 l/min (39.6 US gal/min)
25	1	4 l/min (1.06 US gal/min)	200 l/min (52.8 US gal/min)
32	1 1/4	8 l/min (2.11 US gal/min)	400 l/min (106 US gal/min)
40	1 1/2	12 l/min (3.17 US gal/min)	600 l/min (159 US gal/min)
50	2	1.2 m ³ /h (5.28 US gal/min)	60 m ³ /h (264 US gal/min)
65	2 1/2	2.4 m ³ /h (10.57 US gal/min)	120 m ³ /h (528 US gal/min)
80	3	3.6 m ³ /h (15.9 US gal/min)	180 m ³ /h (793 US gal/min)
100	4	4.8 m ³ /h (21.1 US gal/min)	240 m ³ /h (1057 US gal/min)
125	5	8.4 m ³ /h (37 US gal/min)	420 m ³ /h (1849 US gal/min)
150	6	12 m ³ /h (52.8 US gal/min)	600 m ³ /h (2642 US gal/min)
200	8	21.6 m ³ /h (95.1 US gal/min)	1080 m ³ /h (4755 US gal/min)
250	10	36 m ³ /h (159 US gal/min)	1800 m ³ /h (7925 US gal/min)
300	12	48 m ³ /h (211 US gal/min)	2400 m ³ /h (10567 US gal/min)
350	14	66 m ³ /h (291 US gal/min)	3300 m ³ /h (14529 US gal/min)
400	16	90 m ³ /h (396 US gal/min)	4500 m ³ /h (19813 US gal/min)
450	18	120 m ³ /h (528 US gal/min)	6000 m ³ /h (26417 US gal/min)
500	20	132 m ³ /h (581 US gal/min)	6600 m ³ /h (29059 US gal/min)
600	24	192 m ³ /h (845 US gal/min)	9600 m ³ /h (42268 US gal/min)
700	28	264 m ³ /h (1162 US gal/min)	13200 m ³ /h (58118 US gal/min)
760	30	312 m ³ /h (1374 US gal/min)	15600 m ³ /h (68685 US gal/min)
800	32	360 m ³ /h (1585 US gal/min)	18000 m ³ /h (79252 US gal/min)
900	36	480 m ³ /h (2113 US gal/min)	24000 m ³ /h (105669 US gal/min)
1000	40	540 m ³ /h (2378 US gal/min)	27000 m ³ /h (118877 US gal/min)
1050	42	616 m ³ /h (2712 US gal/min)	30800 m ³ /h (135608 US gal/min)
1100	44	660 m ³ /h (3038 US gal/min)	33000 m ³ /h (151899 US gal/min)
1200	48	840 m ³ /h (3698 US gal/min)	42000 m ³ /h (184920 US gal/min)
1400	54	1080 m ³ /h (4755 US gal/min)	54000 m ³ /h (237755 US gal/min)
1500	60	1260 m ³ /h (5548 US gal/min)	63000 m ³ /h (277381 US gal/min)
1600	66	1440 m ³ /h (6340 US gal/min)	72000 m ³ /h (317006 US gal/min)
1800	72	1800 m ³ /h (7925 US gal/min)	90000 m ³ /h (396258 US gal/min)
2000	80	2280 m ³ /h (10039 US gal/min)	114000 m ³ /h (501927 US gal/min)

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

3 Functional specifications

3.1 Flowmeter sensor

3.1.1 Protection type according to EN 60529

IP 65, P 67, NEMA 4X

IP 68 (for external flowmeter sensors only)

3.1.2 Pipeline vibration according to EN 60068-2-6

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

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

The following applies to devices with a separate transmitter:
Transmitter

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

Flowmeter sensor

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

3.1.3 Installation length

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

3.1.4 Signal cable (for external transmitters only)

A 5 m (16.4 ft) cable is supplied.

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

Preamplifier

Max. signal cable length between flowmeter sensor and transmitter:

a) Without preamplifier:

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

A preamplifier is required for cables > 50 m (164 ft).

b) With preamplifier

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

3.1.5 Temperature range

Storage temperature

-20 ... 70 °C (-4 ... 158 °F)

Min. permissible pressure as a function of fluid temperature:

Lining	Nominal size	Poperating at mbar abs.	T _{Operating} ¹⁾
Hard rubber	15 ... 2000 (1/2 ... 80")	0	< 90 °C (194 °F)
Soft rubber	50 ... 2000 (2 ... 80")	0	< 60 °C (140 °F)
PTFE KTW- approved	10 ... 600 (3/8 ... 24")	270	< 20 °C (68 °F)
		400	< 100 °C (212 °F)
		500	< 130 °C (266 °F)
Thick PTFE, high-temp. design	25 ... 80 100 ... 250 300	0	< 180 °C (356 °F)
		67	< 180 °C (356 °F)
		27	< 180 °C (356 °F)
PFA	3 ... 200 (1/10 ... 8")	0	< 180 °C (356 °F)
ETFE	25 ... 1000 (1 ... 40")	100	< 130 °C (266 °F)

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

Max. permissible cleaning temperature:

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

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

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

Max. ambient temperature as a function of fluid temperature:



Important

When using the device in potentially explosive areas, please observe the additional temperature specifications in the section of this data sheet titled "Ex relevant specifications", and Ex safety instructions.

Models FN--A, FN--A Ex (standard temperature version)

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

Models FN--A, FN--A Ex (high-temperature version)

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

1) PFA (high-temperature version) can be obtained for nominal sizes ≥ DN 10

2) Thick PTFE can be obtained for nominal sizes ≥ DN 25

3) ETFE can be obtained for nominal sizes ≥ DN 25



Important

When using the device in potentially explosive areas, please observe the additional temperature specifications in the section of this data sheet titled "Ex relevant specifications", and Ex safety instructions.

Models FN--G, FN--G Ex (standard temperature version)

Lining	Flange material	Ambient temperature		Fluid temperature	
		Min. temp.	Max. temp.	Min. temp.	Max. temp.
Hard rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	90 °C (194 °F)
Hard rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	90 °C (194 °F)
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
PFA ¹⁾	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
PFA ¹⁾	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
Thick PTFE ²⁾	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
Thick PTFE ²⁾	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)
ETFE ³⁾	Steel	-10 °C (14 °F)	60 °C (140 °F)	-10 °C (14 °F)	130 °C (266 °F)
ETFE ³⁾	Stainless steel	-25 °C (-13 °F)	60 °C (140 °F)	-25 °C (-13 °F)	130 °C (266 °F)

Models FN--G, FN--G Ex (high-temperature version)

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

1) PFA (high-temperature version) can be obtained for nominal sizes ≥ DN 10

2) Thick PTFE can be obtained for nominal sizes ≥ DN 25

3) ETFE can be obtained for nominal sizes ≥ DN 25

3.1.6 Material load

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

DIN flange, stainless steel, 1.4571 [316Ti] up to DN 600 (24")

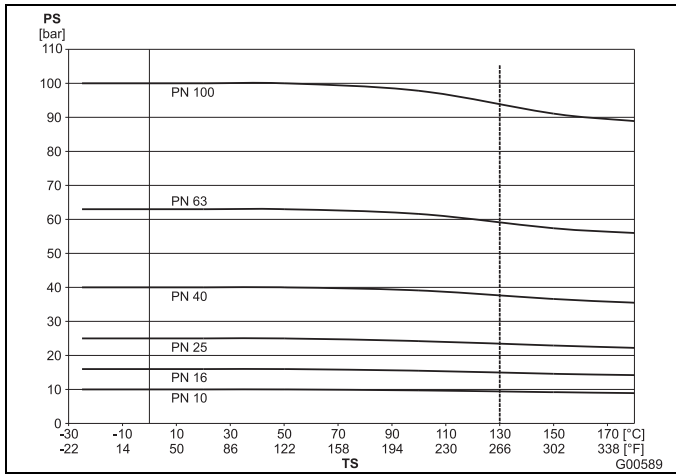


Fig. 2:

ASME flange, stainless steel 1.4571 [316Ti], up to DN 300 (12") (CL150/300); up to DN 1000 (40") (CL150)

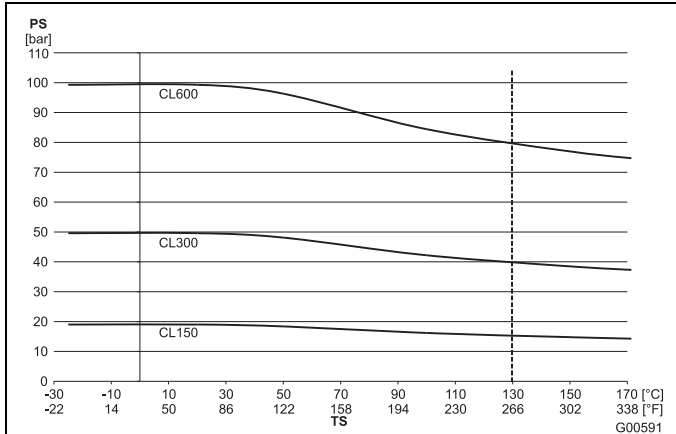


Fig. 3

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

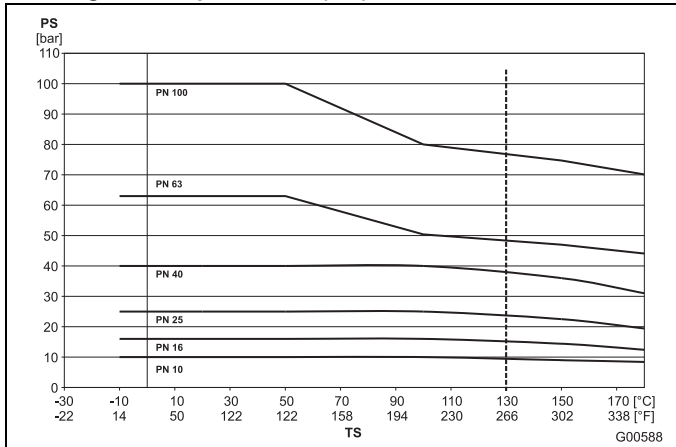


Fig. 4

ASME flange, steel, up to DN 300 (12") (CL150/300); up to DN 1000 (40") (CL150)

