ABB MEASUREMENT & ANALYTICS | DATA SHEET

FSM4000

Electromagnetic flowmeter

Measurement made easy

The ultimate solution for the most demanding applications

Outstanding performance

- The FSM4000 takes on the task where all other flowmeters fail.

FSM4000 for optimal operational security in all demanding applications

- Sludges with high level of solids
- High level of pulp
- Concentrated sludge

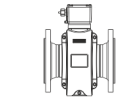
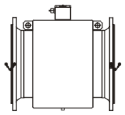
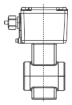
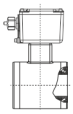
Durability for a maximum service life

- Long-lasting liner materials are resistant to abrasion and corrosion
- No additional wear caused by protruding parts in the meter tube

General properties

- Nominal diameter DN 3 to 1000 ($^{1}/_{10}$ to 40 ”)
- Pressure rating PN 10 to PN 40; ASME CL150, CL300
- Process connection: flange in accordance with DIN/EN, ASME
- Liner materials: PFA, PTFE, hard rubber, soft rubber and ceramic carbide
- Digital communication via HART®

Overview – models

Housing material	**Alu. Housing, Series 4000**	**Stainless Steel Housing, Series 2000**
	 DN 3 ... 400 (1/10 ... 16")  DN 450 ... 1000 (18 ... 40")	 DN 3 ... 40 (1/10 ... 1 1/2")  DN 50 ... 100 (2 ... 4")
	Fixed Flange	Wafer type

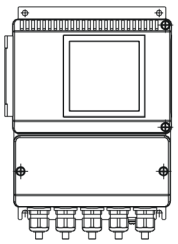
Sensor				
Model number	SE41F		SE21W	
Measured error	0.5% of rate (> DN 2)			
	DN	PN	DN	PN
Wafer type	—		3 to 50	10 to 40
			65 to 100	10 to 16
Flange DIN 2501/EN 1092–1	3 to 1000	10 to 40	—	—
Flange ASME B16.5/B16.47	1/10 to 40"	CL 150	—	—
JIS B2210–10K	1/10 to 12"	CL 300		
Liner	Hard/soft rubber, ceramic carbide, PTFE, PFA, ETFE, other		PFA (vacuum-tight)	
Conductivity	≥ 20 µS/cm (optional ≥ 5/0.5 µS/cm)			
Electrodes	Stainless steel 1.4571 (316 Ti), 1.4539 (904 L), Hastelloy B-3/C-4, platinum-iridium, tantalum, titanium			
Process connection material	Steel, stainless steel		—	
IP degree of protection in accordance with EN 60529	IP 65 / IP 67 / IP 68		IP 65 / IP 67 / IP 68	
Measuring medium temperature	–25 to 130 °C / 180 °C (–13 to 266 °F / 356 °F)		–40 to 130 °C (–40 to 266 °F)	

Approvals		
Model number	SE41F	SE21W
Pressure Equipment Directive 97/23/EC	Conformity assessment in accordance with category III, fluid group 1	
CRN (Canadian Reg. Number)	On request	

… Overview – models

… Measuring accuracy

Transmitter	
Model number	S4
Power supply	85 to 253 V AC, 24 V AC/DC
Current output	0/2 to 10 mA, 0/4 to 20 mA
Pulse output	active (24 V), optocoupler (220 mA)
Ext. output switch-off	yes
Ext. totalizer reset	yes
Forward / reverse flow measurement	yes
Communication	HART® protocol
Pipe empty detection std.	yes, DN 10 or higher and ≥ 20 µS/cm
Self-monitoring, extended diagnosis functions	yes, extended diagnostic functions / fingerprint only in connection with sensors SE21 and SE41F for DN 10 or higher
Local display / totalization	yes
Density correction	yes, manual entry (totalize and display in mass units)
IP rating in accordance with EN 60529	IP 65 / IP 67, NEMA 4X
Chassis	Field mount housing



General data

Measuring accuracy

Reference conditionsin accordance with EN 29104

Measuring medium temperature	20 °C (68 °F) ±2 K
Ambient temperature	20 °C (68 °F) ±2 K
Power supply	Nominal voltage as per name plate U_N ± 1 %
Installation conditions	• Inlet section. > 10 × DN straight section • Outlet section: > 5 × DN straight section DN = Sensor nominal diameter
Warm-up phase	30 min

Maximum measuring error

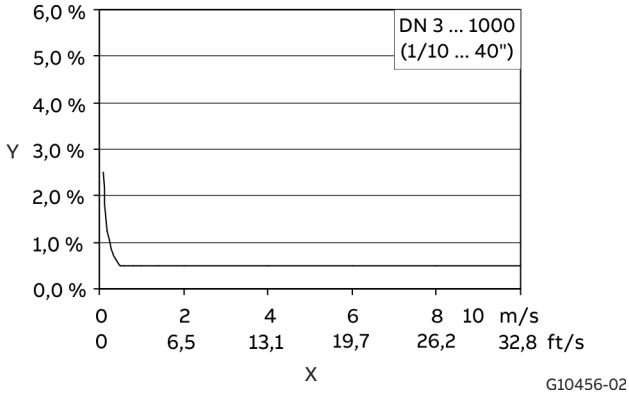
Pulse output

- DN 3 to DN 1000 (1/10 to 40"):
  Q > 0.05 Q_{max}DN ±0.5 % of measured value
- Q < 0.05 Q_{max}DN ± 0.00025 Q_{max}DN

Q_{max}DN = maximum flow rate of the nominal diameter at 10 m/s

Analog output effects

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



Y Measured error ± of measured value

X Flow velocity v

Figure 1: Analog output effects

Grounding

The grounding of the flowmeter sensor is essential for both safety reasons, and to ensure trouble-free operation of the electromagnetic flowmeter.
The ground screws on the flowmeter sensor are to be brought to ground potential. For technical reasons, this potential should be identical to the potential of the metering fluid, if possible.
For plastic or insulated lined pipelines, the fluid is grounded by installing ground plates. When there are stray potentials present in the pipeline, we recommend installing a ground plate on both ends of the flowmeter sensor.
To comply with the EMC and Low Voltage Directives, the connection box/ transmitter must be grounded in addition to the meter tube of the flowmeter sensor.

Installation conditions

Flow direction

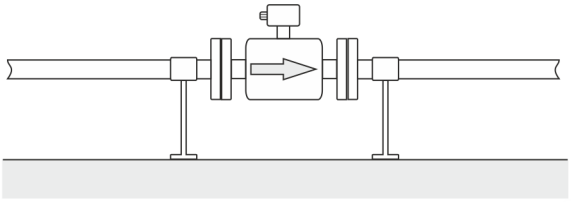


Figure 2: Flow direction

The device measures the flow rate in both flow directions. Forward flow is the factory setting, as shown in Figure 2.

Electrode axis

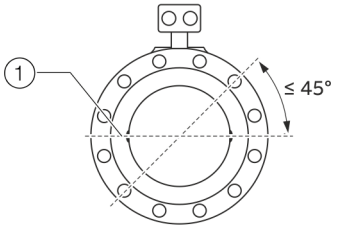


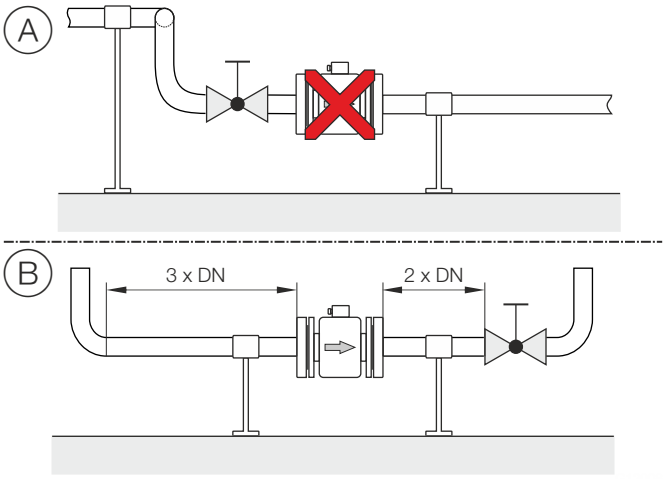
Figure 3: Orientation of the electrode axis

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

… General data

… Installation conditions

Inlet and outlet sections



① Double elbow ② Turn-off device

Figure 4: Inlet and outlet section, turn-off devices

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

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

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

Mounting position

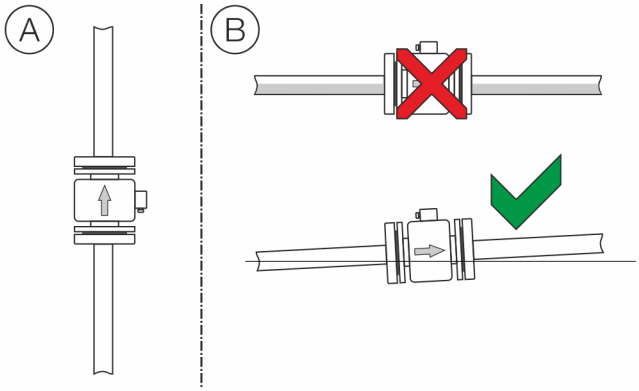


Figure 5: Mounting position

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

Ⓑ For a horizontal installation, the meter tube must always be completely filled with the measuring medium.
Provide for a slight incline of the connection for degassing.

Free inlet or outlet

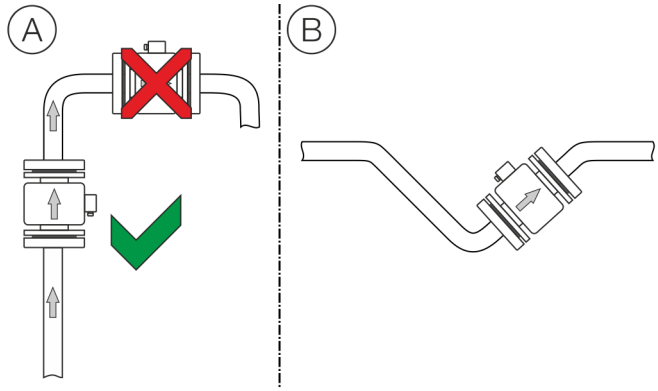


Figure 6: Free inflow and outflow

Ⓐ For a free outflow, do not install flowmeter at the highest point of the piping or on its outflow side, since the measuring tube may run empty, creating air bubbles.
Ⓑ For free inflow/outflow, provide an invert to make sure that the piping is always full

Mounting with heavily contaminated measuring media

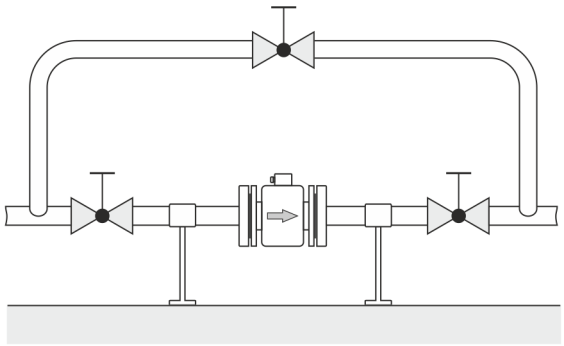
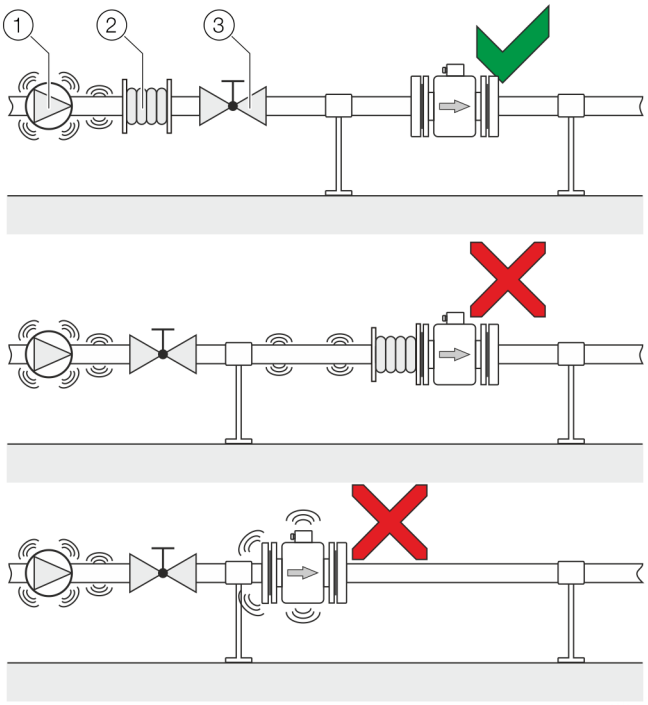


Figure 7: Bypass line

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

Mounting with pipe vibration



① Pump
② Damping device
③ Shut-off device

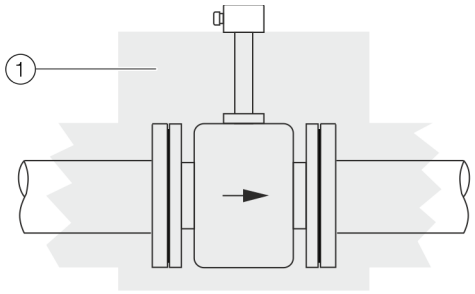
Figure 8: Vibration damping

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

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

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

Sensor insulation



① Insulation

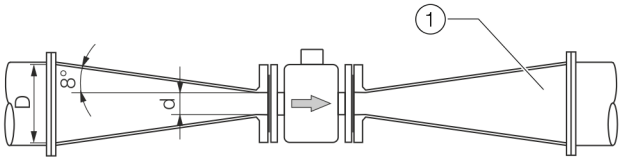
Figure 9: Insulation of the flowmeter sensor

In the high temperature design, the flowmeter sensor can be completely thermally insulated. After the unit is installed, the piping and sensor must be insulated in accordance with the figure.

… General data

… Installation conditions

Installation in piping with larger nominal diameter



(1) Reducer

Figure 10: Using reducers

Determine the resulting pressure loss when using reducers:

1. Determine diameter ratios d/D.
2. Determine the flow velocity based on the flow rate nomogram (Figure 11).
3. Read the pressure loss on the Y-axis in Figure 11.

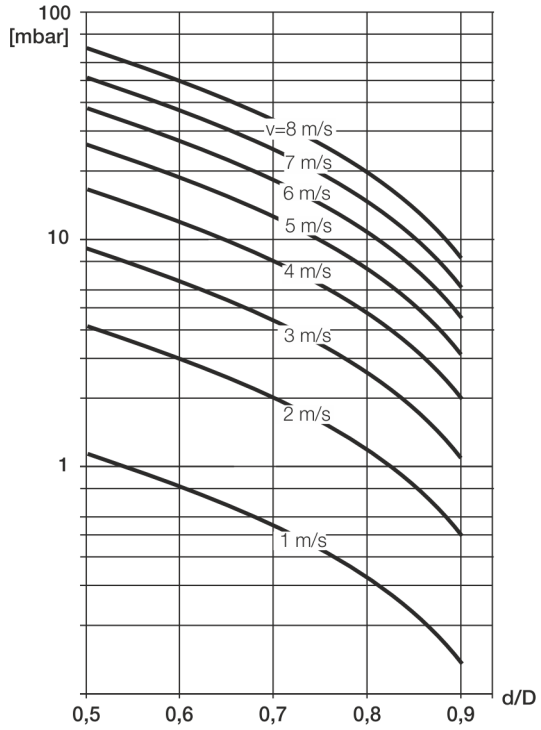


Figure 11: Flow rate nomogram for flange transition piece at α/2 = 8°

Measuring range table

Nominal diameter		**Min. flow velocity measuring range**						**Max. flow velocity measuring range**					
DN		**0 to 0.5 m/s**						**0 to 10 m/s**					
3	1/10	0	up to	0.2	l/min	0.0529	US gal/min	0	up to	4	l/min	1.06	US gal/min
4	5/32	0	up to	0.4	l/min	0.1	US gal/min	0	up to	8	l/min	2.1	US gal/min
6	¼	0	up to	1	l/min	0.3	US gal/min	0	up to	20	l/min	5.3	US gal/min
8	5/16	0	up to	1.5	l/min	0.4	US gal/min	0	up to	30	l/min	7.9	US gal/min
10	⅜	0	up to	2.25	l/min	0.6	US gal/min	0	up to	45	l/min	12	US gal/min
15	½	0	up to	5.0	l/min	1.3	US gal/min	0	up to	100	l/min	36	US gal/min
20	¾	0	up to	7.5	l/min	2.0	US gal/min	0	up to	150	l/min	40	US gal/min
25	1	0	up to	10	l/min	2.6	US gal/min	0	up to	200	l/min	53	US gal/min
32	1 ¼	0	up to	20	l/min	5.3	US gal/min	0	up to	400	l/min	106	US gal/min
40	1 ½	0	up to	30	l/min	7.9	US gal/min	0	up to	600	l/min	159	US gal/min
50	2	0	up to	3	m3/h	13	US gal/min	0	up to	60	m3/h	264	US gal/min
65	2 ½	0	up to	6	m3/h	26	US gal/min	0	up to	120	m3/h	528	US gal/min
80	3	0	up to	9	m3/h	40	US gal/min	0	up to	180	m3/h	793	US gal/min
100	4	0	up to	12	m3/h	53	US gal/min	0	up to	240	m3/h	1057	US gal/min
125	5	0	up to	21	m3/h	92	US gal/min	0	up to	420	m3/h	1849	US gal/min
150	6	0	up to	30	m3/h	132	US gal/min	0	up to	600	m3/h	2642	US gal/min
200	8	0	up to	54	m3/h	238	US gal/min	0	up to	1080	m3/h	4755	US gal/min
250	10	0	up to	90	m3/h	396	US gal/min	0	up to	1800	m3/h	7925	US gal/min
300	12	0	up to	120	m3/h	528	US gal/min	0	up to	2400	m3/h	10567	US gal/min
350	14	0	up to	165	m3/h	726	US gal/min	0	up to	3300	m3/h	14529	US gal/min
400	16	0	up to	225	m3/h	991	US gal/min	0	up to	4500	m3/h	19813	US gal/min
450	18	0	up to	300	m3/h	1321	US gal/min	0	up to	6000	m3/h	26417	US gal/min
500	20	0	up to	330	m3/h	1453	US gal/min	0	up to	6600	m3/h	29059	US gal/min
600	24	0	up to	480	m3/h	2113	US gal/min	0	up to	9600	m3/h	30380	US gal/min
700	28	0	up to	660	m3/h	2906	US gal/min	0	up to	13200	m3/h	58118	US gal/min
800	32	0	up to	900	m3/h	3963	US gal/min	0	up to	18000	m3/h	79252	US gal/min
900	36	0	up to	1200	m3/h	5283	US gal/min	0	up to	24000	m3/h	105669	US gal/min
1000	40	0	up to	1350	m3/h	5944	US gal/min	0	up to	27000	m3/h	118877	US gal/min

… General data

… Measuring range table

Flange design and pressure rating

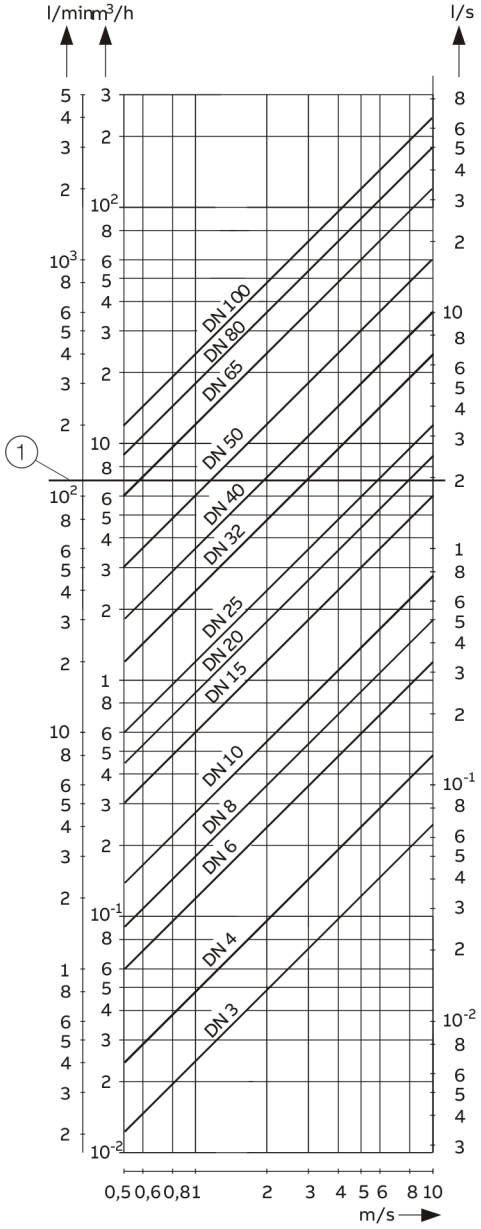
Nominal diameter	Flange[1]	Material	PN
3 to 25	DIN	Stainless steel or steel	40, 63, 100 bar[2]
(1/10 to 1")	ASME		CL150, CL300, CL600[3]
	JIS		10 bar
32	DIN	Stainless steel or steel	40 bar
(1 ¼")	ASME		CL150, CL300
	JIS		10 bar
40	DIN	Stainless steel or steel	40, 63, 100 bar
(1 ½")	ASME		CL150, CL300, CL600
	JIS		10 bar
50	DIN	Stainless steel or steel	40, 63, 100 bar
(2")	ASME		CL150, CL300, CL600
	JIS		10 bar
65	DIN	Stainless steel or steel	16, 40, 63, 100 bar
(2 ½")	ASME		CL150, CL300, CL600
	JIS		10 bar
80	DIN	Stainless steel or steel	40, 63, 100 bar
(3")	ASME		CL150, CL300, CL600
	JIS		10 bar
100	DIN	Stainless steel or steel	16, 40, 63, 100 bar
(4")	ASME		CL150, CL300, CL600
	JIS		10 bar
125	DIN	Stainless steel or steel	16, 40, 63, 100 bar
(5")	ASME		CL150, CL300
	JIS		10 bar
150	DIN	Stainless steel or steel	16, 40, 63, 100 bar
(6")	ASME		CL150, CL300, CL600
	JIS		10 bar
	ASME		CL150
200	DIN	Stainless steel or steel	10, 16, 25, 40, 63, 100 bar
(8")	ASME		CL150, CL300, CL600
	JIS		10 bar
250	DIN	Stainless steel or steel	10, 16, 25, 40 bar
(10")	ASME		CL150, CL300
	JIS		10 bar
300	DIN	Stainless steel or steel	10, 16, 25, 40 bar
(12")	ASME		CL150, CL300
	JIS		10 bar
350 to 600	DIN	Stainless steel or steel	10, 16, 25 bar
(14 to 24")	ASME		CL150, CL300
	JIS		10 bar
700 to 1000	DIN	Stainless steel or steel	10, 16, 25 bar
(28 to 40")	ASME		CL150

1) Connection dimensions for the flange in accordance with DIN2501 / EN1092–1 or ASME or JIS.
2) PN63, PN100 available from nominal diameter DN 25.
3) CL600 available from nominal diameter DN 25.

Other meter sizes, pressure stages and temperature classes are available upon request.

Flow rate nomogram

The volume flowrate is a function of the flow velocity and the diameter of the flowmeter. The flowrate nomograph indicates the flowrate range for a specific flowmeter nominal diameter and which flowmeter nominal diameters are suitable for a specific flowrate.



(1) Example

Figure 12: Flow rate nomogram DN 3 to DN 100 (10 to 4")

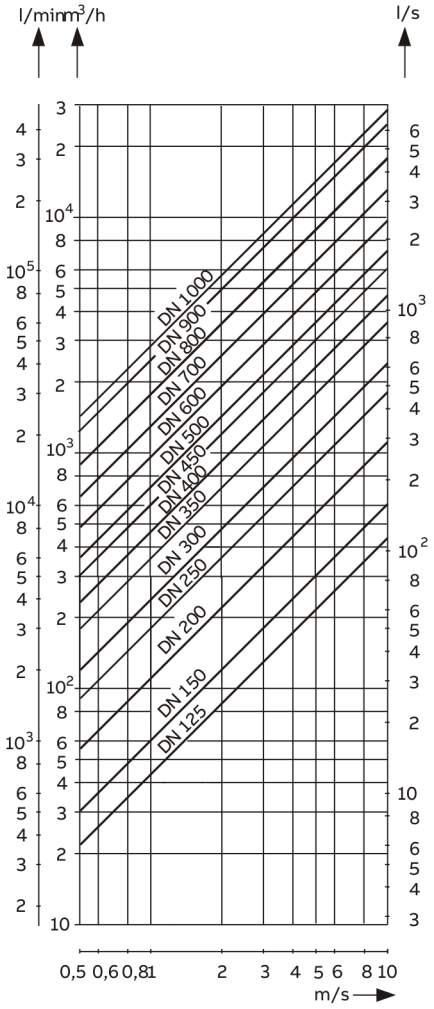


Figure 13: Flow rate nomogram, DN 125 to DN 1000 (5 to 40")

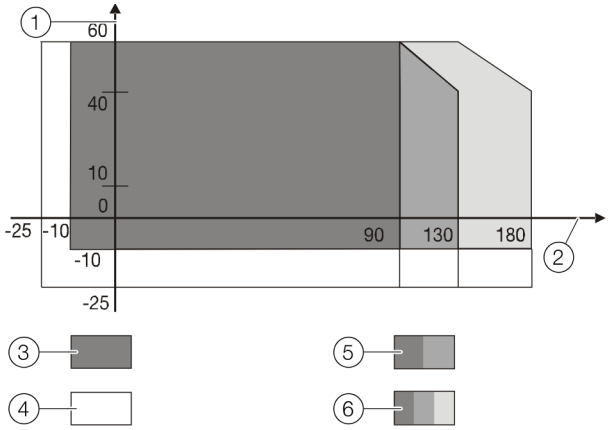
Example:

Flowrate = 7 m3/h (max. value = range end value). Sensors with nominal diameters DN 20 to DN 65 (¾ to 2½") are suited for a flow velocity of 0.5 to 10 m/s.

Model SE41F

Specifications

Temperature graph



1. Ambient temperature °C
2. Measuring medium temperature °C
3. Standard flange (steel): Hard/soft rubber max. 90/60 °C (194 to 140 °F)
4. Stainless steel flange
5. Standard flange (steel): PTFE / PFA / ETFE max. 130 °C (266 °F)
6. High temperature: thick PTFE / PFA max. 180 °C (356 °F)

Figure 14: Measuring medium temperature dependent on the ambient temperature

Max. permissible cleaning temperature PTFE-, PFA-design

CIP cleaning	Liner Flowmeter sensor	T_{max}	t_{max} Min	$T_{amb.}$
Steam cleaning	PTFE, PFA	150 °C (302 °F)	60	25 °C (77 °F)
Wet 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_{max} - Δ °C.Δ °C = ($T_{amb.}$ - 25 °C)

Weight

Refer to **Dimensions** on page 33.

Min. permissible pressure as a function of measuring medium temperature

Liner	Nominal diameter DN	$P_{Betrieb}$ at mbar abs	$T_{Betrieb}$
Hard rubber	15 to 1000 (1/2 to 40″)	0	< 90 °C (194 °F)
Soft rubber	50 to 1000 (2 to 40″)	0	< 60 °C (140 °F)
PTFE	10 to 600 (3/8 to 24″)	270 400 500	< 20 °C (68 °F) < 100 °C (212 °F) < 130°C (266 °F)
Thick PTFE high temperature design	25 to 80 (1 to 3″) 100 to 250 (4 to 10″) 300 (12″)	0 67 27	< 180 °C (356 °F) < 180 °C (356 °F) < 180 °C (356 °F)
PFA	3 to 200 (1/10 to 8″)	0 0	< 130°C (266 °F) < 180 °C (356 °F)
ETFE	25 to 1000 (1 to 40″)	100	< 130°C (266 °F)
Ceramic carbide	25 to 1000 (1 to 40″)	0	< 80 °C (176 °F)

Sensor material

Parts	Standard	Others
Liner	PTFE, PFA, hard rubber, soft rubber, ETFE	Ceramic carbide
Signal and ground electrode for • Hard rubber • Soft rubber	Stainless steel 1.4571 (316 Ti)	Hastelloy B-3 (2.4600), Hastelloy C-4 (2.4610), titanium, tantalum, platinum-iridium, stainless steel 1.4539 (904 L)
• PTFE, PFA, ETFE	Hastelloy C-4 (2.4610)	Stainless steel 1.4571 (316 Ti), Hastelloy B-3 (2.4600), titanium, tantalum, platinum-iridium, stainless steel 1.4539 (904 L)
Grounding plate	Stainless steel 1.4571 (316 Ti)	On request
Protection plate	Stainless steel 1.4571 (316 Ti)	On request

Storage temperature
–20 to 70 °C (–4 to 158 °F)

IP rating in accordance with EN 60529
IP 65/IP 67
IP 68 (option)

Pipe vibration according to EN 60068-2-6
Transmitter

- In the range of 10 to 55 Hz, max. deflection 0.15 mm

Sensor

- In the range of 10 to 55 Hz, max. deflection 0.15 mm
- In the range of 10 to 55 Hz, max. acceleration 2 g

Designs
The flange devices are compliant with the installation lengths determined according to ISO 13359.