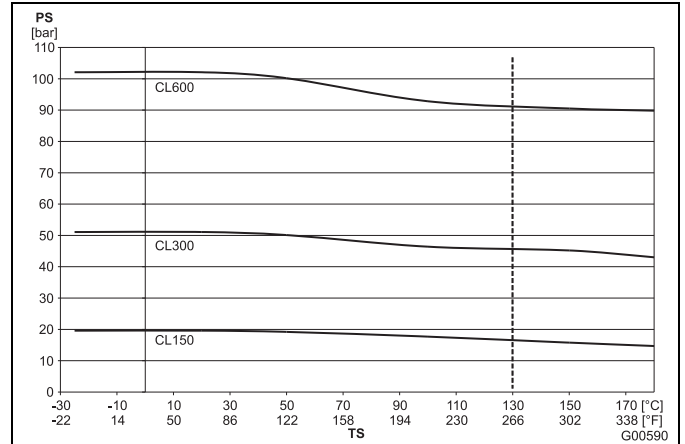


Fig. 5

JIS 10K-B2210 flange

Nominal size	Material	PN	TS	PS [bar]
32 ... 100 (1 1/4 ... 4")	Stainless steel 1.4571[316Ti]	10	-25 ... 180 °C (-13 ... 356 °F)	10 (145 psi)
32 ... 100 (1 1/4 ... 4")	Steel	10	-25 ... 180 °C (14 ... 356 °F)	10 (145 psi)

DIN flange, stainless steel 1.4571 [316Ti], DN 700 (28") up to DN 1000 (40")

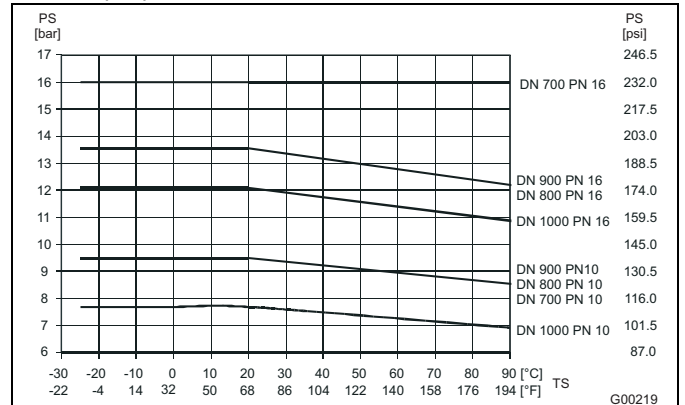


Fig. 6

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

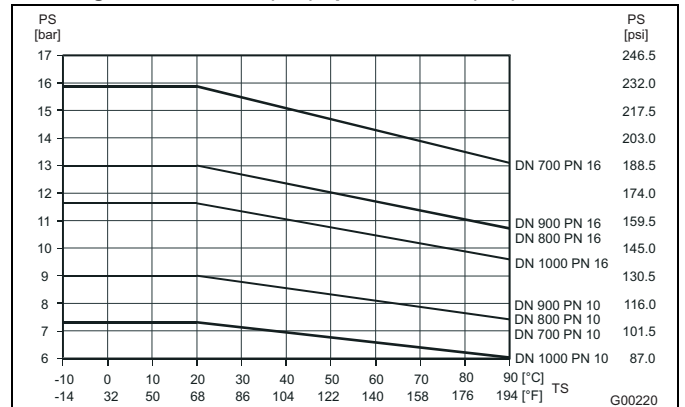


Fig. 7

3.1.7 Sensor

Process-wetted parts

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

Non-wetted parts

	Standard	Option
Flanges DN 3 ... 15 (1/10 ... 1/2") DN 20 ... 400 (3/4 ... 16")	Stainless steel 1.4571 [316Ti] (standard) Steel (galvanized)	Stainless steel 1.4571- [316Ti]
	DIN/EN flange: RST37/ST52/C22-8 ASME flange: A105/C21	
DN 450 ... 2000 (18 ... 80")	Steel (painted)	Stainless steel 1.4571- [316Ti]
	DIN/EN flange: RST37/ST52/C22-8 ASME flange: A105/C21	

Sensor housing

	Standard	Option
Housing DN 3 ... 400 (1/10 ... 16")	Dual-shell casing, cast aluminum, painted, paint coat, 60 µm thick, RAL 9002	–
DN 450 ... 2000 (18 ... 80")	Welded steel design, painted, paint coat, 60 µm thick, RAL 9002	–
Connection box	Aluminum alloy, painted, 60 µm thick, light gray, RAL 9002	–
Meter tube	SS 1.4301	–
PG-Connector	Polyamide	–

3.1.8 Electrical connection diagram

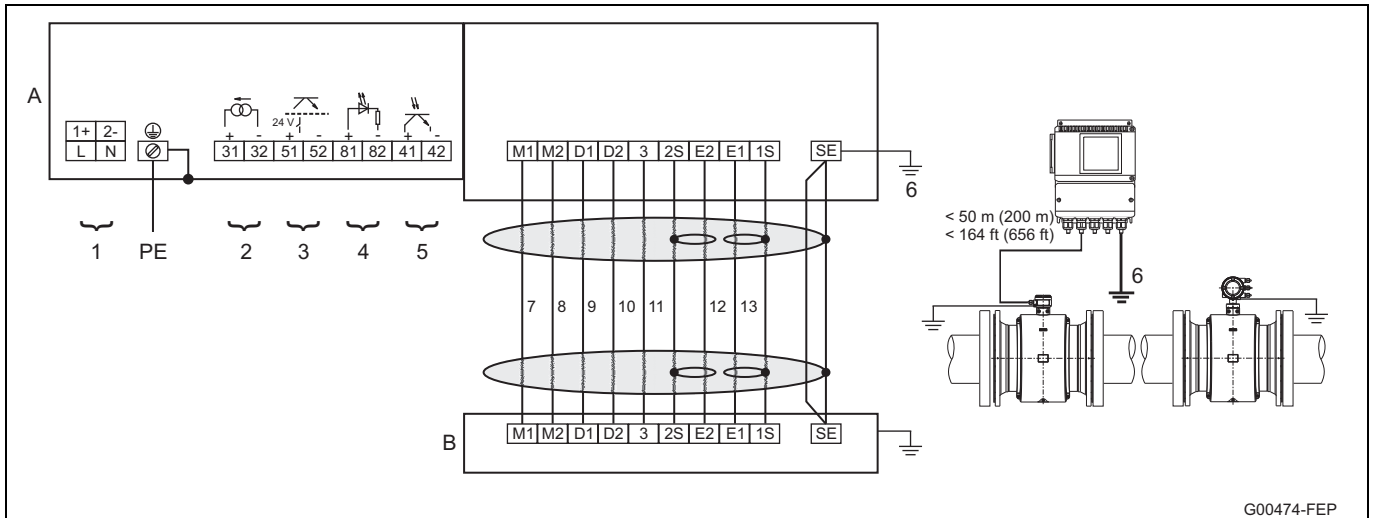


Fig. 8

- A **Transmitter**
- B **Flowmeter sensor**
- 1 **Supply power:**
See name plate
- 2 **Current output (terminals 31/32)**
The current output can be operated in "active" or "passive" mode.
 - Active: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 650 \Omega$
 - Passive: 4 ... 20 mA, HART protocol (standard), load: $250 \Omega \leq R \leq 650 \Omega$
 Supply voltage for the current output: Min. 17 V, max. 30 V
- 3 **Digital output DO1 (terminals 51/52) (pulse output or digital output)**
Function can be configured locally as "Pulse Output" or "Digital Output" using software. Factory setting is "Pulse Output".
The output can be configured as an "active" or "passive" output.
Configuration is performed using software.
 - Configuration as pulse output
Max. pulse frequency: 5,250 Hz.
Pulse width: 0.1 ... 2,000 ms.
The pulse factor and pulse width are interdependent and are calculated dynamically.
 - Configuration as contact output
Function: System alarm, empty pipe alarm, max./min. alarm, flow direction signaling, other
 - Configuration as "active" output
 $U = 19 \dots 21 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5,250 \text{ Hz}$
 - Configuration as "passive" output
 $U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5,250 \text{ Hz}$
- 4 **Digital input (terminals 81/82) (contact input)**
Function can be configured locally using software:
External output switch-off, external totalizer reset, external totalizer stop, other
Data for the optocoupler: $16 \text{ V} \leq U \leq 30 \text{ V}$, $R_i = 2 \text{ k}\Omega$
- 5 **Digital output DO2 (terminals 41/42) (pulse output or digital output)**
Function can be configured locally as "Pulse Output" or "Digital Output" using software.
Factory setting is "Digital Output", flow direction signaling.
The output is always a "passive" output (optocoupler).
Data for the optocoupler: $U_{\text{max}} = 30 \text{ V}$, $I_{\text{max}} = 220 \text{ mA}$, $f_{\text{max}} \leq 5,250 \text{ Hz}$
- 6 Functional ground
- 7 Brown
- 8 Red
- 9 Orange
- 10 Yellow
- 11 Green
- 12 Blue
- 13 Violet

Connection examples for the peripherals

Current output

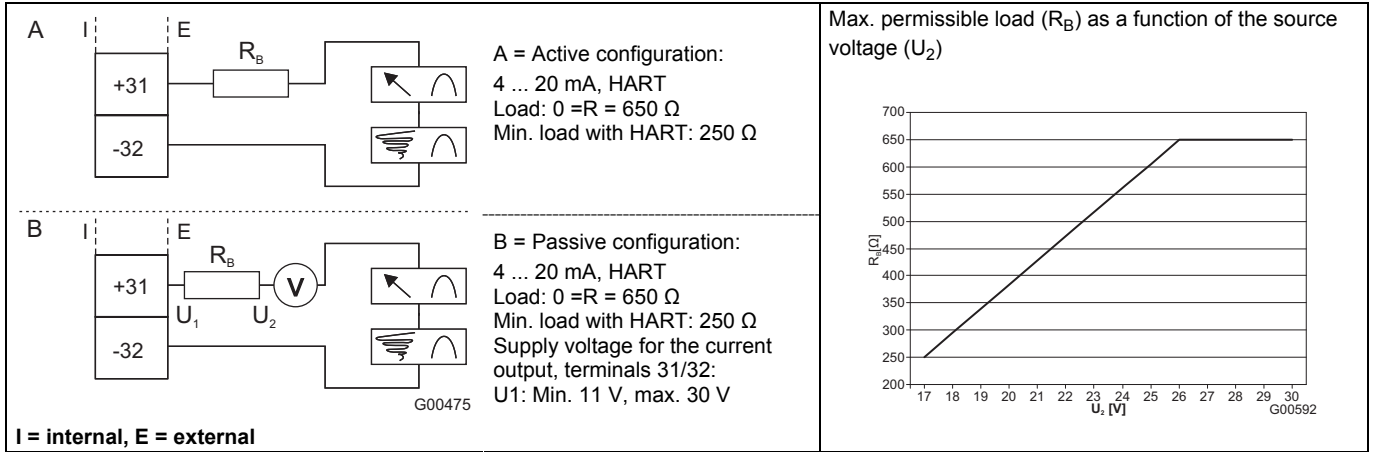


Fig. 9

Digital output DO1

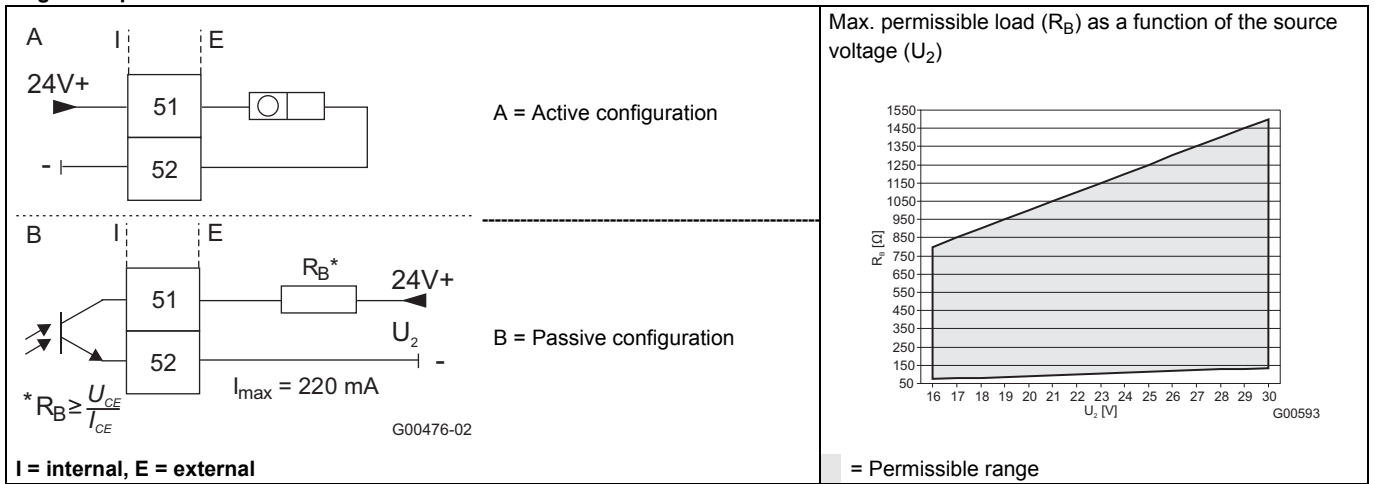
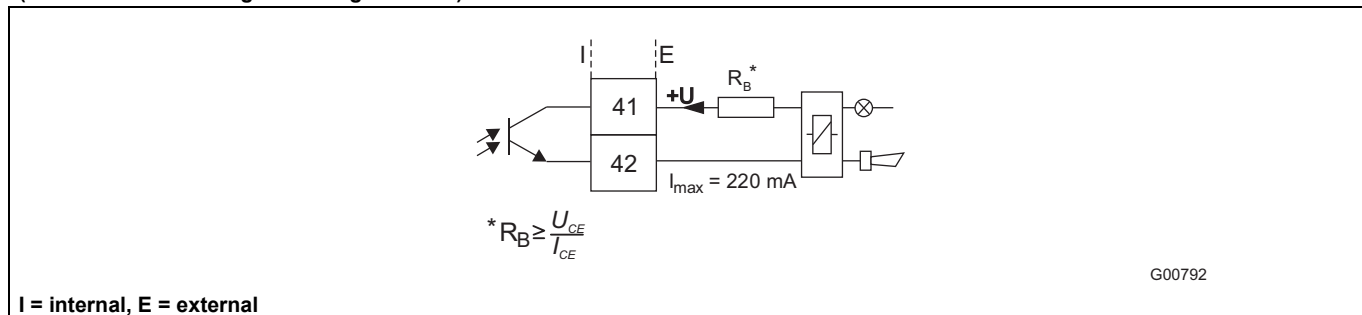


Fig. 10

Digital output DO2, e.g., for system monitoring, max./min. alarm, empty meter tube or forward/reverse signal, or counting pulses (function can be configured using software)



I = internal, E = external

Fig. 11

Digital outputs DO1 and DO2, separate forward and reverse pulses

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

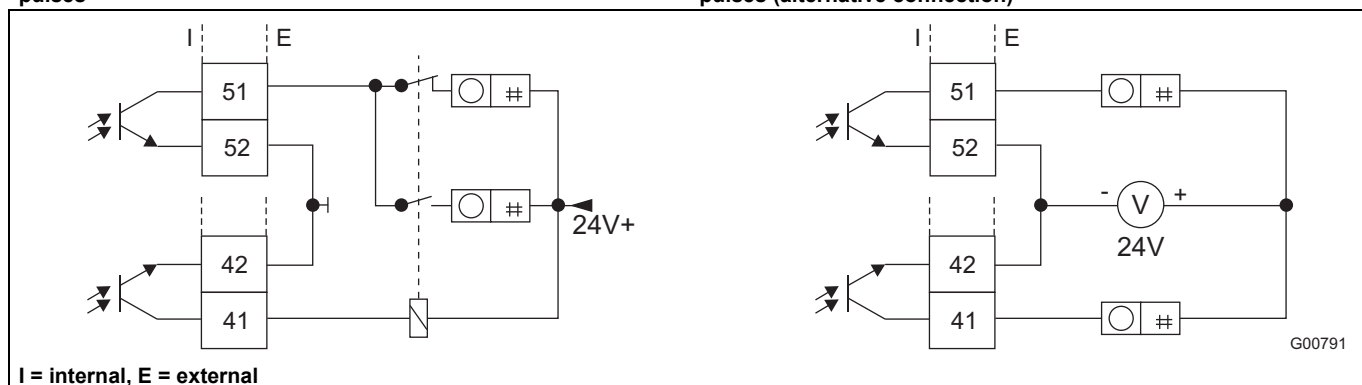


Fig. 12

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

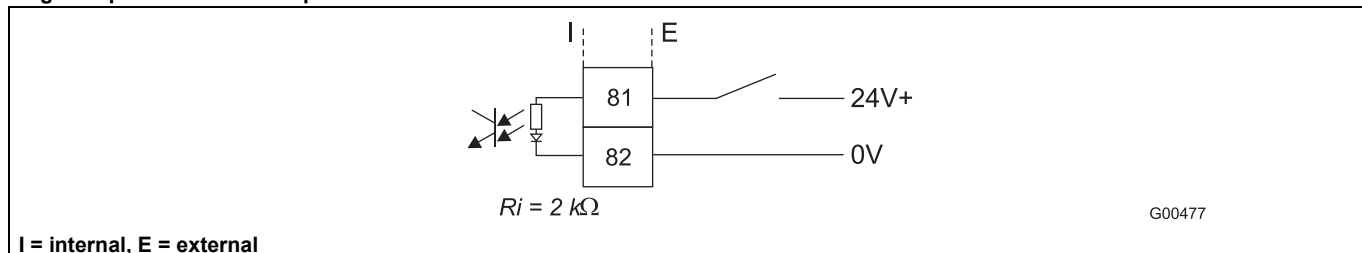


Fig. 13

4 Ex relevant specifications

4.1 General

Devices with model names FN--A Ex and FN--G Ex are approved for operation in the following potentially explosive areas:

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



Important

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

4.2 Electrical data

When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter.

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

4.3 Temperature values

4.3.1 Transmitter

Model name	Temperature class	Surface temperature
MUFNB200 Ex	T4	70 °C (158 °F)

4.3.2 Flowmeter sensor

Model name	Surface temperature
FN--A Ex / FEH315	70 °C (158 °F)
FN--G Ex / FEH325	85 °C (185 °F)

The surface temperature depends on the fluid temperature.