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

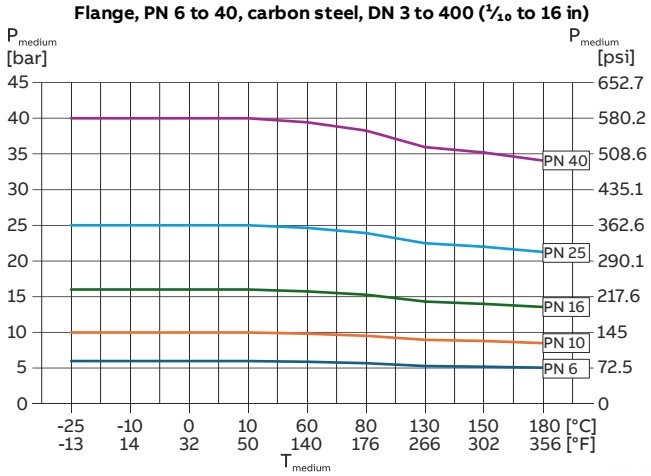
Temperature limits

Liner	Flange material	Min. temperature	Max. temperature	
			Standard	High temperature
Hard rubber	Steel	–10 °C (14 °F)	90 °C (194 °F)	—
	Stainless steel	–15 °C (5°F)	90 °C (194 °F)	—
Soft rubber	Steel	–10 °C (14 °F)	60 °C (140 °F)	—
	Stainless steel	–15 °C (5°F)	60 °C (140 °F)	—
PTFE / ETFE	Steel	–10 °C (14 °F)	130 °C (266 °F)	—
	Stainless steel	–25 °C (–13 °F)	130 °C (266 °F)	—
Thick PTFE / PFA	Steel	–10 °C (14 °F)	130 °C (266 °F)	180 °C (356 °F)
	Stainless steel	–25 °C (–13 °F)	130 °C (266 °F)	180 °C (356 °F)
Ceramic carbide	Steel	–10 °C (14 °F)	80 °C (176 °F)	—
	Stainless steel	–20 °C (–4 °F)	80 °C (176 °F)	—

… Model SE41F

… Specifications

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



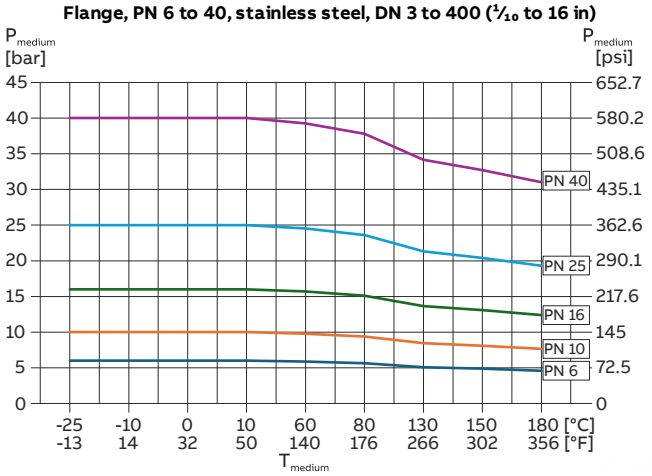
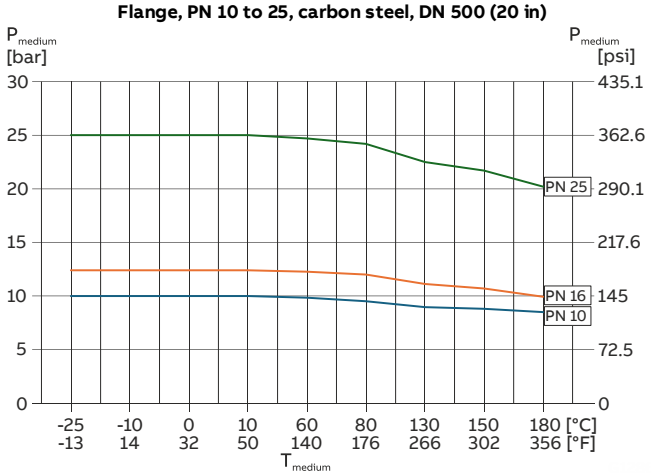


Figure 15: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 3 to 400, Pressure Rating PN 6 to 40



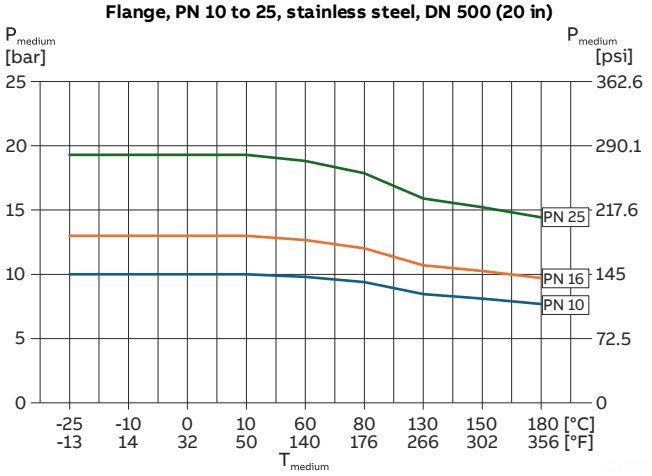
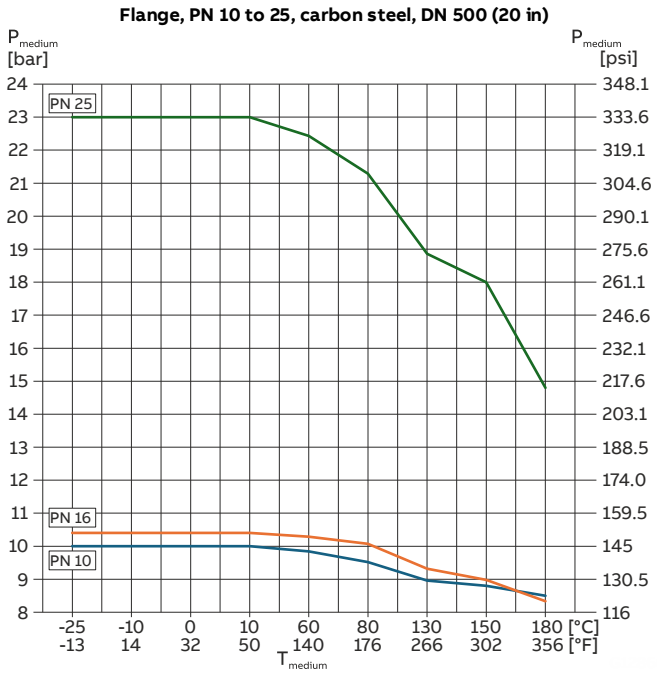


Figure 16: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 500, Pressure Rating PN 10 to 25



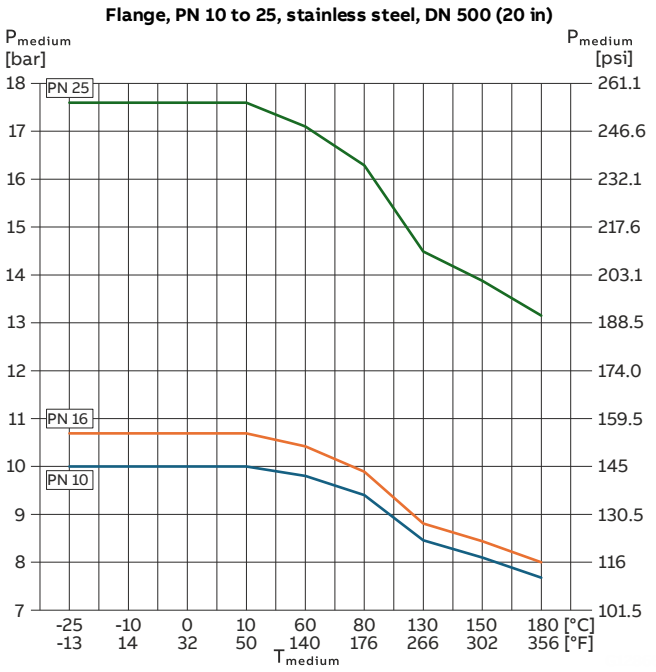
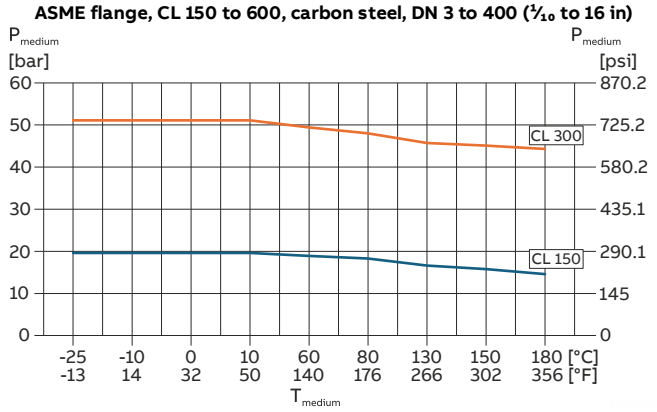


Figure 17: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 500, Pressure Rating PN 10 to 25



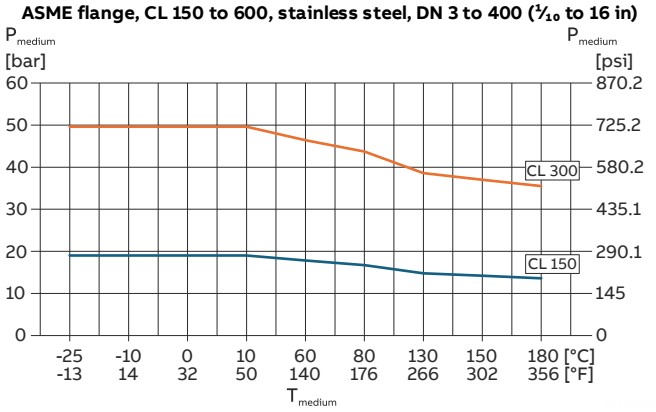


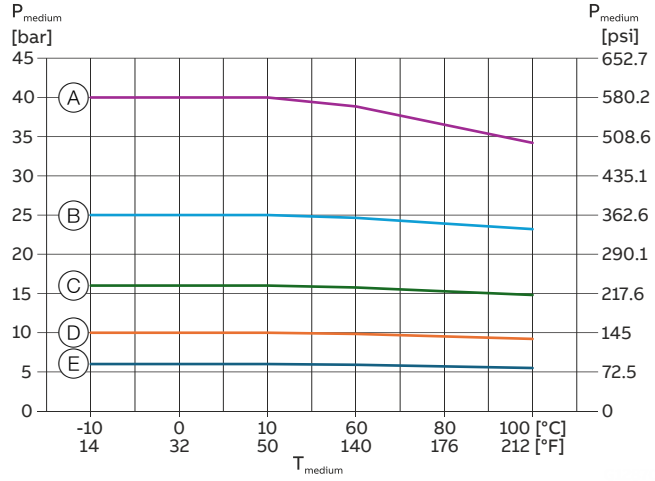
Figure 18: Flowmeter sensor with carbon steel flange or stainless steel flange, Nominal Diameter DN 3 to 400 (½ to 24 in), Pressure Rating CL 150 to 600

… Model SE41F

… Specifications

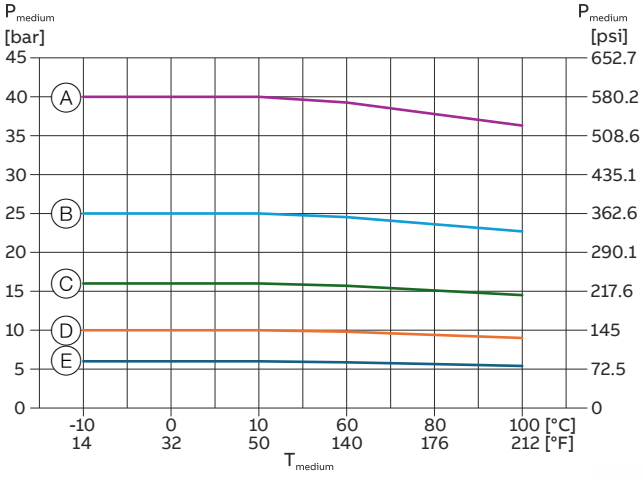
Devices with DN 700 to 1000 (28 to 40 in)

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



Ⓐ DN 700 to 1000 (28 to 40 in), PN 40
Ⓑ DN 700 to 1000 (28 to 40 in), PN 25
Ⓒ DN 700 to 1000 (28 to 40 in), PN 16
Ⓓ DN 700 to 1000 (28 to 40 in), PN 10
Ⓔ DN 1000 (40 in), PN 6

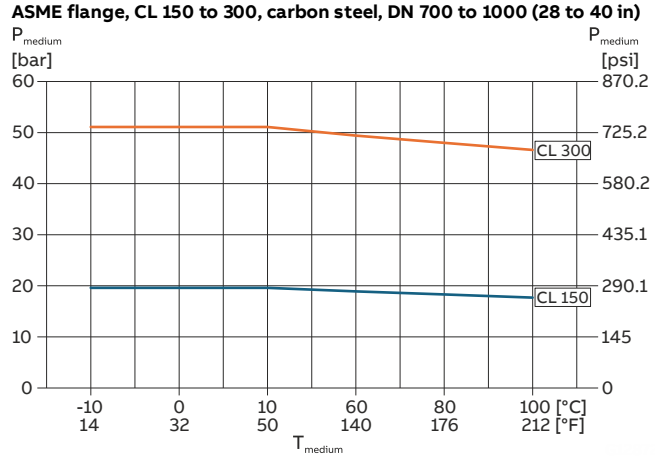
Flange, PN 6 to 40, stainless steel, DN 700 to 1000 (28 to 40 in)



Ⓐ DN 700 to 1000 (28 to 40 in), PN 40
Ⓑ DN 700 to 1000 (28 to 40 in), PN 25
Ⓒ DN 700 to 1000 (28 to 40 in), PN 16
Ⓓ DN 700 to 1000 (28 to 40 in), PN 10
Ⓔ DN 1000 (40 in), PN 6

Figure 19: Flowmeter sensor with carbon steel flange or stainless steel flange, nominal diameter DN 700 to 100 (28 to 40 in), pressure Rating PN 6 to 40

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



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

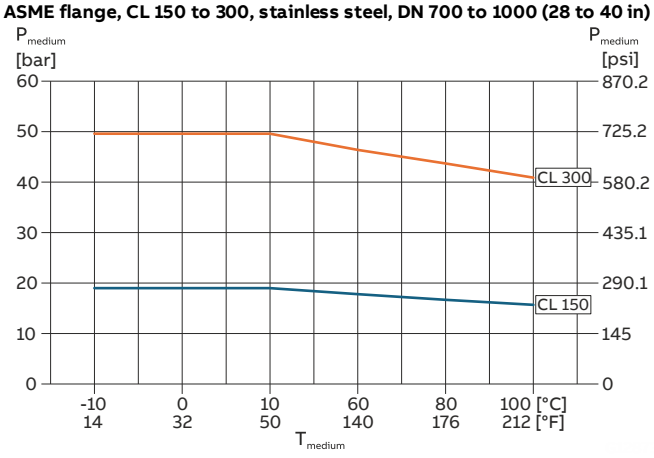
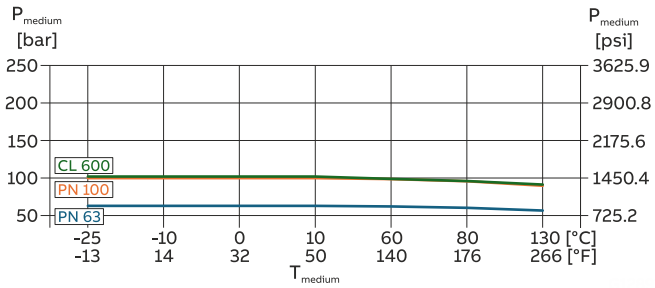


Figure 20: Flowmeter sensor with carbon steel flange or stainless steel flange, nominal diameter DN 700 to 1000 (28 to 40 in), pressure Rating CL 150 to 300

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

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



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

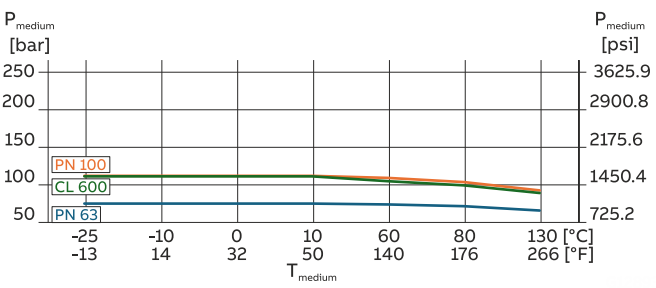
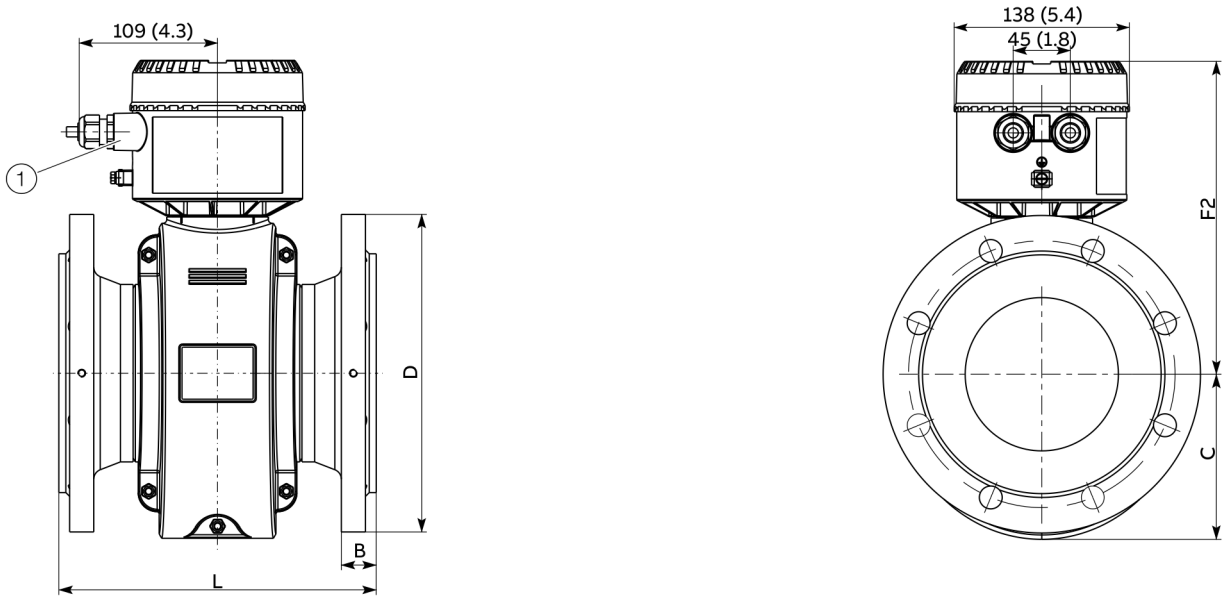


Figure 21: Flowmeter sensor with carbon steel flange and stainless steel flange, nominal diameter DN 25 to 400 (¾ to 16 in), high pressure design

Dimensions

Flange DN 3 to 100 (1/10 to 4"), aluminum sensor housing (shell housing)

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



(1) Female thread (either ½" NPT or M20 x 1.5), see model coding. In the case of a ½" NPT, there is a plug instead of a PG cable entry.