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

4.3.3 Temperature limit values



Important

The maximum permissible fluid temperature depends on the lining and flange material, and is limited by the operating values in Table 1 and the Ex relevant specifications in Tables 2 and 3.

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

Models FN--A Ex/FN--G Ex

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

Table 2: Fluid temperature (Ex data) for Flowcont FN--A Ex and Flowcont LN model FEH315

Nominal size	Design	Temperature class	Ambient temperature											
			- 20 °C ... + 40 °C				- 20 °C ... + 50 °C				- 20 °C ... + 60 °C			
			- 40 °C ... + 40 °C ¹⁾				- 40 °C ... + 50 °C ¹⁾				- 40 °C ... + 60 °C ¹⁾			
			Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated		Not thermally insulated		Thermally insulated	
Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust	Gas	Gas & dust			
Flowcont FN DN 3 ... DN 2000 Flowcont LN DN 3 ... DN 100	NT	T1	130 °C	130 °C	---	---	130 °C	100 °C ²⁾ 110 °C ³⁾	---	---	80 °C	40 °C	---	---
			HT	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C
	NT	T2	130 °C	130 °C	---	---	130 °C	100 °C ²⁾ 110 °C ³⁾	---	---	80 °C	40 °C	---	---
			HT	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C
	NT	T3	130 °C	130 °C	---	---	130 °C	100 °C ²⁾ 110 °C ³⁾	---	---	80 °C	40 °C	---	---
			HT	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	180 °C	40 °C	180 °C
	NT	T4	130 °C	130 °C	---	---	130 °C	100 °C ²⁾ 110 °C ³⁾	---	---	80 °C	40 °C	---	---
			HT	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	130 °C	40 °C	130 °C

1) Low-temperature version (option)
 2) Temperature values for Flowcont FN
 3) Temperature values for Flowcont LN

NT standard version, Tmedium maximum 130 °C (266 °F)

HT high-temperature version, Tmedium maximum 180 °C (356 °F)

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

Thermally insulated: The flowmeter sensor is surrounded by pipe insulation material.



Important

The standard version includes explosion protection for gases and dust.

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

Table 3: Fluid temperature (Ex data) for Flowcont FN model FN--G Ex and Flowcont LN model FEH325

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

1) Low-temperature version (option)
 2) Temperature values for Flowcont FN
 3) Temperature values for Flowcont LN

NT standard version, Tmedium maximum 130 °C (266 °F)

HT high-temperature version, Tmedium maximum 180 °C (356 °F)

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

Thermally insulated: The flowmeter sensor is surrounded by pipe insulation material.



Important

The standard version includes explosion protection for gases and dust.

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

5 Installation requirements

5.1 Grounding

The flowmeter sensor must be connected to ground potential. For technical reasons, this potential should be identical to the potential of the metering fluid.

For plastic or insulated lined pipelines, the fluid is grounded by installing ground plates. When there are stray potentials present in the pipeline, a ground plate is recommended on both ends of the meter sensor.

For flowmeter sensor with hardrubber liners, sizes DN 100/4" and larger, a conductive element is incorporated in the liner. This assures that the fluid is grounded.

5.2 Mounting

The following points must be observed for the installation:

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

The device measures the flowrate in both directions. Forward flow is the factory setting, as shown in Fig. 14.

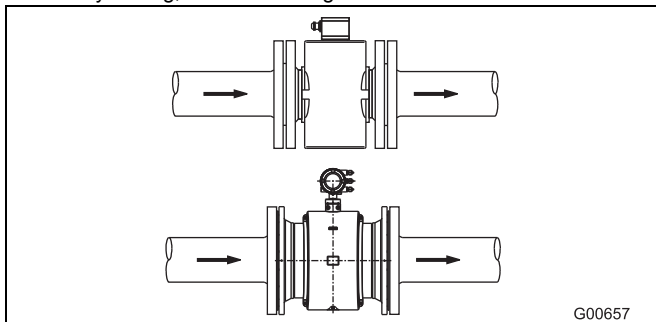


Fig. 14

5.2.1 Electrode axis

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

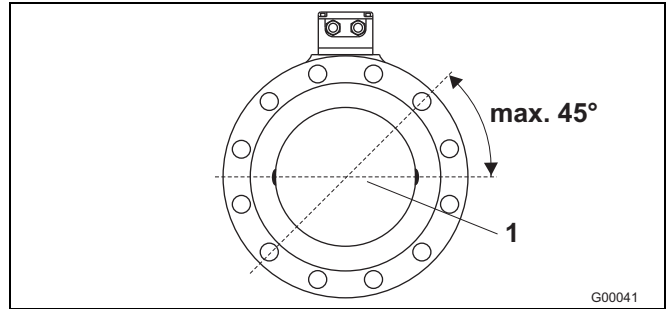


Fig. 15

5.2.2 In- and outlet pipe sections

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

DN = Flowmeter sensor size

- Do not install fittings, manifolds, valves etc. directly in front of the meter tube (1).
- Butterfly valves must be installed so that the valve plate does not extend into the flowmeter sensor.
- Valves or other turn-off components should be installed in the outlet pipe section (2).
- For compliance with the measuring accuracy, observe the inlet and outlet pipe sections.

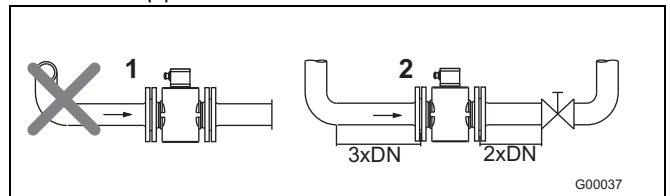


Fig. 16

5.2.3 Vertical connections

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

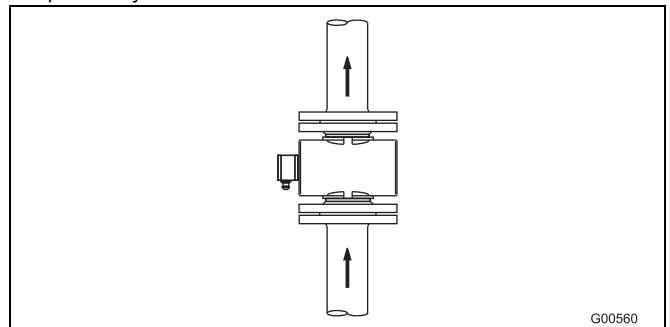


Fig. 17

5.2.4 Horizontal connections

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

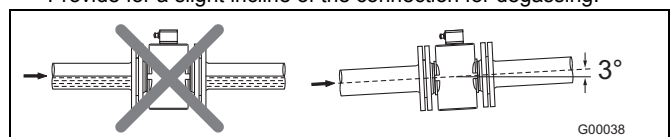


Fig. 18

5.2.5 Free inlet or outlet

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

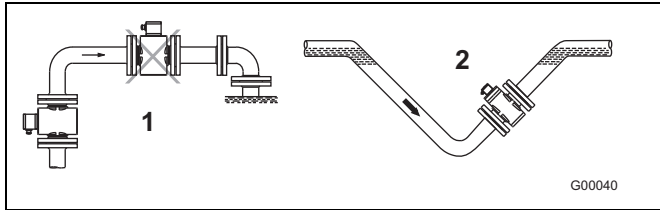


Fig. 19

5.2.6 Strongly contaminated fluids

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

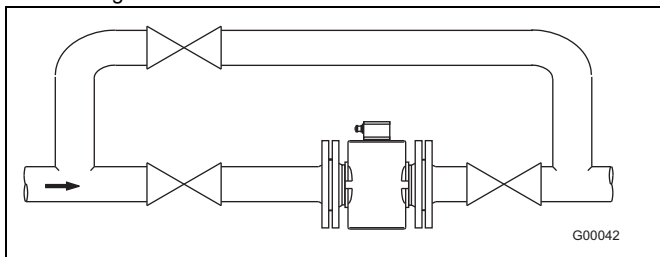


Fig. 20

5.2.7 Installation in the vicinity of pumps

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

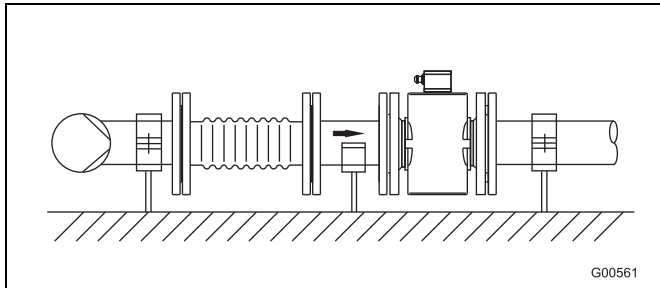


Fig. 21

5.2.8 Installing the high temperature design

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

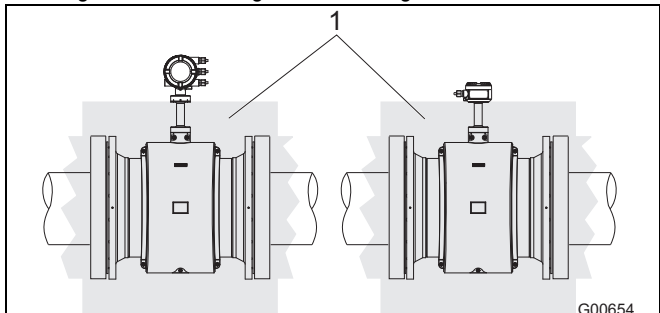


Fig. 22

1 Insulation

5.2.9 Installation in pipelines with larger nominal diameters

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

1. Calculate the diameter ratio d/D .
2. Determine the flow velocity based on the flow range nomograph (Fig. 24).
3. Read the pressure drop on the Y-axis in Fig. 24.

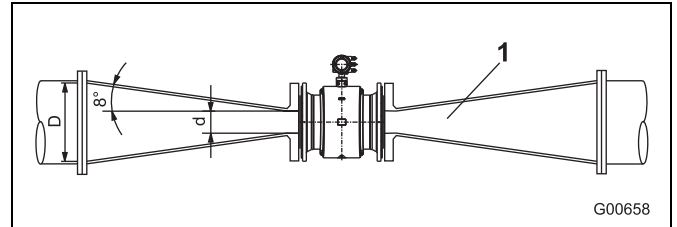


Fig. 23

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

Nomograph for pressure drop calculations

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

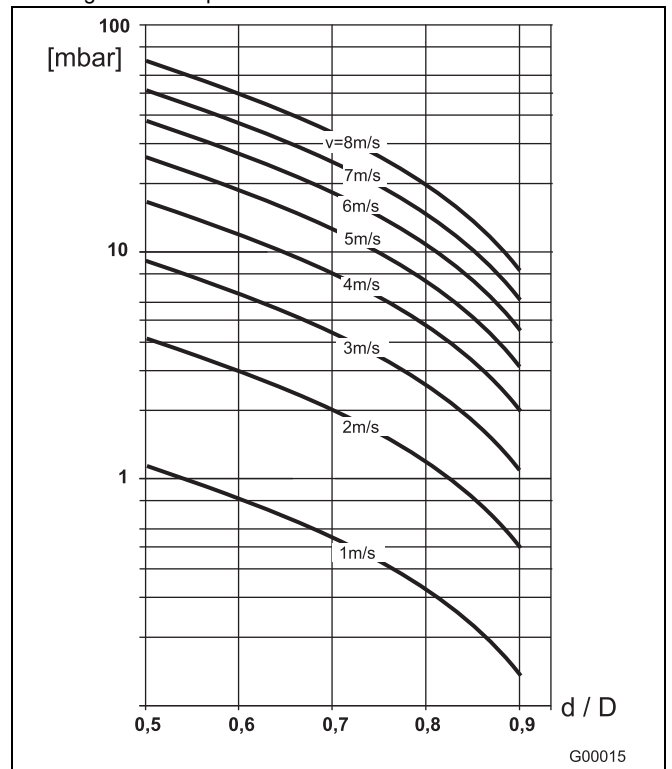


Fig. 24

6 Dimensions

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

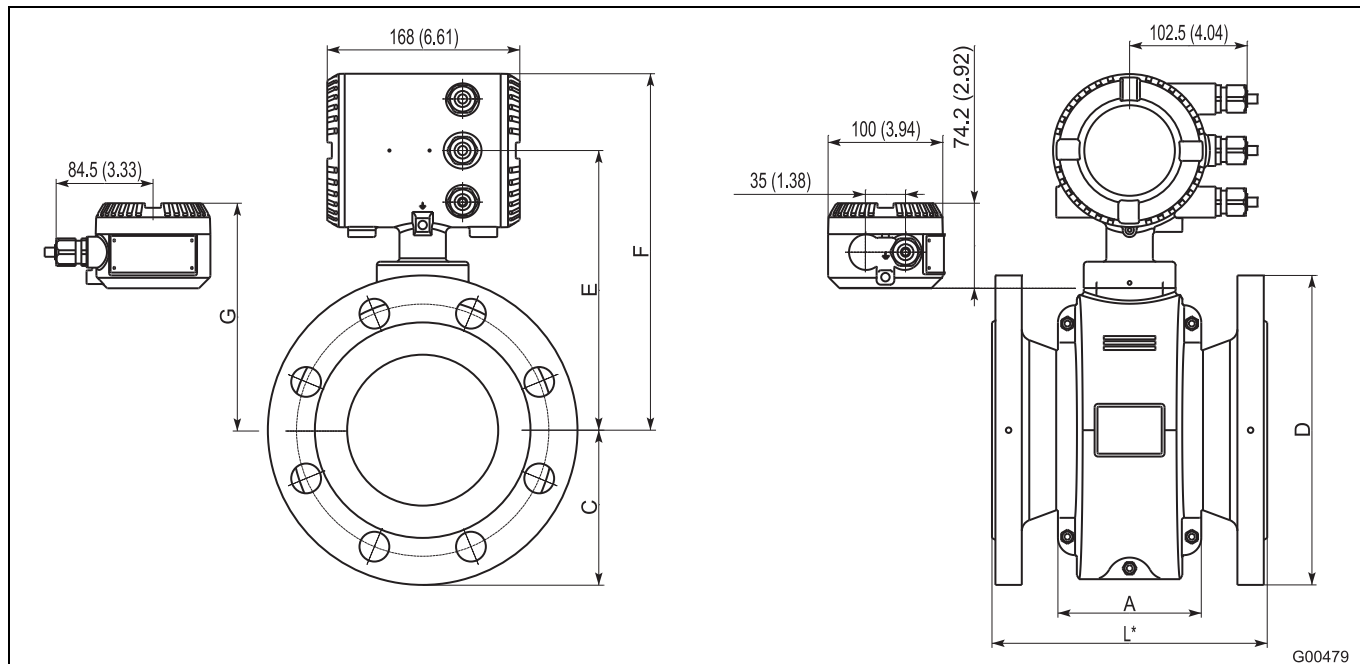


Fig. 25: Dimensions in mm (inch)

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

DN	PN 1)	Dimensions [mm]						Approx. weight [kg]	
		D	L 2) 3)	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
3 ... 8 5)	10 ... 40	90	200	255	82	188	143	7	5
10	10 ... 40	90	200	255	82	188	143	7	5
15	10 ... 40	95	200	255	82	188	143	8	6
20	10 ... 40	105	200	255	82	188	143	8	6
25	10 ... 40	115	200	255	82	188	143	9	7
32	10 ... 40	140	200	262	92	195	150	11	9
40	10 ... 40	150	200	262	92	195	150	11	9
50	10 ... 40	165	200	268	97	201	156	13	11
65	10 ... 40	185	200	279	108	212	167	17	15
80	10 ... 40	200	200	279	108	212	167	20	18
100	10 ... 16	220	250	301	122	234	189	23	21
	25 ... 40	235	250	301	122	234	189	29	27
125	10 ... 16	250	250	311	130	244	199	30	28
	25 ... 40	270	250	311	130	244	199	36	34

Tolerance L: +0 / -3 mm

DN (inch)	PN 1)	Dimensions [inch]						Approx. weight [lb]	
		D	L 2) 3)	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
3 ... 8 5) (1/8 ... 5/16)	10 ... 40	3.54	7.87	10.04	3.23	7.40	5.63	15.43	11
10 (3/8)	10 ... 40	3.54	7.87	10.04	3.23	7.40	5.63	15.43	11
15 (1/2)	10 ... 40	3.74	7.87	10.04	3.23	7.40	5.63	17.64	13.23
20 (3/4)	10 ... 40	4.13	7.87	10.04	3.23	7.40	5.63	17.64	13.23
25 (1)	10 ... 40	4.53	7.87	10.04	3.23	7.40	5.63	19.84	15.43
32 (1 1/4)	10 ... 40	5.51	7.87	10.31	3.62	7.68	5.91	24.25	19.84
40 (1 1/2)	10 ... 40	5.91	7.87	10.31	3.62	7.68	5.91	24.25	19.84
50 (2)	10 ... 40	6.50	7.87	10.55	3.82	7.91	6.14	28.66	24.25
65 (2 1/2)	10 ... 40	7.28	7.87	10.98	4.25	8.35	6.57	37.48	33.07
80 (3)	10 ... 40	7.87	7.87	10.98	4.25	8.35	6.57	44.09	39.68
100 (4)	10 ... 16	8.66	9.84	11.85	4.80	9.21	7.44	50.71	46.30
	25 ... 40	9.25	9.84	11.85	4.80	9.21	7.44	63.93	59.52
125 (5)	10 ... 16	9.84	9.84	12.24	5.12	9.61	7.83	66.14	61.73
	25 ... 40	10.63	9.84	12.24	5.12	9.61	7.83	79.37	75

Tolerance L: +0 / -0.018 inch

Electromagnetic Flowmeter Flowcont FN

Flange in acc. with ASME B16.5

Dimensions [mm]									Approx. weight [kg]	
DN	Inch	CL150	CL300	ISO 13359	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
		D	D	L 2) 3)						
3 ... 8	1/8 ... 5/16 6)	89	96	200	255	82	188	143	7	5
10	3/8 6)	89	96	200	255	82	188	143	7	5
15	1/2	89	96	200	255	82	188	143	8	6
20	3/4	98	118	200	255	82	188	143	8	6
25	1	108	124	200	255	82	188	143	9	7
32	1 1/4	118	134	200	262	92	195	150	11	9
40	1 1/2	127	156	200	262	92	195	150	11	9
50	2	153	165	200	268	97	201	156	13	11
65	2 1/2	178	191	200	279	108	212	167	17	15
80	3	191	210	200	279	108	212	167	20	18
100	4	229	254	250	301	122	234	189	23	21
125	5	254	280	250	311	130	244	199	30	28

Tolerance L: +0 / -3 mm

Dimensions [inch]									Approx. weight [lb]	
DN	Inch	CL150	CL300	ISO 13359	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
		D	D	L 2) 3)						
3 ... 8	1/8 ... 5/16 6)	3.50	3.78	7.87	10.04	3.23	7.40	5.63	15.4	11
10	3/8 6)	3.50	3.78	7.87	10.04	3.23	7.40	5.63	15.4	11
15	1/2	3.50	3.78	7.87	10.04	3.23	7.40	5.63	17.6	13.2
20	3/4	3.86	4.65	7.87	10.04	3.23	7.40	5.63	17.6	13.2
25	1	4.25	4.88	7.87	10.04	3.23	7.40	5.63	19.8	15.4
32	1 1/4	4.65	5.28	7.87	10.31	3.62	7.68	5.91	24.3	19.8
40	1 1/2	5.00	6.14	7.87	10.31	3.62	7.68	5.91	24.3	19.8
50	2	6.02	6.50	7.87	10.55	3.82	7.91	6.14	28.7	24.3
65	2 1/2	7.01	7.52	7.87	10.98	4.25	8.35	6.57	37.5	33.1
80	3	7.52	8.27	7.87	10.98	4.25	8.35	6.57	44.1	39.7
100	4	9.02	10.0	9.84	11.85	4.80	9.21	7.44	63.9	59.5
125	5	10.0	11.0	9.84	12.24	5.12	9.61	7.83	79.4	75

Tolerance L: +0 / -0.118 inch

1) Other pressure ratings available on request.