Figure 22: Flange DN 3 to 100; sensor housing

Dimensions - flange device, aluminum sensor housing (shell housing)

Nominal diameter	Process connection	D	B	L[2 3]	C	F[7]	F1[7]	F2[7]	Weight
DN 3 to 8[4]	EN 1092-1[6], PN 10 to 40[1]	90 (3.54)	19 (0.75)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	5.5 (12)
(1/8 to 5/16"[5])	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)						
DN 10	ASME B16.5, CL 300	95 (3.74)	17.3 (0.68)						
(3/8"[5])	JIS 10K	90 (3.54)	15 (0.59)						
DN 15 (½")	EN 1092-1[6], PN 10 to 40[1]	95 (3.74)	19 (0.75)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	5.5 (12)
	ASME B16.5, CL 150	90 (3.54)	14.2 (0.56)						
	ASME B16.5, CL 300	95.2 (3.75)	17.3 (0.68)						
	JIS 10K	95 (3.74)	15 (0.59)						
DN 20 (¾")	EN 1092-1[6], PN 10 to 40[1]	105 (4.13)	21 (0.83)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	6.5 (14)
	ASME B16.5, CL 150	98.6 (3.88)	15.7 (0.62)						
	ASME B16.5, CL 300	117.3 (4.62)	18.7 (0.74)						
	JIS 10K	100 (3.94)	17 (0.67)						
DN 25 (1")	EN 1092-1[6], PN 10 to 40[1]	115 (4.53)	21 (0.83)	200 (7.84)	82 (3.23)	255 (10.04)	269 (10.6)	191 (7.52)	7.5 (16.5)
	ASME B16.5, CL 150	108 (4.25)	17.2 (0.68)						
	ASME B16.5, CL 300	124 (4.88)	20.5 (0.81)						
	JIS 10K	125 (4.92)	17 (0.67)						
DN 32 (1 ¼")	EN 1092-1[6], PN 10 to 40[1]	140 (5.51)	21 (0.83)	200 (7.84)	92 (3.62)	262 (10.3)	276 (10.87)	198 (7.80)	8.5 (18.5)
	ASME B16.5, CL 150	117.3 (4.62)	18.7 (0.74)						
	ASME B16.5, CL 300	133.4 (5.25)	22.1 (0.87)						
	JIS 10K	135 (5.31)	19 (0.75)						

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

… Model SE41F

… Dimensions

Dimensions – flange device, aluminum sensor housing (shell housing)

Nominal diameter	Process connection	D	B	L[2 3]	C	F[7]	F1[7]	F2[7]	Weight
DN 40 (1 ½")	EN 1092-1[6], PN 10 to 40[1]	150 (5.91)	21 (0.83)	200 (7.84)	92 (3.62)	262 (10.3)	276 (10.87)	198 (7.80)	9.5 (21)
	ASME B16.5, CL 150	127 (5.00)	20.5 (0.81)						
	ASME B16.5, CL 300	155.4 (6.12)	23.6 (0.93)						
	JIS 10K	140 (5.51)	19 (0.75)						
DN 50 (2")	EN 1092-1[6], PN 10 to 40[1]	165 (6.50)	23 (0.91)	200 (7.87)	97.5 (3.84)	268 (10.55)	282 (11.1)	204 (8.0)	11 (24)
	ASME B16.5, CL 150	152.4 (6.00)	22.1 (0.87)						
	ASME B16.5, CL 300	165.1 (6.50)	25.4 (1.0)						
	JIS 10K	155 (6.10)	19 (0.75)						
	AS2129 table D, E	150 (5.91)	–						8.5 (18.5)
DN 65 (2 ½")	EN 1092-1[6], PN 16[1]	185 (7.28)	22 (0.87)	200 (7.87)	108.5 (4.25)	279 (10.98)	293 (11.54)	215 (8.46)	11.5 (25)
	EN 1092-1[6], PN 40[1]	185 (7.28)	26 (1.02)						13.5 (30)
	ASME B16.5, CL 150	177.8 (7.00)	25.4 (1.0)						11.5 (25)
	ASME B16.5, CL 300	190.5 (7.50)	28.4 (1.12)						13.5 (30)
	JIS 10K	175 (6.89)	21 (0.83)						13.5 (30)
	AS2129 table D, E	165 (6.50)	–						–
DN 80 (3")	EN 1092-1[6], N 10 to 40[1]	200 (7.87)	28 (1.10)	200 (7.87)	108.5 (4.27)	279 (10.98)	293 (11.54)	215 (8.46)	15.5 (34)
	ASME B16.5, CL 150	190.5 (7.50)	26.9 (1.06)						15.5 (34)
	ASME B16.5, CL 300	210 (8.27)	31.4 (1.24)						17.5 (38.5)
	JIS 10K	185 (7.28)	21 (0.83)						17.5 (38.5)
	AS2129 table D, E	185 (7.28)	–						–
DN 100 (4")	EN 1092-1[6] PN 16[1]	220 (8.66)	24 (0.94)	250 (9.84)	122.5 (4.82)	301 (11.85)	315 (12.4)	237 (9.33)	17.5 (38.5)
	EN 1092-1[6] PN 25 to 40[1]	235 (9.25)	28 (1.10)						21.5 (47)
	ASME B16.5 CL 150	228.6 (9.00)	27.4 (1.08)						19.5 (43)
	ASME B16.5 CL 300	254 (10.0)	35.8 (1.41)						28.5 (63)
	JIS 10K	210 (8.72)	21 (0.83)						17.5 (38.5)
	AS2129 table D, E	215 (8.46)	–						–

1 Other pressure ratings on request.

2) If an grounding plate is fitted (fastened to one side of the flange), dimension L increases as follows: by 3 mm (0.118 in) for DN 3 to 100, and by 5 mm (0.197 in) for DN 125.

3) If protection plates are fitted (fastened to both sides of the flange), dimension L increases as follows: by 6 mm (0.236 in) for DN 3 to 100, and by 10 mm (0.394 in) for DN 125.

4 Connection flange DN 10.

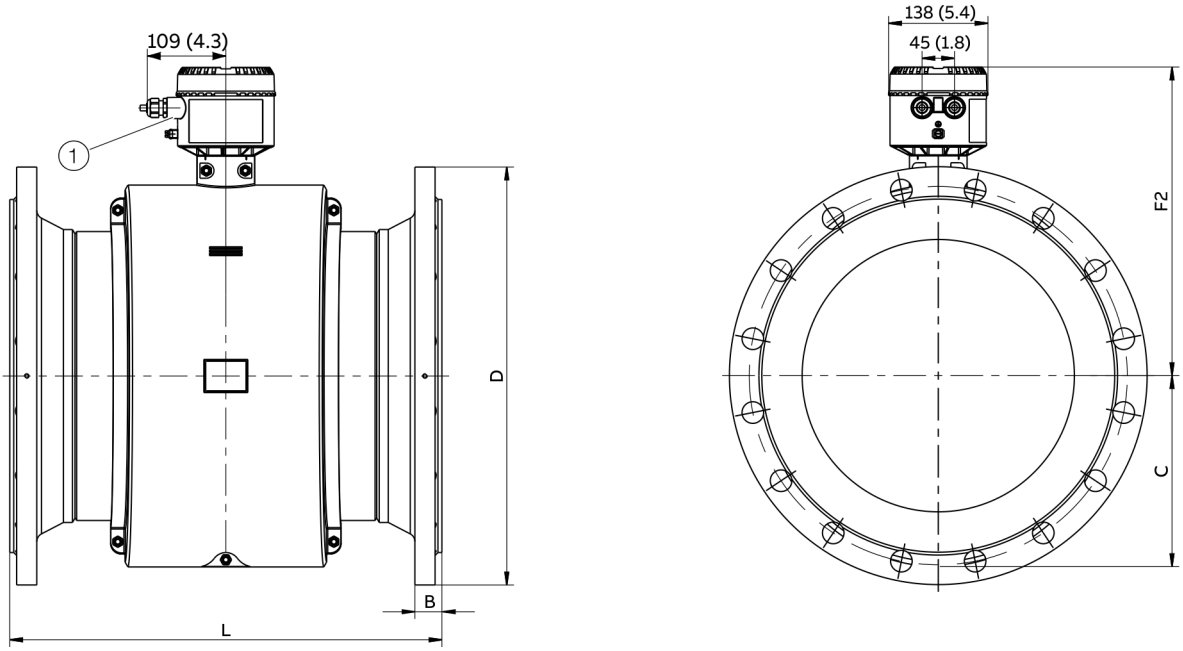
5 Connection flange ½".

6 Connection dimensions in accordance with EN 1092-1. For DN 65, PN 16 in accordance with EN 1092-1 please order PN 40.

7 In devices with high temperature design, the dimensions F, F1 and F2 increase by +127 mm (+5.0 in).

Flange DN 125 to 400 (6 to 16”), aluminum sensor housing (shell housing)

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



(1) Female thread (either ½” NPT or M20 x 1.5), see model coding. In the case of a ½” NPT, there is a plug instead of a PG cable entry.

Figure 23: Flange DN 125 to 400; sensor housing

Dimensions - flange device, aluminum sensor housing (shell housing)

Nominal diameter	Process connection	D	B	L[2 3]	C	F[4]	F1[4]	F2[4]	Weight
DN 125 (5")	EN 1092-1[6] PN 16[1]	250 (9.84)	25 (0.98)	250 (9.84)	130 (5.12)	311 (12.24)	325 (12.80)	247 (9.72)	20.5 (45)
	EN 1092-1[6] PN 25 to 40[1]	270 (10.63)	29 (1.14)						27.5 (60.5)
	ASME B16.5 CL 150	254 (10.0)	27.9 (1.10)						20.5 (45)
	ASME B16.5 CL 300	279.4 (11.0)	39.1 (1.54)	450 (17.72)					33.5 (74)
	JIS 10K	250 (9.84)	27 (1.06)	250 (9.84)					20.5 (45)
	AS2129 table D, E	255 (10.04)	—						—
DN 150 (6")	EN 1092-1 PN 16[1]	285 (11.22)	25 (0.98)	300 (11.81)	146 (5.75)	358 (14.09)	372 (14.65)	294 (11.57)	31.5 (69.5)
	EN 1092-1 PN 25 to 40[1]	300 (11.81)	31 (1.22)						37.5 (82.5)
	ASME B16.5 CL 150	279.4 (11.0)	29.4 (1.16)						31.5 (69.5)
	ASME B16.5 CL 300	317.5 (12.5)	40.5 (1.59)						45.5 (100)
	JIS 10K	280 (11.02)	28 (1.10)						31.5 (69.5)
	AS2129 table D, E	280 (11.02)	—						31.5 (69.5)
DN 200 (8")	EN 1092-1, PN 10 to 16[1]	340 (13.39)	28 (1.10)	350 (13.78)	170.5 (6.71)	399 (15.71)	413 (16.26)	334 (13.15)	41.5 (90.5)
	EN 1092-1, PN 25[1]	360 (14.17)	34 (1.34)						53.5 (118)
	EN 1092-1, PN 40[1]	375 (14.76)	38 (1.50)						63.5 (151)
	ASME B16.5, CL 150	345 (13.58)	33.6 (1.32)						48.5 (107)
	ASME B16.5, CL 300	380 (14.96)	46.1 (1.81)						70.5 (155.5)
	JIS 10K	330 (12.99)	33 (1.30)						41.5 (90.5)
	AS2129 table D, E	335 (13.19)	—						48.5 (107)

Tolerance L: +0 / −3 mm (+0 / −0.018 in)

… Model SE41F

… Dimensions

Dimensions – flange device, aluminum sensor housing (shell housing)

Nominal diameter	Process connection	D	B	L[2 3]	C	F[4]	F1[4]	F2[4]	Weight
DN 250 (10")	EN 1092-1, PN 10[1]	395 (15.55)	30 (1.18)	450 (17.72)	198 (7.80)	413 (16.26)	427 (16.81)	349 (13.74)	59.5 (131)
	EN 1092-1, PN 16[1]	405 (15.94)	30 (1.18)						63.5 (140)
	EN 1092-1, PN 25[1]	425 (16.73)	36 (1.42)						82.5 (182)
	EN 1092-1, PN 40[1]	450 (17.72)	42 (1.65)						93.5 (206)
	ASME B16.5, CL 150	405 (15.94)	35.2 (1.39)						68.5 (151)
	ASME B16.5, CL 300	445 (17.52)	52.8 (2.08)						103.5 (228)
	JIS 10K	400 (15.75)	37 (1.46)						63.5 (140)
	AS2129 table D, E	405 (15.94)	—						68.5 (151)
DN 300 (12")	EN 1092-1, PN 10[1]	445 (17.52)	31 (1.22)	500 (19.68)	228 (8.98)	436 (17.17)	450 (17.72)	372 (14.62)	72.5 (160)
	EN 1092-1, PN 16[1]	460 (18.11)	33 (1.30)						78.5 (173)
	EN 1092-1, PN 25[1]	485 (19.09)	39 (1.54)						98.5 (217)
	EN 1092-1, PN 40[1]	515 (20.28)	47 (1.85)	600 (23.62)					138.5 (305)
	ASME B16.5, CL 150	485 (19.09)	36.8 (1.45)	500 (19.68)					103.5 (228)
	ASME B16.5, CL 300	520 (20.47)	55.8 (2.20)						148.5 (327)
	JIS 10K	450 (17.72)	40 (1.57)						78.5 (173)
	AS2129 table D, E	455 (17.19)	—						103.5 (228)
DN 350 (14")	EN 1092-1, PN 10[1]	505 (19.88)	31 (1.22)	550 (21.65)	267 (10.51)	451 (17.76)	465 (18.31)	416 (16.38)	93.5 (206)
	EN 1092-1, PN 16[1]	520 (20.47)	35 (1.38)						108.5 (239)
	EN 1092-1, PN 25[1]	555 (21.85)	43 (1.69)						143.5 (316)
	ASME B16.5, CL 150	535 (21.06)	40.1 (1.58)						128.5 (283)
	ASME B16.5, CL 300	585 (23.03)	58.8 (2.31)						196.5 (433)
	JIS 10K	490 (19.29)	—						108.5 (239)
	AS2129 table D, E	525 (20.67)	—						103.5 (228)
DN 400 (16")	EN 1092-1 PN 10[1]	565 (22.24)	31 (1.22)	600 (23.62)	267 (10.51)	493 (19.41)	507 (19.96)	416 (16.38)	101.5 (224)
	EN 1092-1 PN 16[1]	580 (22.83)	37 (1.46)						124.5 (274)
	EN 1092-1 PN 25[1]	620 (24.41)	45 (1.77)						168.5 (371)
	ASME B16.5 CL 150	595 (23.43)	41.6 (1.64)						173.5 (382)
	ASME B16.5 CL 300	650 (25.59)	62.2 (2.45)						262.5 (579)
	JIS 10K	560 (22.05)	—						124.5 (274)
	AS2129 table D, E	580 (22.83)	—						173.5 (382)