2) If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 ... 100 by 3 mm (0.118 inch); DN 125 by 5 mm (0.197 inch).

3) If protection plates are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 ... 100 by 6 mm (0.236 inch); DN 125 by 10 mm (0.394 inch).

4) With the high-temperature version, the dimension is increased by 112 mm (4.41 inch).

5) Connection flange DN 10

6) Connection flange 1/2"

7) Connecting dimensions in acc. with EN 1092-1. For DN 65, PN 16 in acc. with EN 1092-1, please order PN 40.

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

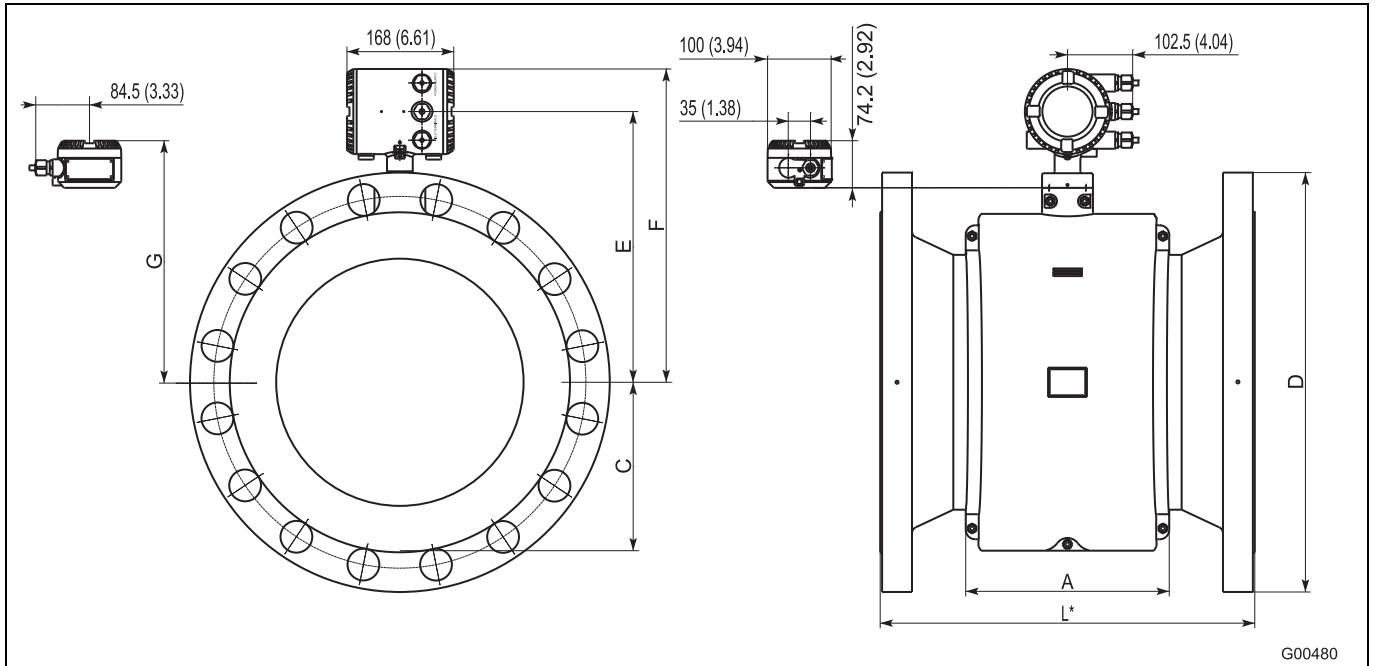


Fig. 26: Dimensions in mm (inch)

Flange in acc. with DIN/EN 1092-1

DN	PN 1)	D	Dimensions [mm]					Approx. weight [kg]	
			L 2) 3)	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
150	10 ... 16	285	300	358	146	291	246	40	38
	25 ... 40	300	300	358	146	291	246	45	43
200	10	340	350	399	170	331	286	67	65
	16	340	350	399	170	331	286	67	65
250	10	395	450	413	198	346	301	106	104
	16	405	450	413	198	346	301	106	104
300	10	445	500	436	228	369	324	120	118
	16	460	500	436	228	369	324	120	118
350	10	505	550	451	265	384	339	146	144
	16	520	550	451	265	384	339	146	144
400	10	565	600	493	265	426	381	180	178
	16	580	600	493	265	426	381	180	178

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

DN (inch)	PN 1)	D	Dimensions [inch]					Approx. weight [lb]	
			L 2) 3)	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
150 (6)	10 ... 16	11.22	11.81	14.09	5.75	11.46	9.69	88.18	83.78
	25 ... 40	11.81	11.81	14.09	5.75	11.46	9.69	99.21	94.80
200 (8)	10	13.39	13.78	15.71	6.69	13.03	11.26	147.71	143.30
	16	13.39	13.78	15.71	6.69	13.03	11.26	147.71	143.30
250 (10)	10	15.55	17.72	16.26	7.80	13.62	11.85	233.69	229.28
	16	15.94	17.72	16.26	7.80	13.62	11.85	233.69	229.28
300 (12)	10	17.52	19.68	17.17	8.98	14.53	12.76	264.55	260.15
	16	18.11	19.68	17.17	8.98	14.53	12.76	264.55	260.15
350 (14)	10	19.88	21.65	17.76	10.43	15.12	13.35	321.87	317.47
	16	20.47	21.65	17.76	10.43	15.12	13.35	321.87	317.47
400 (16)	10	22.24	23.62	19.41	10.43	16.77	15.00	396.83	392.42
	16	22.83	23.62	19.41	10.43	16.77	15.00	396.83	392.42

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

Electromagnetic Flowmeter Flowcont FN

Flange in acc. with ASME B16.5

Dimensions [mm]									Approx. weight [kg]	
DN	Inch	CL150	CL300	ISO 13359					Compact design	Ext. transmitter
		D	D	L 2) 3)	F 4)	C	E 4)	G 4)		
150	6	280	318	300	358	146	291	246	40	38
200	8	343	381	350	399	170	331	286	67	65
250	10	407	445	450	413	198	346	301	106	104
300	12	483	521	500	436	228	369	324	120	118
350	14	533	-	550	451	265	384	339	146	144
400	16	597	-	600	493	265	426	381	180	178

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

Dimensions [inch]									Approx. weight [lb]	
DN	Inch	CL150	CL300	ISO 13359					Compact design	Ext. transmitter
		D	D	L 2) 3)	F 4)	C	E 4)	G 4)		
150	6	11.02	12.52	11.81	14.09	5.75	11.46	9.69	106	101
200	8	13.50	15.00	13.78	15.71	6.69	13.03	11.26	159	154
250	10	16.02	17.52	17.72	16.26	7.80	13.62	11.85	229	225
300	12	19.02	20.51	19.68	17.17	8.98	14.53	12.76	313	309
350	14	20.98	-	21.65	17.76	10.43	15.12	13.35	421	417
400	16	23.50	-	23.62	19.41	10.43	16.77	15.00	511	507

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

1) Other pressure ratings available on request.

2) If a grounding plate is installed (attached to one side of the flange), this increases dimension L by 5 mm (0.197 inch).

3) If protection plates are installed (attached to both sides of the flange), this increases dimension L by 10 mm (0.394 inch).

4) With the high-temperature version, the dimension is increased by 112 mm (4.41 inch).