1 Other pressure ratings on request.

2 If a grounding plate is fitted (fastened to one side of the flange), dimension L increases by 5 mm (0.197 in).

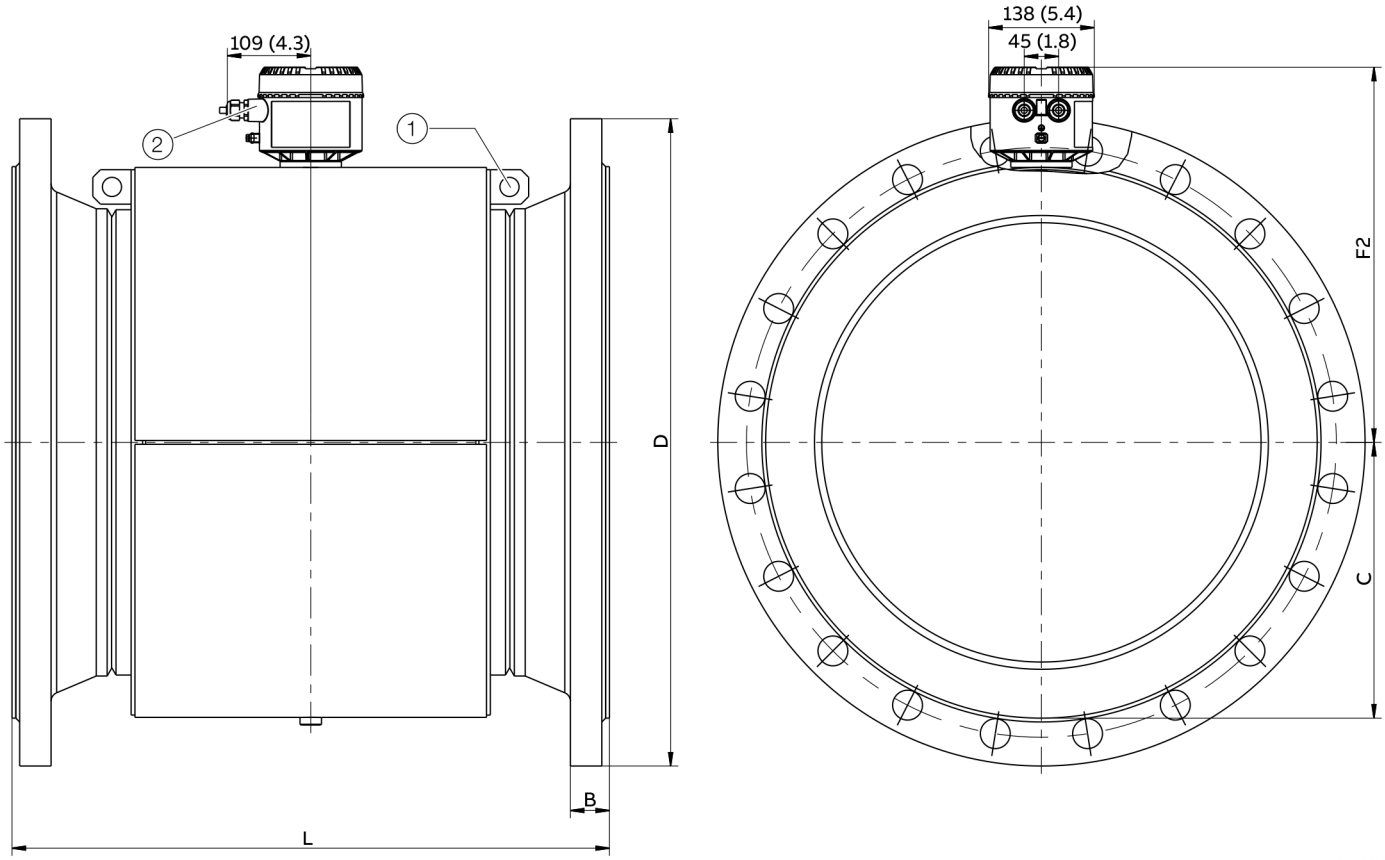
3 If protection plates are fitted (fastened to both sides of the flange), dimension L increases by 10 mm (0.394 in).

4 In devices with high temperature design, the dimensions F, F1 and F2 increase by +127 mm (+5.0 in).

Tolerance L: DN 150 to 200: +0 / -3 mm (+0 / -0.018 in), DN 250 to 400: +0 / -5 mm (+0 / -0.197 in)

Flange DN 450 to 600 (18 to 24”), steel sensor housing

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



① Transport lugs
② Female thread (either ½” NPT or M20 x 1.5), see model coding. In the case of a ½” NPT, there is a plug instead of a PG cable entry.

Figure 24: Flange DN 450 to 2000; sensor housing

Dimensions - flange device, aluminum sensor housing (shell housing)

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

1 Other pressure ratings on request.

2 If a grounding plate is fitted (fastened to one side of the flange), dimension L increases by 5 mm (0.197 in).

3 If protection plates are fitted (fastened to both sides of the flange), dimension L increases by 10 mm (0.394 in).

4 In devices with high temperature design, the dimensions F, F1 and F2 increase by +127 mm (+5.0 in).

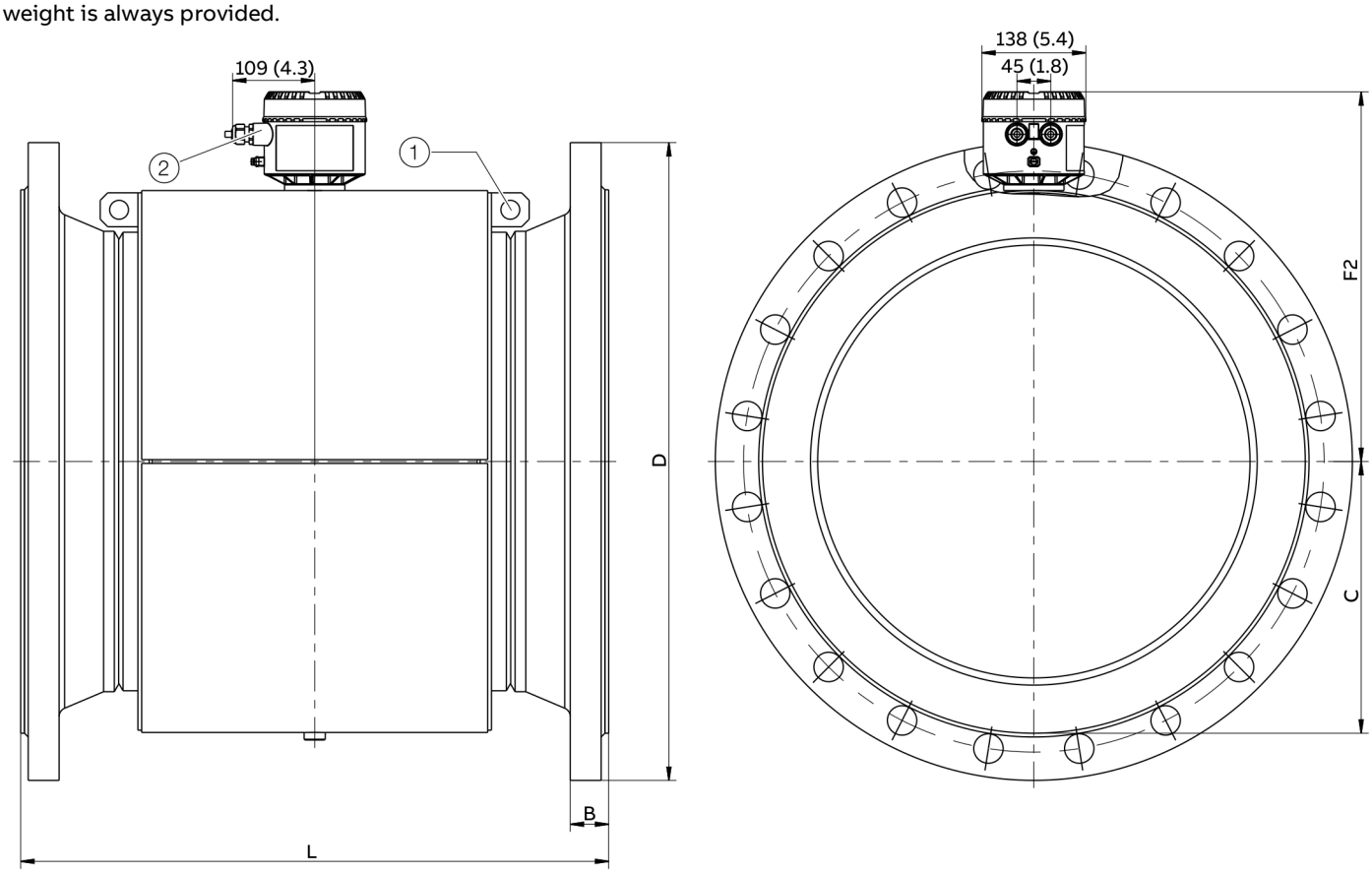
Tolerance for L: DN 450, DN 500 +0 / −5 mm (+0 / −0.197 in); DN 600 +0 / −10 mm (+0 / −0.394 in)

… Model SE41F

… Dimensions

Flange DN 700 to 1000 (28 to 40”), steel sensor housing

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



Remote mount design

① Transport lugs
② Female thread (either ½” NPT or M20 x 1.5), see model coding. In the case of a ½” NPT, there is a plug instead of a PG cable entry.

Figure 25: Flange DN 700 to 1000; sensor housing

Dimensions – flange device, aluminum sensor housing (shell housing)

Nominal diameter	Process connection	D	B	L[2 3]	C	F[4]	F1[4]	F2[4]	Weight
DN 700 (28”)	EN 1092-1, PN 10[1]	895 (35.24)	35 (1.38)	910 (35.83)	405 (15.94)	596 (23.46)	610 (24.02)	534 (21.02)	318.5 (702)
	EN 1092-1, PN 16[1]	910 (35.83)	36 (1.42)						438.5 (967)
	ASME B16.47, CL 150	836.7 (32.94)	49.5 (1.95)						348.5 (768)
DN 800 (32”)	EN 1092-1, PN 10[1]	1015 (39.96)	37 (1.46)	1040 (40.94)	455 (17.91)	646 (25.43)	660 (25.98)	584 (22.99)	418.5 (923)
	EN 1092-1, PN 16[1]	1025 (40.35)	43 (1.69)						488.5 (1077)
	ASME B16.47, CL 150	942 (37.09)	51 (2.01)						498.5 (1099)
DN 900 (36”)	EN 1092-1, PN 10[1]	1115 (43.90)	39 (1.54)	1170 (46.06)	505 (19.88)	696 (27.40)	710 (27.95)	635 (25.0)	503.5 (1110)
	EN 1092-1, PN 16[1]	1125 (44.29)	45 (1.77)						588.5 (1297)
	ASME B16.47, CL 150	1157.1 (41.62)	57.3 (2.26)						678.5 (1496)
DN 1000 (40”)	EN 1092-1, PN 10[1]	1230 (48.43)	39 (1.54)	1300 (51.18)	555 (21.85)	746 (29.37)	760 (29.92)	685 (26.97)	688.5 (1517)
	EN 1092-1, PN 16[1]	1255 (49.41)	47 (1.85)						848.5 (1870)
	ASME B16.47, CL 150	1174.8 (46.25)	60.6 (2.39)						878.5 (1937)

1 Other pressure ratings on request.

2 If a grounding plate is fitted (fastened to one side of the flange), dimension L increases by 5 mm (0.197 in).

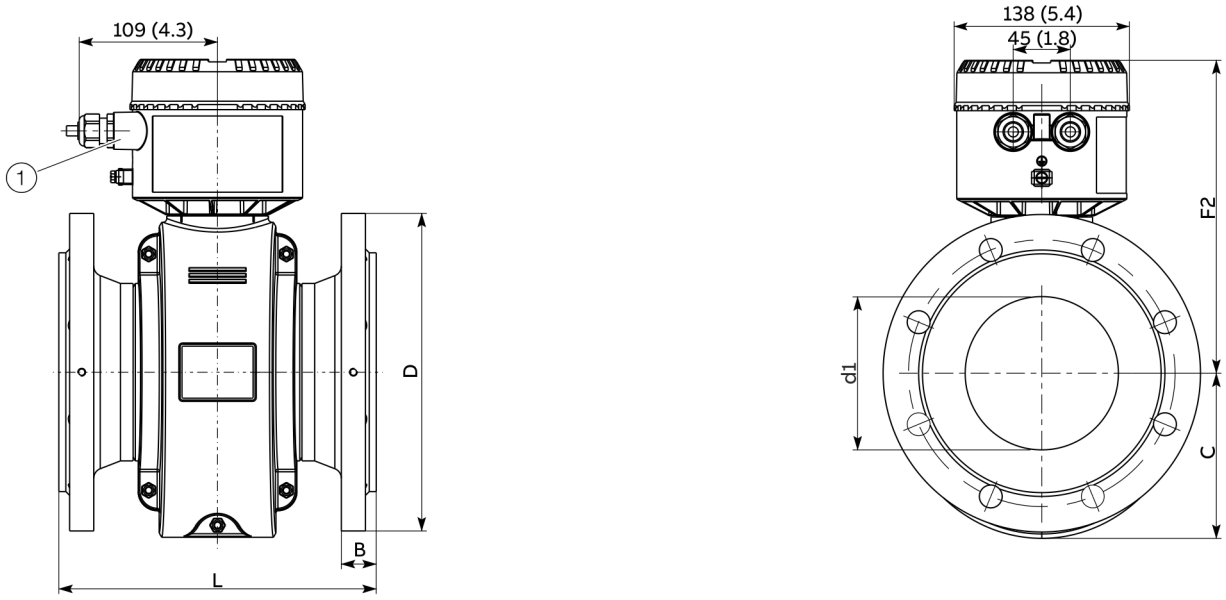
3 If protection plates are fitted (fastened to both sides of the flange), dimension L increases by 10 mm (0.394 in).

4 In devices with high temperature design, the dimensions F, F1 and F2 increase by +127 mm (+5.0 in).

Tolerance for L: DN 700 to 1000 +0 / −10 mm (+0 / −0.394 in)

Flange DN 25 to 200 (1 to 8”), high pressure design, aluminum sensor housing (shell housing)

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



① Female thread (either ½” NPT or M20 x 1.5), see model coding. In the case of a ½” NPT, there is a plug instead of a PG cable entry.

Figure 26: Flange DN 25 to 200; sensor housing

Dimensions - flange device, aluminum sensor housing (shell housing)

DN	Process connection	D	di	Plan	L[1 2]	F	C	F1	F2	A	Weight
25 (1”)	EN1092-1 PN63	140	22	—	270						10 (22)
	EN1092-1 PN100	(5.51)	(0.87)		(10.63)	255	82	269	191	113	
	ASME B16.5, CL 600	124	22	40	270	(10.04)	(3.23)	(10.6)	(7.52)	(4.45)	10 (22)
		(4.88)	(0.87)	(1.57)	(10.63)						
40 (1½”)	EN1092-1 PN63	170	36	—	280						11 / 12
	EN1092-1 PN100	(6.69)	(1.42)		(11.02)	262	92	276	198	113	(24 / 27)
	ASME B16.5, CL 600	156	35	40	280	(10.31)	(3.62)	(10.87)	(7.80)	(4.45)	11
		(6.14)	(1.38)	(1.57)	(11.02)						(24)
50 (2”)	EN1092-1 PN63	180	48	—	280						13
		(7.09)	(1.89)		(11.02)						(29)
	EN1092-1 PN100	195	48	—	280	268	97	282	204	115	16
		(7.68)	(1.89)		(11.02)	(10.55)	(3.82)	(11.1)	(8.0)	(4.53)	(35)
	ASME B16.5, CL 600	165	46	40	280						13
		(6.50)	(1.81)	(1.57)	(11.02)						(29)
65 (2½”)	EN1092-1 PN63	205	64	--	330						16
		(8.07)	(2.52)		(12.99)						(35)
	EN1092-1 PN100	220	63	--	330	279	108	293	215	104	21
		(8.66)	(2.48)		(12.99)	(10.98)	(4.25)	(11.54)	(8.46)	(4.09)	(46)
	ASME B16.5, CL 600	190	60	30	330						18
		(7.48)	(2.36)		(12.99)						(40)

… Model SE41F

… Dimensions

Dimensions - flange device, aluminum sensor housing (shell housing)

DN	Process connection	D	di	Plan	L[1 2]	F	C	F1	F2	A	Weight
80 (3″)	EN1092-1 PN63	215	76	--	340						20
		(8.46)	(2.99)		(13.39)						(44)
	EN1092-1 PN100	230	75	--	340	279	108	293	215	104	24
		(9.06)	(2.95)		(13.39)	(10.98)	(4.25)	(11.54)	(8.46)	(4.09)	(53)
	ASME B16,5, CL 600	209	72	40	340						23
		(8.23)	(2.83)		(13.39)						(51)
100 (4″)	EN1092-1 PN63	250	100	--	400						27
		(9.84)	(3.94)		(15.75)						(60)
	EN1092-1 PN100	265	98	--	400	301	122	315	237	125	26
		(10.43)	(3.85)		(15.75)	(11.85)	(4.8)	(12.4)	(9.33)	(4.92)	(57)
	ASME B16,5, CL 600	273	91	80	400						44
		(10.75)	(3.58)		(15.75)						(97)
125 (5″)	EN1092-1 PN63	295	124	--	450	311	130	325	247	125	68
		(11.61)	(4.88)		(17.72)	(12.24)	(5.12)	(12.80)	(9.72)	(4.92)	(150)
	EN1092-1 PN100	315	121	--	450						68
		(12.4)	(4.76)		(17.72)						(150)
	ASME B16,5, CL 600	330	116	80	400						68
		(12.99)	(4.56)		(15.75)						(150)
150 (6″)	EN1092-1 PN63	345	151	--	450						92
		(13.58)	(5.94)		(17.72)						(203)
	EN1092-1 PN100	355	148	--	450	358	146	372	294	166	92
		(13.98)	(5.83)		(17.72)	(14.09)	(5.75)	(14.65)	(11.57)	(6.54)	(203)
	ASME B16,5, CL 600	355	140	80	450						92
		(13.98)	(5.51)		(17.72)						(203)
200 (8″)	EN1092-1 PN63	415	199	—	500						148
		(16.34)	(7.83)		(19.68)						(326)
	EN1092-1 PN100	430	193	—	500	399	170	413	334	200	148
		(16.93)	(7.60)		(19.68)	(15.71)	(6.69)	(16.26)	(13.15)	(7.78)	(326)
	ASME B16,5, CL 600	419	188	80	500						148
		(16.50)	(7.40)		(19.68)						(326)

1 If a grounding plate is fitted (fastened to one side of the flange), dimension L increases as follows: by 3 mm for DN 3 … 100, and by 5 mm for DN 125.

2 If protection plates are fitted (fastened to both sides of the flange), dimension L increases as follows: by 6 mm for DN 3 … 100, and by 10 mm for DN 125.

Tolerance for L: DN 25 to 100 +0 / –5 mm, DN 150 to 200 +0 / –5 mm
Tolerance Di: hard rubber: +1 / –3 mm
All nominal pressures (PN63, PN100, CL600) are available with hard rubber only

Ordering information

FSM4000 SE41F with welded Flange, Liner Material Thick-PTFE / PTFE / PFA / ETFE

Main order number																
Electromagnetic Flowmeter FSM4000	**SE41F-**	**XXX**	X	X	X	X	X	X	X	X	X	X	X	X	XXX	XXX
Liner Material / Meter Size																
PFA / DN 3 (1/10 in)		P03														
PFA / DN 4 (5/32 in)		P04														
PFA / DN 6 (1/4 in)		P06														
PFA / DN 8 (5/16 in)		P08														
PFA / DN 10 (3/8 in)		P10														
PFA / DN 15 (1/2 in)		P15														
PFA / DN 20 (3/4 in)		P20														
PFA / DN 25 (1 in)		P25														
PFA / DN 32 (1-1/4 in)		P32														
PFA / DN 40 (1-1/2 in)		P40														
PFA / DN 50 (2 in)		P50														
PFA / DN 65 (2-1/2 in)		P65														
PFA / DN 80 (3 in)		P80														
PFA / DN 100 (4 in)		P1H														
PFA / DN 125 (5 in)		P1Q														
PFA / DN 150 (6 in)		P1F														
PFA / DN 200 (8 in)		P2H														
PTFE / DN 10 (3/8 in)		T10														
PTFE / DN 15 (1/2 in)		T15														
PTFE / DN 20 (3/4 in)		T20														
PTFE / DN 25 (1 in)		T25														
PTFE / DN 32 (1-1/4 in)		T32														
PTFE / DN 40 (1-1/2 in)		T40														
PTFE / DN 50 (2 in)		T50														
PTFE / DN 65 (2-1/2 in)		T65														
PTFE / DN 80 (3 in)		T80														
PTFE / DN 100 (4 in)		T1H														
PTFE / DN 125 (5 in)		T1Q														
PTFE / DN 150 (6 in)		T1F														
PTFE / DN 200 (8 in)		T2H														
PTFE / DN 250 (10 in)		T2F														
PTFE / DN 300 (12 in)		T3H														
PTFE / DN 350 (14 in)		T3F														
PTFE / DN 400 (16 in)		T4H														
PTFE / DN 450 (18 in)		T4F														
PTFE / DN 500 (20 in)		T5H														
PTFE / DN 600 (24 in)		T6H														
Thick PTFE / DN 25 (1 in)		F25														
Thick PTFE / DN 32 (1-1/4 in)		F32														
Thick PTFE / DN 40 (1-1/2 in)		F40														
Thick PTFE / DN 50 (2 in)		F50														
Thick PTFE / DN 65 (2-1/2 in)		F65														
Thick PTFE / DN 80 (3 in)		F80														
Thick PTFE / DN 100 (4 in)		F1H														
Thick PTFE / DN 125 (5 in)		F1Q														
Thick PTFE / DN 150 (6 in)		F1F														

Continued on next page

… Model SE41F

… Ordering information

Main order number																	
Electromagnetic Flowmeter FSM4000	**SE41F-**	**XXX**	X	X	X	X	X	X	X	X	X	X	X	X	X	XXX	XXX
Liner Material / Meter Size																	
Thick PTFE / DN 200 (8 in)		F2H															
Thick PTFE / DN 250 (10 in)		F2F															
Thick PTFE / DN 300 (12 in)		F3H															
ETFE / DN 25 (1 in)		E25															
ETFE / DN 32 (1-1/4 in)		E32															
ETFE / DN 40 (1-1/4 in)		E40															
ETFE / DN 50 (2 in)		E50															
ETFE / DN 65 (2-1/2 in)		E65															
ETFE / DN 80 (3 in)		E80															
ETFE / DN 100 (4 in)		E1H															
ETFE / DN 125 (5 in)		E1Q															
ETFE / DN 150 (6 in)		E1F															
ETFE / DN 200 (8 in)		E2H															
ETFE / DN 250 (10 in)		E2F															
ETFE / DN 300 (12 in)		E3H															
ETFE / DN 350 (14 in)		E3F															
ETFE / DN 400 (16 in)		E4H															
ETFE / DN 450 (18 in)		E4F															
ETFE / DN 500 (20 in)		E5H															
ETFE / DN 600 (24 in)		E6H															
ETFE / DN 700 (28 in)		E7H															
ETFE / DN 800 (32 in)		E8H															
ETFE / DN 900 (36 in)		E9H															
ETFE / DN 1000 (40 in)		E1T															
Others / DN 3 (1/10 in)		Z03															
Others / DN 4 (5/32 in)		Z04															
Others / DN 6 (1/4 in)		Z06															
Others / DN 8 (5/16 in)		Z08															
Others / DN 10 (3/8 in)		Z10															
Others / DN 15 (1/2 in)		Z15															
Others / DN 20 (3/4 in)		Z20															
Others / DN 25 (1 in)		Z25															
Others / DN 32 (1-1/4 in)		Z32															
Others / DN 40 (1-1/2 in)		Z40															
Others / DN 50 (2 in)		Z50															
Others / DN 65 (2-1/2 in)		Z65															
Others / DN 80 (3 in)		Z80															
Others / DN 100 (4 in)		Z1H															
Others / DN 125 (5 in)		Z1Q															
Others / DN 150 (6 in)		Z1F															
Others / DN 200 (8 in)		Z2H															
Others / DN 250 (10 in)		Z2F															
Others / DN 300 (12 in)		Z3H															
Others / DN 350 (14 in)		Z3F															
Others / DN 400 (16 in)		Z4H															
Others / DN 450 (18 in)		Z4F															
Others / DN 500 (20 in)		Z5H															
Others / DN 600 (24 in)		Z6H															

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Main order number																		
Electromagnetic Flowmeter FSM4000	**SE41F-** XXX	**X**	**X**	**X**	**X**	**X**	X	X	X	X	X	X	X	X	XXX	XXX
Measuring Electrodes Material / Grounding Electrodes																		
Hastelloy C-4 (2.4610) / Without		H																
Hastelloy B-3 (2.4600) / Without		B																
AISI 316Ti SST (1.4571) / Without		S																
Titanium / Without		M																
Tantalum / Without		T																
AISI 904L SST (1.4539) / Without		F																
Platinum-Iridium / Without		P																
Nickel / Without		U[4)]																
Double Layer/ Without		C[1)]																
Tungsten-Carbide / Without		K[1)]																
Hastelloy C-4 (2.4610) / With		O[3)]																
Hastelloy B-3 (2.4600) / With		N[3)]																
AISI 316Ti SST (1.4571) / With		E[3)]																
Titanium / With		I[3)]																
Tantalum / With		Q[3)]																
AISI 904L SST (1.4539) / With		R[3)]																
Platinum-Iridium / With		G[3)]																
Nickel / With		V[5)]																
Double Layer / With		D[2)]																
Pressure Rating																		
PN 10, ISO lay length			C															
PN 16, ISO lay length			D[6)]															
PN 25, ISO lay length			E															
PN 40, ISO lay length			F[7)]															
JIS 10K, ISO lay length			K[8)]															
ASME CL 150, ISO lay length			R															
ASME CL 300, ISO lay length			S[9)]															
Others			Z															
Material of Process Connection																		
Steel				1[10)]														
Stainless steel				3[11)]														
Accessories																		
Without					A													
Protection rings AISI 316Ti SST (1.4571)					B[12)]													
Grounding ring AISI 316Ti SST (1.4571)					C[12)]													
Others					Z													
Temperature Range																		
Standard design (<= 130 °C [266 °F])						S												
High temperature design (<= 180 °C [356 °F])						H[13)]												

1) Basic material Hastelloy C-4
2) Basic material Hastelloy C-4 / Grounding electrodes <= DN 400 (16 in)
3) Grounding electrodes <= DN 400 (16 in)
4) ≥ DN 25 (1 in)
5) >= DN 25 (1 in) / Grounding electrodes <= DN 400 (16 in)
6) DN 65 (2-1/2 in) / PN 16 with connection dimensions acc. EN 1092-1: Please order PN 40
7) Standard for DN 3 ... DN 80 (1/10 ... 3 in)
8) <= DN 300 (12 in)
9) <= DN 400 (16 in)
10) >= DN 20 (3/4 in
11) Standard for DN 3 ... DN 15 (1/10 ... 1/2 in), option from DN 20 (3/4 in)
12) Protection rings mounted on both sides and ground rings mounted on one side to flange
13) Only with Thick-PTFE / PFA >= DN 25 (1 in)

Continued on next page

… Model SE41F

… Ordering information

Main order number																		
Electromagnetic Flowmeter FSM4000	**SE41F-**	XXX	X	X	X	X	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	XXX	XXX
Certificates																		
PED Standard								A										
Material certificate 3.1 acc. EN 10204 with pressure test acc. AD2000								D[14)]										
Pressure test acc. AD2000								G										
Inspection certificate 3.1 acc. EN 10204								F										
Calibration Certificates																		
Standard									A									
Fingerprint saved at factory									F[15)]									
Type of Protection / Cable Entry																		
IP 67 / Thread for screw-type conduit fitting M20 x 1.5										2								
IP 67 / Thread for screw-type conduit fitting NPT 1/2 in										4								
IP 68 / Thread for screw-type conduit fitting M20 x 1.5										7[16)]								
IP 68 / Cable connected and connection box potted										8								
IP 68 / Cable connected and connection box potted NPT 1/2 in										A								
Design																		
Without pre-amplifier											1[17)]							
With pre-amplifier type A											2[18)]							
With pre-amplifier type B											4[19)]							
Name Plate Language / Type																		
German / Adhesive foil												G						
English / Adhesive foil												E						
French / Adhesive foil												F						
German / Stainless steel												J						
English / Stainless steel												K						
French / Stainless steel												L						
Design Level																		
(Specified by ABB)													x					
Lay Length																		
Short, acc. ISO 13359														A				
Electrode Design																		
Standard															1			
Conical head, AISI 904L SST (1.4539)															2[20)]			
Swedish design, Hastelloy C-4 (2.4610)															3[21)]			

14) Material certificate for meter tube and flanges

15) > DN8 (5/16 in)

16) Sealing compound (optional): D141B038U01

17) From DN 10 (3/8 in) >= 20 µS/cm

18) Standard up to DN 8 (5/16 in) >= 20 µS/cm, option > DN 8 (5/16 in) >= 5 µS/cm and cable length max. 200 m (660 ft)

19) Option: Up to DN 8 (5/16 in) >= 5 µS/cm, > DN 8 (5/16 in) >= 0.5 µS/cm and cable length max. 200 m (660 ft)

20) For application e.g. with high fat contents

21) DN 50 … DN 400 (2 … 16 in), for pulp applications with high resin contents

Continued on next page

Main order number																		
Electromagnetic Flowmeter FSM4000	**SE41F-**	XXX	X	X	X	X	X	X	X	X	X	X	X	X	X	**XXX**	**XXX**
Signal Cable Length																		
Without cable																000	
5 m (16 ft)																005	
10 m (33 ft)																010	
20 m (66 ft)																020	
30 m (100 ft)																030	
40 m (131 ft)																040	
50 m (164 ft)																050	
60 m (197 ft)																060	
70 m (230 ft)																070	
80 m (262 ft)																080	
90 m (295 ft)																090	
100 m (328 ft)																100	
125 m (410 ft)																125	
150 m (490 ft)																150	
175 m (570 ft)																175	
200 m (660 ft)																200	
Excitation Cable Length																	
Without cable																	000
5 m (16 ft)																	005
10 m (33 ft)																	010
20 m (66 ft)																	020
30 m (100 ft)																	030
40 m (131 ft)																	040
50 m (164 ft)																	050
60 m (197 ft)																	060
70 m (230 ft)																	070
80 m (262 ft)																	080
90 m (295 ft)																	090
100 m (328 ft)																	100
125 m (410 ft)																	125
150 m (490 ft)																	150
175 m (570 ft)																	175
200 m (660 ft)																	200

Continued on next page

… Model SE41F

… Ordering information

Additional order number

Additional order number				
Electromagnetic Flowmeter FSM4000 SE41F-	**XX**	**XX**	**XXX**	**X**
Calibration				
2 points (standard)	VK			
3 point standard calibration	VC			
Witnessed calibration, 5 calibration points	VE[22)]			
5 point calibration acc. ISO17025	VD[22)]			
Language of Documentation				
German		M1		
English		M5		
Russian		MB		
Language package Western Europe / Scandinavia (Languages: FR, ES, DA, IT, NL, PT, SV, FI)		MW		
Language package Eastern Europe (Languages: EL, CS, ET, HU, HR, LT, LV, PL, SK, SL, RO, BG)		ME		
Others		MZ		
Other Usage Certifications				
Without			CG0	
3A certification and potable water approval				
Without				B

22) Only available with FSM4000-S4 External Converter

Model SE21_

Specifications

Minimum permissible absolute pressure

Liner	Nominal diameter DN	$P_{Betrieb}$ mbar abs	at	$T_{Betrieb}$ [1] °C
PFA	3 to 100 (1/10 to 4“)	0	≤	130 °C (266 °F)

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

Maximum permissible cleaning temperature

CIP cleaning	Liner	T_{max}	T_{max} Minutes	$T_{amb.}$
Steam cleaning	PFA	150 °C (302 °F)	60	25 °C (77 °F)
Wet cleaning	PFA	140 °C (284 °F)	60	25 °C (77 °F)

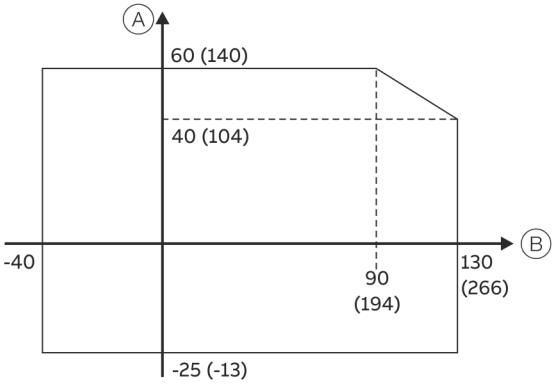
If the ambient temperature is > 25 °C (77 °F), then the difference must be subtracted from the max. cleaning temperature.