6.3 Flange DN 450 ... 1000 (18 ... 40")

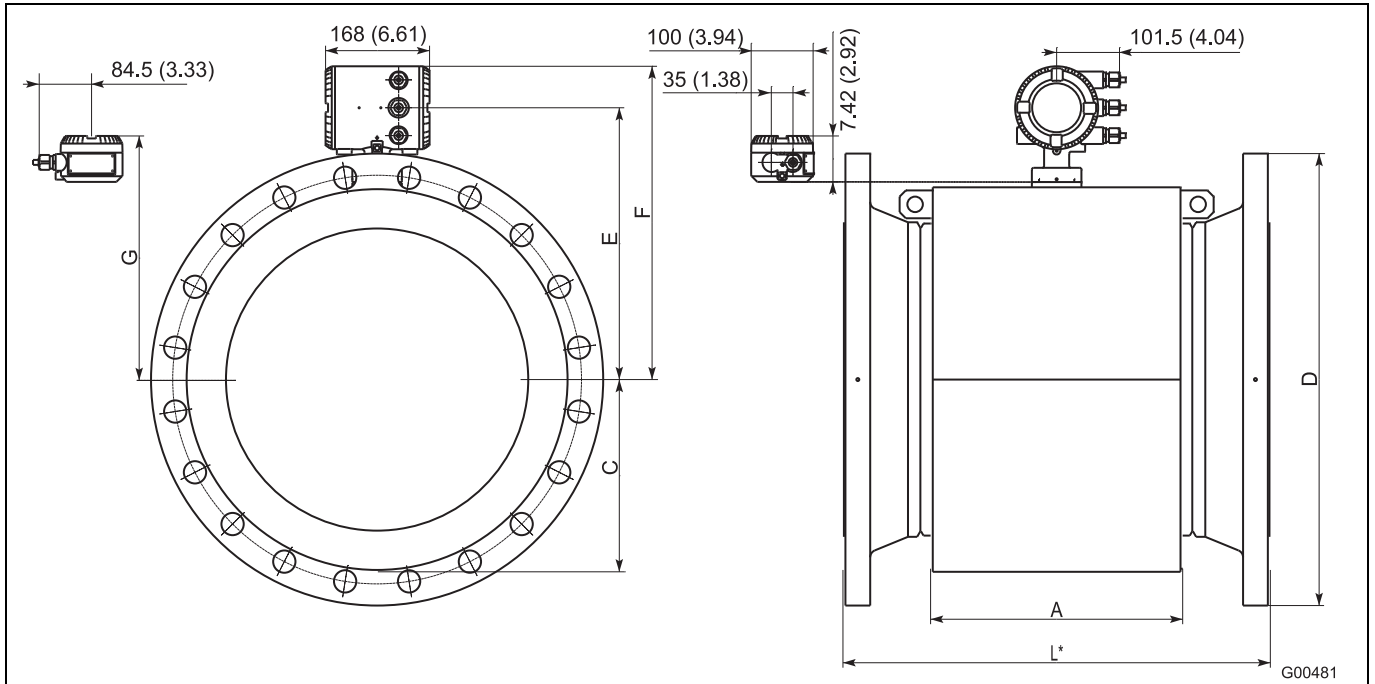


Fig. 27: Dimensions in mm (inch)

Flange in acc. with DIN/EN 1092-1

Dimensions [mm]								Approx. weight [kg]	
DN	PN 1)	D	L 2) 3)	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
500	10	670	650	375	310	308	389	196	194
600	10	780	780	426	361	359	440	276	274
700	10	895	910	470	405	403	484	319	317
800	10	1015	1040	520	455	453	534	409	407
900	10	1115	1170	570	505	503	584	487	485
1000	10	1230	1300	620	555	553	634	579	577

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

Dimensions [inch]								Approx. weight [lb]	
DN (inch)	PN 1)	D	L 2) 3)	F 4)	C	E 4)	G 4)	Compact design	Ext. transmitter
500 (20)	10	26.38	25.59	14.76	12.20	12.13	15.31	432.11	427.70
600 (24)	10	30.71	30.71	16.77	14.21	14.13	17.32	608.48	604.07
700 (28)	10	35.24	35.83	18.50	15.94	15.87	19.06	703.27	698.86
800 (32)	10	39.96	40.94	20.47	17.91	17.83	21.02	901.69	897.28
900 (36)	10	43.90	46.06	22.44	19.88	19.80	22.99	1073.65	1069.24
1000 (40)	10	48.43	51.18	24.41	21.85	21.77	24.96	1276.47	1272.07

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

Electromagnetic Flowmeter Flowcont FN

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

Dimensions [mm]									Approx. weight [kg]	
									Compact design	Ext. transmitter
		CL150	ISO 13359	ASC (previous installation length)					CL150	CL150
DN	Inch	D	L 2) 3)	L 2) 3)	F 4)	C	E 4)	G 4)	Approx. kg	Approx. kg
450	18	635	686	-	375	310	308	389	188	190
500	20	699	762	-	375	310	308	389	196	194
600	24	813	914	-	426	361	359	440	276	274
700	28	837	-	910	470	405	403	484	319	317
800	32	942	-	1040	520	455	453	534	409	407
900	36	1057	-	1170	570	505	503	584	487	485
1000	40	1380	-	1300	620	555	553	634	579	577

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

Dimensions [inch]									Approx. weight [lb]	
									Compact design	Ext. transmitter
		CL150	ISO 13359	ACS (previous installation length)					CL150	CL150
DN	Inch	D	L 2) 3)	L 2) 3)	F 4)	C	E 4)	G 4)	Approx. lb	Approx. lb
450	18	25.0	27.01	-	14.76	12.20	12.13	15.31	518	513
500	20	27.52	30.0	-	14.76	12.20	12.13	15.31	590	584
600	24	32.01	35.98	-	16.77	14.21	14.13	17.32	725	720
700	28	32.95	-	35.83	18.50	15.94	15.87	19.06	853	848
800	32	37.09	-	40.94	20.47	17.91	17.83	21.02	1135	1131
900	36	41.61	-	46.06	22.44	19.88	19.80	22.99	1463	1459
1000	40	54.33	-	51.18	24.41	21.85	21.77	24.96	2500	2495

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

1) Other pressure ratings available on request.

2) If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 400 ... 600 by 5 mm (0.197 inch).

3) If protection plates are installed (attached to both sides of the flange), this increases dimension L as follows: DN 400 ... 600 by 10 mm (0.394 inch).

4) With the high-temperature version, the dimension is increased by 112 mm (4.41 inch).

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

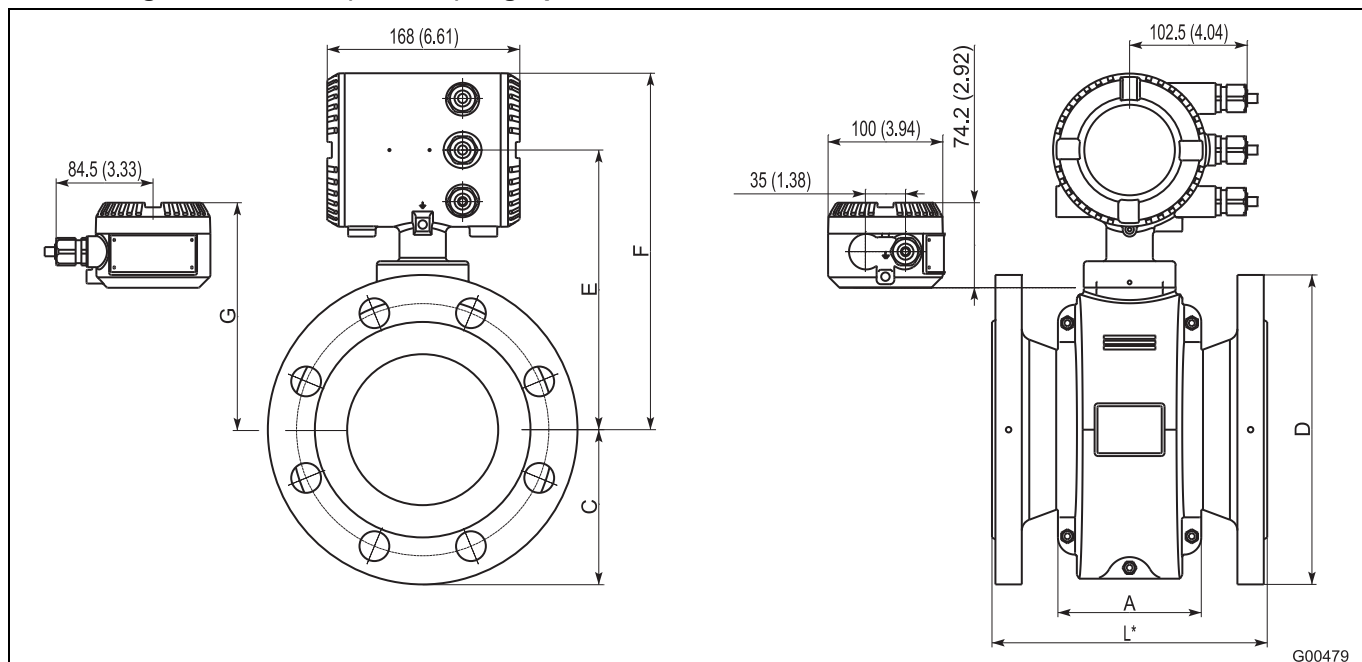


Fig. 28: Dimensions in mm (inch)

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

		Dimensions [mm (inch)]					
DN	PN	D	L 1) 2)	F 4)	C	E 3)	G 3)
15	64 ... 100	105 (4.13)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)
25	64 ... 100	140 (5.51)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)
40	64 ... 100	170 (6.69)	280 (11.02)	262 (10.31)	92 (3.62)	195 (7.68)	150 (5.91)
50	64	180 (7.09)	280 (11.02)	268 (10.55)	97 (3.82)	201 (7.91)	156 (6.14)
	100	195 (7.68)	280 (11.02)	268 (10.55)	97 (3.82)	201 (7.91)	156 (6.14)
65	64	208 (8.19)	330 (12.99)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
	100	220 (8.66)	330 (12.99)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
80	64	215 (8.46)	340 (13.39)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
	100	230 (9.06)	340 (13.39)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
100	64	250 (9.84)	400 (15.75)	301 (11.85)	122 (4.8)	234 (9.21)	189 (7.44)
	100	265 (10.43)	400 (15.75)	301 (11.85)	122 (4.8)	234 (9.21)	189 (7.44)
125	64	295 (11.61)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)
	100	315 (12.4)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)
150	64	345 (13.58)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)
	100	355 (13.98)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)
200	64	415 (16.34)	500 (19.69)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)
	100	430 (16.93)	500 (19.69)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)

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

- 1) If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 ... 100 by 3 mm (0.118 inch); DN 125 by 5 mm (0.197 inch).
- 2) If protection plates are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 ... 100 by 6 mm (0.236 inch); DN 125 by 10 mm (0.394 inch).
- 3) With the high-temperature version, the dimension is increased by 112 mm (4.41 inch).