$T_{max} – \Delta$ °C, Δ °C = (T_{amb} - 25 °C)

Maximum Allowable Temperature Shock

Lining	Temp shock max. temp. diff. °C	Temp. gradient °C/min
PFA	Any	Any

Maximum permissible ambient temperature as a function of measuring medium temperature



Ⓐ Ambient temperature $T_{amb.}$

Ⓑ Measuring medium temperature T_{medium}

Figure 27: Temperature graph

Sensor material

Liner	Electrode material		Electrode design	
	Standard	Others	Standard	Others
PFA	Hast.-C4 (2.4610), 1.4539 (904 L), 1.4571 (316 Ti), Titanium, Tantalum, Platinum-iridium	Hast.-B3 (2.4600), 1.4539 (904 L)	Flat head	Pointed head (≥ DN 10) 1.4539, (904 L)

Process connection material

Process connection	Standard
Wafer type	without
Terminal box	
• without/with preamplifier, type A	Stainless steel 1.4301 (304)
• with preamplifier, type B	Aluminum alloy, painted, paint coat frame: dark gray, RAL 7012 cover: light gray, RAL 9002
Meter tube	Stainless steel 1.4301 (304)
Cable gland	Polyamide
Flowmeter sensor housing	Stainless steel 1.4301 (304)

… Model SE21_

… Specifications

Storage temperature

−25 to 70 °C (-13 to 158 °F)

IP rating in accordance with EN 60529

- IP 67
- IP 68 (Option)

Pipe vibration according to EN 60068-2-6

Transmitter

- In the range of 10 to 55 Hz, max. deflection 0.15 mm

Sensor

- In the range of 10 to 55 Hz, max. deflection 0.15 mm
- In the range of 10 to 55 Hz, max. acceleration 2 g

Material loads for process connections

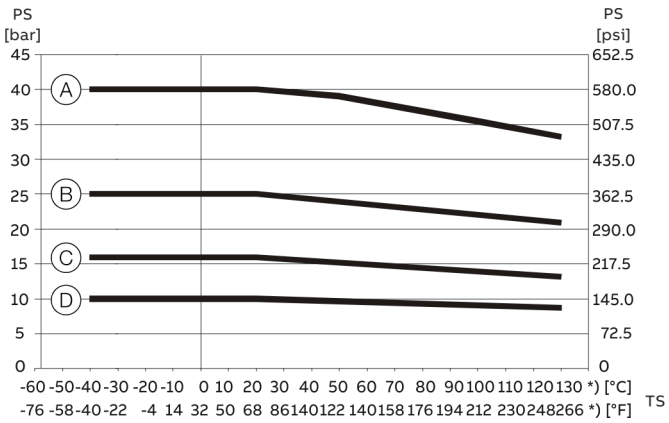
The limits of the permissible measuring medium temperature (T_{medium}) and permissible pressure (P_{medium}) are calculated on the basis of the liner and flange material used in the device (see device name plate).

Devices with variable process connections / wafer type SE21 DN 3 to 100 (1/10 to 4 in)

Process connection PFA liner	Nominal diameter DN	PS_{max} Bar (psi)	TS_{min}	TS_{max}
Wafer type	3 to 50 (1/10 to 2 in)	40 (580.2)	−40 °C (−40 °F)	130 °C (266 °F)
	65 to 100 (2½ to 4 in)	16 (232.1)		

Material load for wafer type design model SE21W

Liner: PFA wafer type



(A) PN 40/CL 300
(B) PN 25
(C) PN 16/CL 150
(D) PN 10

Figure 28: Wafer type design model SE21W

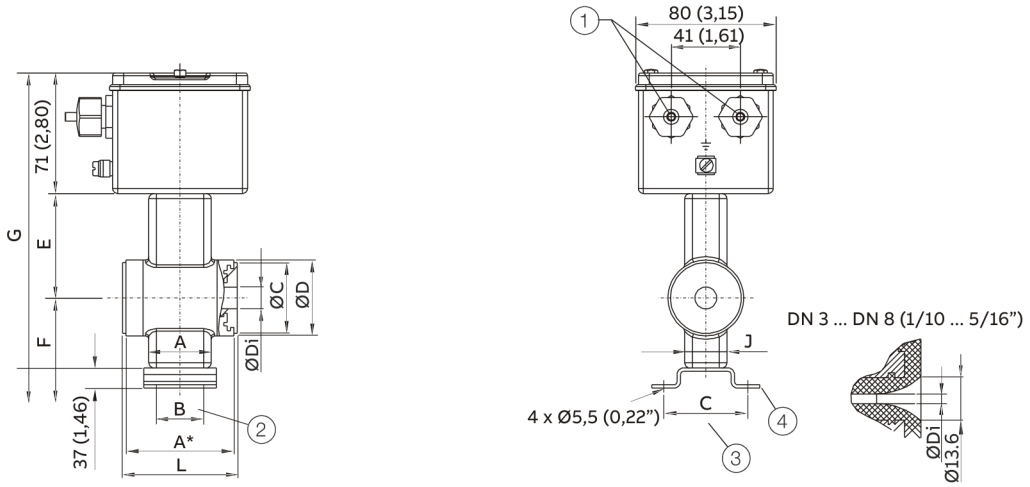
*) Higher temperatures are allowed for CIP/SIP cleaning for limited time periods, see Table 'Maximum permissible cleaning temperature'.

Dimensions

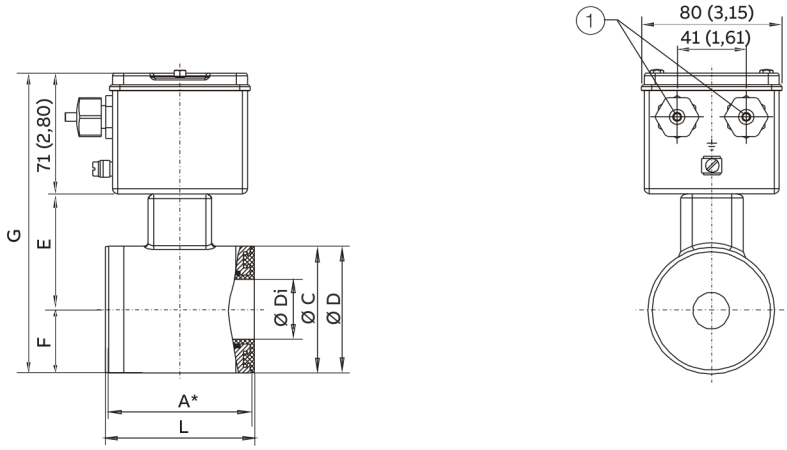
Model SE21W

Stainless steel housing, wafer type DN 3 to DN 100 (1/10 to 4")

DN 3 to DN 40 (1/10 to 1½")



DN 50 to DN 100 (2 to 4")



1. Cable gland Pg 13.5 or NPT
2. Hole pattern shaft holes
3. Hole pattern
4. Mounting bracket (optional)

Figure 29: Dimensions in mm (inch

… Model SE21_

… Dimensions

DN (inch)	PN	mm													Weight
		L[1) 2)]	L[1) 3)]	A*	A	B	C	ØC	ØDi	ØD	E	F	G	J	kg approx.
3 (1/10)									3						
4 (5/32)									4						
6 (1/4)		68	68	64	37	28	50	42	6	45	62	39	172	28	1.5
8 (5/16)									8						
10 3/8)	10 to 40								10						
15 (1/2)	CL150								13					32	
20 (3/4)	CL300	78	78	74	42	28	50	50	18	54	66	43	205	32	2.0
25 (1)	JIS	90	90	86	42	46	70	59	24	63	73	48	219	32	2.0
32 (1¼)		98	98	94	42	46	70	69	30	73	78	53	229	32	2.5
40 (1½)		103	103	99	42	46	70	77	36	82	82	57	237	32	3.0
50 (2)		117	117	112	–	60	110	95	47	100	90	50	213	–	4.0
65 (2½)	10 to 16	103	200	99	–	60	110	111	62	116	105	58	235	–	4.5
80 (3)	CL150	103	200	99	–	60	110	128	74	133	114	67	252	–	6.5
100 (4)	JIS	133	250	129	–	60	110	155	96	160	128	80	279	–	8.5
DN (inch)	**PN**	**in**													**Weight**
		L1)2)	**L1)3)**	**A***	**A**	**B**	**C**	**ØC**	**ØDi**	**ØD**	**E**	**F**	**G**	**J**	**lb approx.**
3 (1/10)									0.12						
4 (5/32)									0.16						
6 (1/4)		2.68	68	2.52	1.46	1.10	1.97	1.65	0.24	1.77	2.44	1.54	6.77	1.10	3.3
8 (5/16)									0.31						
10 3/8)	10 to 40								0.39						
15 (1/2)	CL150								0.51					1.26	
20 (3/4)	CL300	3.07	78	2.91	1.65	1.10	1.97	1.97	0.71	2.13	2.60	1.69	8.07	1.26	4.4
25 (1)	JIS	3.54	90	3.39	1.65	1.81	2.76	2.32	0.94	2.48	2.87	1.89	8.62	1.26	4.4
32 (1¼)		3.86	98	3.70	1.65	1.81	2.76	2.72	1.18	2.87	3.07	2.09	9.02	1.26	5.5
40 (1½)		4.06	103	3.90	1.65	1.81	2.76	3.03	1.42	3.23	3.23	2.24	9.33	1.26	6.6
50 (2)		4.61	117	4.41	–	2.36	4.33	3.74	1.85	3.94	3.54	1.97	8.39	–	8.8
65 (2½)	10 to 16	4.06	7.87	3.90	–	2.36	4.33	4.37	2.44	4.57	4.13	2.28	9.25	–	9.9
80 (3)	CL150	4.06	7.87	3.90	–	2.36	4.33	5.04	2.91	5.24	4.49	2.64	9.92	–	14.3
100 (4)	JIS	5.24	9.84	5.08	–	2.36	4.33	6.10	3.78	6.30	5.04	3.15	10.98	–	18.7

1) Installation lengths with 2 grounding plates L + 3 mm (0.12”)

2) Previous installation length. The installation length (old / new) is specified through the model number key. Old installation length for replacement purposes only.

3) New installation length.

Mounting bracket (optional)
With mounting bracket, combined height + 37 mm (1.46”) DN 3 to DN 40 (1/10 to 1½”), + 10.5 mm (0.41”) DN 50 to DN 100 (2 to 4”).

Ordering information

FSM4000-SE21, Wafer Type, Variable Process Connections, Liner Material PFA

Main order number																			
Electromagnetic Flowmeter FSM4000	**SE21-**	**X**	**XXX**	**X**	X	X	X	X	X	X	X	X	X	X	X	X	XXX	XXX
Process Connection																			
Wafer type		W																	
Liner Material / Meter Size																			
PFA / DN 3 (1/10 in)			P03																
PFA / DN 4 (5/32 in)			P04																
PFA / DN 6 (1/4 in)			P06																
PFA / DN 8 (5/16 in)			P08																
PFA / DN 10 (3/8 in)			P10																
PFA / DN 15 (1/2 in)			P15																
PFA / DN 20 (3/4 in)			P20																
PFA / DN 25 (1 in)			P25																
PFA / DN 32 (1-1/4 in)			P32																
PFA / DN 40 (1-1/2 in)			P40																
PFA / DN 50 (2 in)			P50																
PFA / DN 65 (2-1/2 in)			P65																
PFA / DN 80 (3 in)			P80																
PFA / DN 100 (4 in)			P1H																
Measuring Electrodes Material / Grounding Electrodes																			
Hastelloy C-4 (2.4610) / Without				H															
Hastelloy B-3 (2.4600) / Without				B															
AISI 316Ti SST (1.4571) / Without				S															
Titanium / Without				M															
Tantalum / Without				T															
AISI 904L SST (1.4539) / Without				F[2)]															
Platinum-Iridium / Without				P															
Hastelloy C-4 (2.4610) / With				O															
Hastelloy B-3 (2.4600) / With				N															
AISI 316Ti SST (1.4571) / With				E															
Titanium / With				I															
Tantalum / With				Q															
AISI 904L SST (1.4539) / With				R[2)]															
Platinum-Iridium / With				G															

1) For food and beverage applications

2) DN 65 (2-1/2 in) / PN 16 with connection dimensions according to EN 1092-1: Please order PN 40

… Model SE21_

… Ordering information

Main order number																		
Electromagnetic Flowmeter FSM4000	**SE21-**	X	XXX	X	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	XXX	XXX
Pressure Rating																		
PN 10					C													
PN 16					D													
PN 40					F													
ASME CL 150					P													
ASME CL 300					Q													
Material of Process Connection																		
Without						0												
Accessories																		
Without							A[6]											
With fastening element							C											
Temperature Range																		
Standard design (<= 130 °C [266 °F])								S										
Certificates																		
PED Standard									A									
Material certificate 3.1 acc. EN 10204 with pressure test AD2000									D[8]									
Pressure test AD2000									G									
Inspection certificate 3.1 acc. EN 10204									F									
Calibration Certificates																		
Standard										A								
Fingerprint saved at factory										F[9]								
Type of Protection / Cable Entry																		
IP 67 / Thread for screw-type conduit fitting M20 x 1.5											2							
IP 67 / Thread for screw-type conduit fitting NPT 1/2 in											4							
IP 68 / Thread for screw-type conduit fitting M20 x 1.5											7[10]							
IP 68 / Cable connected and connection box potted											8							
Design																		
Without pre-amplifier												1[11]						
With pre-amplifier type A												2[12]						
With pre-amplifier type B												4[13]						

6) > DN 2 (1/12 in)

8) From DN 3 (1/10 in)

9) From DN 10 (3/8 in)