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

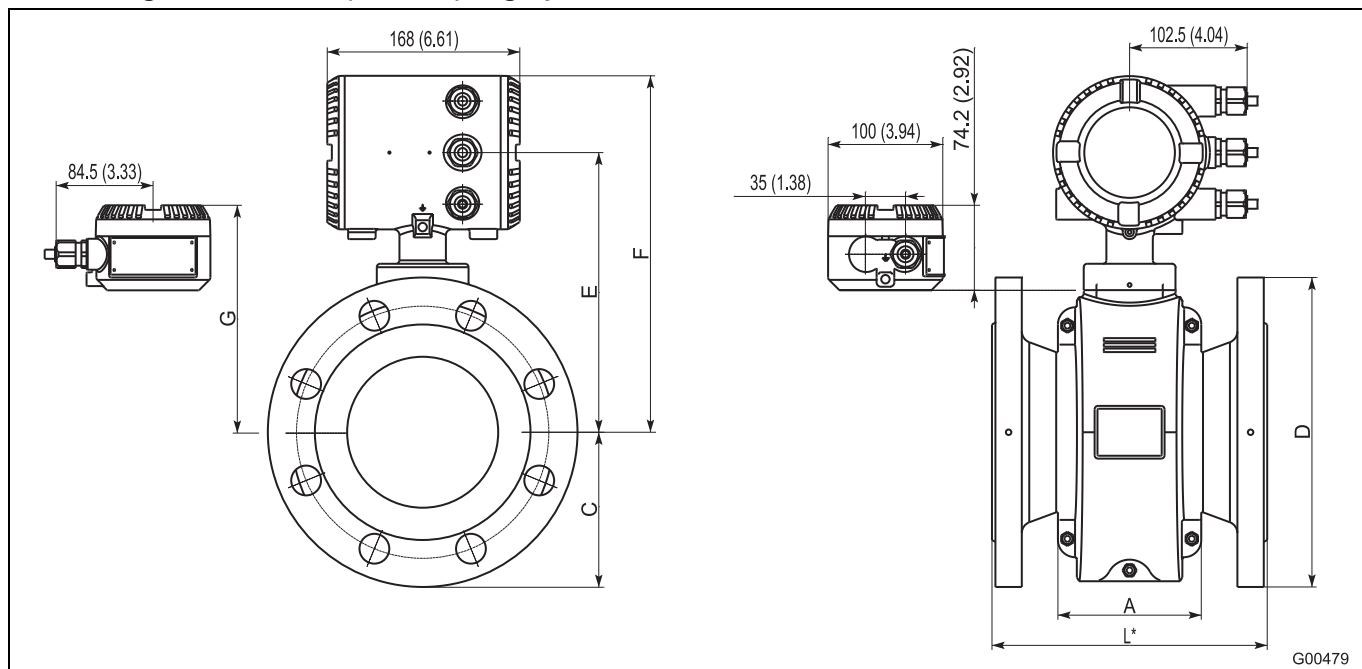


Fig. 29: Dimensions in mm (inch)

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

Dimensions [mm (inch)]							
DN	PN ¹⁾	D	L ^{1) 2)}	F ⁴⁾	C	E ³⁾	G ³⁾
15	64 ... 100	95 (3.74)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)
25	64 ... 100	124 (4.88)	270 (10.63)	255 (10.04)	82 (3.23)	188 (7.4)	143 (5.63)
40	64 ... 100	156 (6.14)	280 (11.02)	262 (10.31)	92 (3.62)	195 (7.68)	150 (5.91)
50	64	165 (6.5)	280 (11.02)	268 (10.55)	97 (3.82)	201 (7.91)	156 (6.14)
	100	165 (6.5)	280 (11.02)	268 (10.55)	97 (3.82)	201 (7.91)	156 (6.14)
65	64	190 (7.48)	330 (12.99)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
	100	190 (7.48)	330 (12.99)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
80	64	210 (8.27)	340 (13.39)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
	100	210 (8.27)	340 (13.39)	279 (10.98)	108 (4.25)	212 (8.35)	167 (6.57)
100	64	273 (10.75)	400 (15.75)	301 (11.85)	122 (4.8)	234 (9.21)	189 (7.44)
	100	273 (10.75)	400 (15.75)	301 (11.85)	122 (4.8)	234 (9.21)	189 (7.44)
125	64	330 (12.99)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)
	100	330 (12.99)	450 (17.72)	311 (12.24)	130 (5.12)	244 (9.61)	199 (7.83)
150	64	355 (13.98)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)
	100	355 (13.98)	450 (17.72)	358 (14.09)	146 (5.75)	291 (11.46)	246 (9.69)
200	64	422 (16.61)	500 (19.69)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)
	100	422 (16.61)	500 (19.69)	399 (15.71)	170 (6.69)	331 (13.03)	286 (11.26)

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

- 1) If a grounding plate is installed (attached to one side of the flange), this increases dimension L as follows: DN 3 ... 100 by 3 mm (0.118 inch); DN 125 by 5 mm (0.197 inch).
- 2) If protection plates are installed (attached to both sides of the flange), this increases dimension L as follows: DN 3 ... 100 by 6 mm (0.236 inch); DN 125 by 10 mm (0.394 inch).
- 3) With the high-temperature version, the dimension is increased by 112 mm (4.41 inch).

6.6 Transmitter housing and suggested installation method

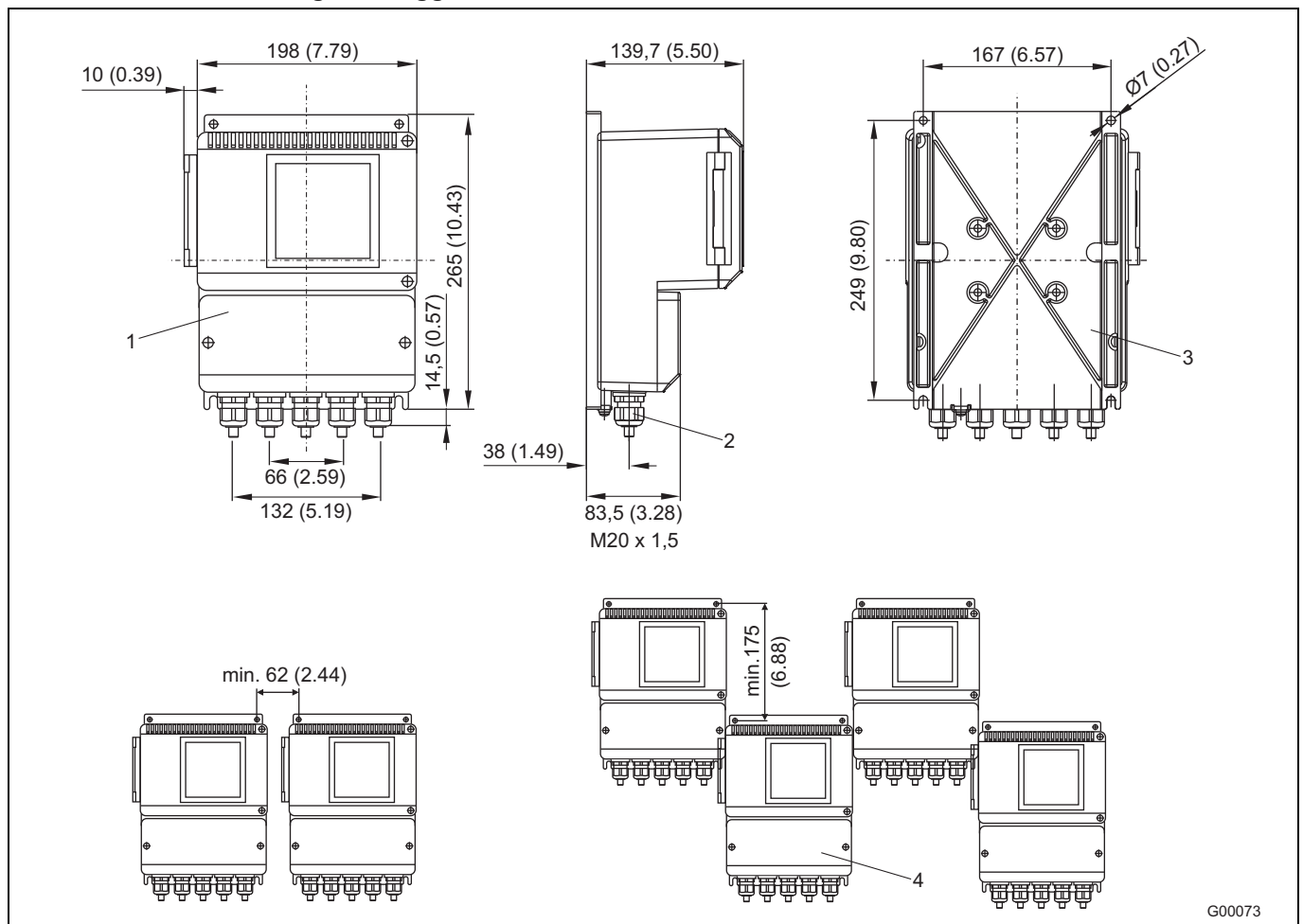


Fig. 30: Dimensions in mm (inch)

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

ACS-CONTROL-SYSTEM
knowledge and systems

Your partner for measuring technology and automation



ACS-CONTROL-SYSTEM GmbH
Lauterbachstr. 57
D- 84307 Eggenfelden

Tel: +49 (0) 8721-9668-0
Fax: +49 (0) 8721-9668-30

info@acs-controlsystem.de
www.acs-controlsystem.de