10) Sealing compound (optional): D141B038U01

11) From DN 10 (3/8 in) >= 20 µS/cm

12) Standard up to DN 8 (5/16 in) >= 20 µS/cm, > DN 8 (5/16 in) >= 5 µS/cm and cable length max. 200 m (660 ft)

13) Option: Up to DN 8 (5/16 in) >= 5 µS/cm, > DN 8 (5/16 in) >= 0.5 µS/cm and cable length max. 200 m (660 ft)

Continued on next page

Main order number																		
Electromagnetic Flowmeter FSM4000	**SE21-**	X	XXX	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**	**X**	**XXX**	XXX
Name Plate Language / Type																		
German / Adhesive foil													G					
English / Adhesive foil													E					
French / Adhesive foil													F					
German / Stainless steel													J					
English / Stainless steel													K					
French / Stainless steel													L					
Design Level																		
(Specified by ABB)														x				
Electrode Design																		
Standard															1			
Conical head, AISI 904L SST (1.4539)															2[14)]			
Gasket Material																		
Without																A		
Signal Cable Length																		
Without cable																	000	
5 m (16 ft)																	005	
10 m (33 ft)																	010	
20 m (66 ft)																	020	
30 m (100 ft)																	030	
40 m (131 ft)																	040	
50 m (164 ft)																	050	
60 m (197 ft)																	060	
70 m (230 ft)																	070	
80 m (262 ft)																	080	
90 m (295 ft)																	090	
100 m (328 ft)																	100	
125 m (410 ft)																	125	
150 m (490 ft)																	150	
175 m (570 ft)																	175	
200 m (660 ft)																	200	

14) For application e.g. with high fat contents

Continued on next page

… Model SE21_

… Ordering information

Main order number																			
Electromagnetic Flowmeter FSM4000	**SE21-**	X	XXX	X	X	X	X	X	X	X	X	X	X	X	X	X	XXX	**XXX**
Excitation Cable Length																		
Without cable																		000
5 m (16 ft)																		005
10 m (33 ft)																		010
20 m (66 ft)																		020
30 m (100 ft)																		030
40 m (131 ft)																		040
50 m (164 ft)																		050
60 m (197 ft)																		060
70 m (230 ft)																		070
80 m (262 ft)																		080
90 m (295 ft)																		090
100 m (328 ft)																		100
125 m (410 ft)																		125
150 m (490 ft)																		150
175 m (570 ft)																		175
200 m (660 ft)																		200

Additional order number

Additional order number			
Electromagnetic Flowmeter FSM4000 SE21-	**XX**	**XX**	**XX**
Calibration			
2 points (standard)	VK		
3 point standard calibration	VC		
Witnessed calibration, 5 calibration points	VE[16)]		
point calibration acc. ISO 17025	VD[16)]		
Language of Documentation			
German		M1	
English		M5	
Russian		MB	
Language package Western Europe / Scandinavia (Languages: FR, ES, DA, IT, NL, PT, SV, FI)		MW	
Language package Eastern Europe (Languages: EL, CS, ET, HU, HR, LT, LV, PL, SK, SL, RO, BG)		ME	
Others		MZ	
Lay Length			
Old length for DN 1 - 100			JE
New length for DN 65, DN 80, DN 100			JF

16) Only available with FSM4000-S4 External Converter

Mounting accessories

Wafer type accessories

Depending on the nominal diameter and nominal pressure, the following accessories are available: bolts, nuts, spring washers. Gaskets are not included in the accessories.

Designation	Nominal diameter	Nominal pressure rating	Ordering number
FX / FSM wafer type accessories, stainless steel	DN 3 to DN 10 (1/10 to 3/8 in.)	PN 10 to PN 40	D614L265U03
		ASME CL 150	D614L265U03
		ASME CL 300	D614L265U04
	DN 15 (1/2 in.)	PN 10 to PN 40	D614L265U03
		ASME CL 150	D614L266U05
		ASME CL 300	D614L266U06
	DN 20 (3/4 in.)	PN 10 to PN 40	D614L267U04
		ASME CL 150	D614L267U05
		ASME CL 300	D614L267U06
	DN 25 (1 in.)	PN 10 to PN 40	D614L268U04
		ASME CL 150	D614L268U05
		ASME CL 300	D614L268U06
	DN 32 (1-1/4 in.)	PN 10 to PN 40	D614L269U04
		ASME CL 150	D614L269U05
		ASME CL 300	D614L269U06
	DN 40 (1-1/2 in.)	PN 10 to PN 40	D614L270U04
		ASME CL 150	D614L270U05
		ASME CL 300	D614L270U06
	DN 50 (2 in.)	PN 10 to PN 40	D614L296U04
		ASME CL 150	D614L296U05
		ASME CL 300	D614L296U06
	DN 65 (2-1/2 in.)	PN 10 to PN 16	D614L297U08
		PN 25 to PN 40	D614L297U09
		ASME CL 150	D614L297U10
		ASME CL 300	D614L297U11
	DN 80 (3 in.)	PN 10 to PN 40	D614L298U08
		ASME CL 150	D614L298U09
		ASME CL 300	D614L298U10
	DN 100 (4 in.)	PN 10 to PN 16	D614L299U07
		PN 25 to PN 40	D614L299U08
		ASME CL 150	D614L299U09

Transmitter

Specifications

Figure 30: Transmitter FSM4000-S4

Meas. range	Any flow range whose 100% value corresponds to a flow velocity between 0.5 m/s and 10 m/s can be selected.	
Minimum conductivity	≥ 20 µS/cm standard	DN 10 to DN 1000 (⅜ to 40”)
	≥ 20 µS/cm with preamplifier	DN 3 to DN 8 (1/25 to 5/16”)
	≥ 5 µS/cm with preamplifier	DN 3 to 1000 (1/25 to 40”)
	≥ 0.5 µS/cm with preamplifier	DN 10 to DN 1000 (⅜ to 40”)
Repeatability (measurement period = 100 s)	DN 3 to 1000 (1/10 to 40”): ≤ ± (0.1 % of measured value + 0.01 % of Q_{max}DN)	
Response time	1τ = 70 ms (0 to 66 %) Fast operating mode 1τ = 200 ms (0 to 66 %) Standard/piston pump operating mode	
Power supply	U = 100 to 230 V, 50/60 Hz U_{rat} = 85 to 253 V, 50/60 Hz 50/60 Hz ± 6% 20.4 to 26.4 V AC, 20.4 to 31.2 V DC, ripple ≤ 5 %	
Power consumption	S ≤ 45 VA (sensor including transmitter)	
Ambient temperature	−20 to 60 °C (−4 to 140 °F)	
Storage temperature	−20 to 80 °C (−4 to 176 °F)	

Relative humidity

Acc. to IEC 60068-2-30 classification of environmental conditions, natural factors, temperature and air humidity.

No effect under the following operating conditions: temperature ranging from 25 to 55 °C (77 to 131 °F) and a relative air humidity of 94 to 97 %.

Vibration

In accordance with IEC 60068-2-6 (03/95), grouping of devices according to table C2 for general industry applications. No additional effect on the following levels of vibration. Frequency range 10 to 55 Hz; amplitude max. 0.15 mm.

IP rating in accordance with EN 60529

IP 67 for field-mount housing and NEMA 4X

Design

Field-mount housing made of cast aluminum per DIN 1725, painted.
Paint coat thickness 80 µm. Lower section (RAL 7012), upper section (RAL 9002). For dimensions, see **Dimensions** on page 48. Weight, approx. 3.3 kg.

Electrical connections

Cable entry M20 × 1.5, NPT, PF with adapter (upon request), screw terminals

Damping (1τ)

Can be configured from 0.07 to 20 s

Low flow cutoff

Can be set to 0 to 10 % of the final value

Signal cable

Max. cable length between flowmeter sensor and transmitter is:

- 50 m for the standard design and versions with automatic zero return, from DN 10 (3/8”) and from 20 µS/cm.
- 200 m for designs with preamplifier.

A 5 m signal cable is included with each flowmeter. If a cable longer than 5 m is required, refer to the ordering information for the sensor.

Coil supply cable

Is required to connect the flowmeter sensor to the transmitter. For EMC reasons, the 2-wire cable is shielded. A 5 m cable is included with each flowmeter. If a cable longer than 5 m is required, refer to the ordering information for the sensor.

Forward flow/reverse flow measurement
Flow direction is indicated by direction arrows in the display and over the contact for external signaling. The contact output can also transmit this information.

Display
4-line, illuminated graphic display. To improve readability, the flow information can be displayed on two lines with larger characters. This allows the individual flowrate and output values to be displayed. Non-switching measured value presentation on dot-matrix display with max. 4 × 16 characters. A plaintext diagnostic display opens automatically when the system detects an error. An alarm condition can also be signaled via contact output.

Data backup
Via FRAM (Ferroelectric Nonvolatile Random Access Memory), all data over 10 years old is stored (without power supply) in the event of shut-off or failure of the line voltage. Additional security is provided by a serial FRAM installed in the transmitter and on the external connection board in which the parameter settings and process information are stored. This makes it easy to replace a transmitter – without parameterization – by simply uploading the stored data from the external FRAM.

Flow totalization
The flow is totalized in engineering units. The limits for the pulse value can be set, are dynamic and depend on the measuring range (Qmax) setting as well as the totalizer units selected. The limits are a min. (0.00016 Hz) and max. pulse frequency (5 KHz). Totalizer values for the forward and reverse flow can be displayed simultaneously when configuring the ‘Display’ parameter.

Parameter configuration
The display supports several languages (German, English, French, Finnish, Swedish, Italian, Spanish, Dutch or Turkish), and information can be entered using the three buttons in the dialog or via a communication interface with a PC or HART® protocol.

The magnet stick can also be used to configure the flowmeter with the front door closed. Position the magnet stick over the magnet icons on the display cover.

Alarm signaling
A max-min alarm can be used with the transmitter. The max. and min. limit values can be set in the range from 0 to 103 % of the flow rate. When the flowrate is outside the alarm limits, an error message is displayed in the upper line and a contact is triggered. The contact output can also transmit this information.

Wiring error
Monitoring of magnet coil or electrode circuits for short circuits or wire breaks.

Isolation of input/output
The current output, pulse output, contact input and contact output are electrically isolated from the input circuit and from each other.

Retrofitting
The transmitter with all its functions can also be used with older model electromagnetic flowmeters. The appropriate model number must be selected during parameter setting of the transmitter. It is also possible to use the transmitter with model 10D1422 flowmeters. A special FRAM (Cs = 100 %, Cz = 0 %) is required when retrofitting (see ordering information for the transmitter) and applies for nominal diameter range DN 3 to DN 1000 (1/10 to 40”) in low voltage design only.

… Transmitter

… Specifications

Extended diagnostic functions

Recorded parameters / fingerprints

Cyclical (10 sec to 7 days) or manual acquisition of parameters.
The data sets are stored in the transmitter FRAM (with time stamp / operating hours counter). A maximum of 10 sets can be stored. When the eleventh record is stored, the oldest data set is overwritten automatically.

Magnet coil circuit	AC voltage
	AC
	DC resistance (primary value for temperature)
	Temperature
	Insulation resistance (ground)
	DAC value (primary value for coil current)
Electrode circuit	Magnetic linearity
	Electrode voltage E1 (primary value for electrode balance)
	Electrode voltage E2 (primary value for electrode balance)
	Electrode balance
	Quality (signal-to-noise ratio)

The parameters can be checked for min.-max. errors. If the value is above or below the specified limit, a diagnostic error or warning, depending on the configuration, is triggered. The ‘fingerprint’ database integrated in the transmitter allows you to easily compare the values at the time of factory calibration or commissioning, for example, with the currently recorded values.
Users can store up to three different fingerprint data sets (commissioning, product1, product2) in the fingerprint database. The default fingerprint (optional) cannot be overwritten.

Detectable error states

Monitoring of …	**Detection of …**
Coil current / coil voltage / DAC value	Changes in the driver or coil circuit.
Coil resistance	Changes in coil circuit, e.g., fine short.
Coil temperature	Risk of overheating due to fluid.
Coil insulation resistance	Problems with the coil insulation. Can be caused, e.g., by dampness in the flowmeter sensor or in the connection box.
Linearity of magnetic circuit	External magn. field interference on the EMF, resulting in loss of accuracy.
Signal quality (signal-to-noise ratio)	Changes in fluid, e.g., gas bubbles, increased/reduced amount of solids.
Electrode balance	Distorted flow profile, e.g., due to improper installation. Detect interference in electrode circuit, e.g., failure of electrode due to insulating coating or a collapsed liner (vacuum shock).

Backward compatibility

The transmitter is suitable for connecting to flowmeter sensors over 20 years old. Occasionally, an adapter board may be required (for details, see the FSM4000 operating instructions).
The following flowmeter sensors are supported:
DS21, DS21F, DS41F, 10DS3111 (A-E), 10DI1425, 10D1422, 10D1462, 10D1472

Inputs/Outputs

DC output (terminals 31, 32)
The following functions can be selected in the software:

- 0 to 20 mA load ≤ 560 Ω
- 4 to 20 mA load ≤ 560 Ω
- 0 to 10 mA load ≤ 1120 Ω
- 2 to 10 mA load ≤ 1120 Ω

Switch output (terminals 41, 42)
The following functions can be selected in the software:

- Forward/reverse flow direction signal
- Flow limit alarm (max. or min.)
- Collective alarm
- Empty meter tube

The contact output can be configured as normally open or normally closed.

Optoelectronic coupler

- 'closed': 0 V ≤ U_{CEL} ≤ 2 V, 2 mA ≤ I_{CEL} ≤ 220 mA
- 'open': 16 V ≤ U_{CEH} ≤ 30 V, 0 mA ≤ I_{CEH} ≤ 2 mA

Scaled pulse output (terminals 51, 52)
Maximum totalizer frequency 5 kHz. Pulse value per physical unit from 0.001 to 1000 / unit selectable in the software. The pulse width can be configured from 0.100 to 2000 ms. The version (active, passive) can be changed via jumpers.

Active
Voltage pulse 24 V rectangular

- Load ≥ 150 Ω
  pulse width ≤ 50 ms, max. pulse frequency ≤ 3 Hz,
- Load ≥ 500 Ω
  pulse width ≥ 0.1 ms, max. pulse frequency: 5 kHz.

Passive (optoelectronic coupler)

- 'closed': 0 V ≤ U_{CEL} ≤ 2 V, 2 mA ≤ I_{CEL} ≤ 220 mA
- 'open': 16 V ≤ U_{CEH} ≤ 30 V, 0 mA ≤ I_{CEH} ≤ 2 mA

Digital communication

HART® protocol
The device is registered with the HART Communication Foundation.

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

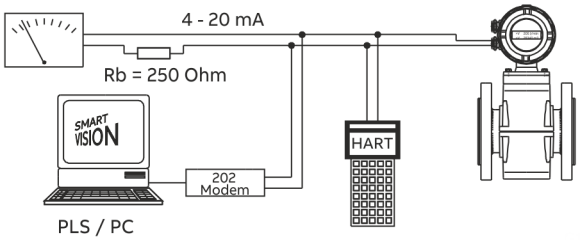


Figure 31: HART communication

HART protocol	
Configuration	Directly on the device Software DAT200 Asset Vision Basic (+ HART-DTM)
Transmission	FSK modulation on current output 4 to 20 mA according to Bell 202 Standard
Max. signal amplitude	1.2 mAss
Current output load	Min. 250 Ω, max. = 560 Ω
Cable	AWG 24 twisted
Max. cable length	1500 m
Baud rate	1200 baud
Display	Log. 1: 1200 HZ Log. 0: 2200 Hz

For additional information, see the separate interface description.

System integration
In conjunction with the DTM (Device Type Manager) available for the device (software version B.10 and higher), communication (configuration, parameterization) can occur with the corresponding framework applications according to FDT 1.21 (DAT200 Asset Vision Basic).

Other tool/system integrations (e.g., Emerson AMS/Siemens S7) are available upon request.

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

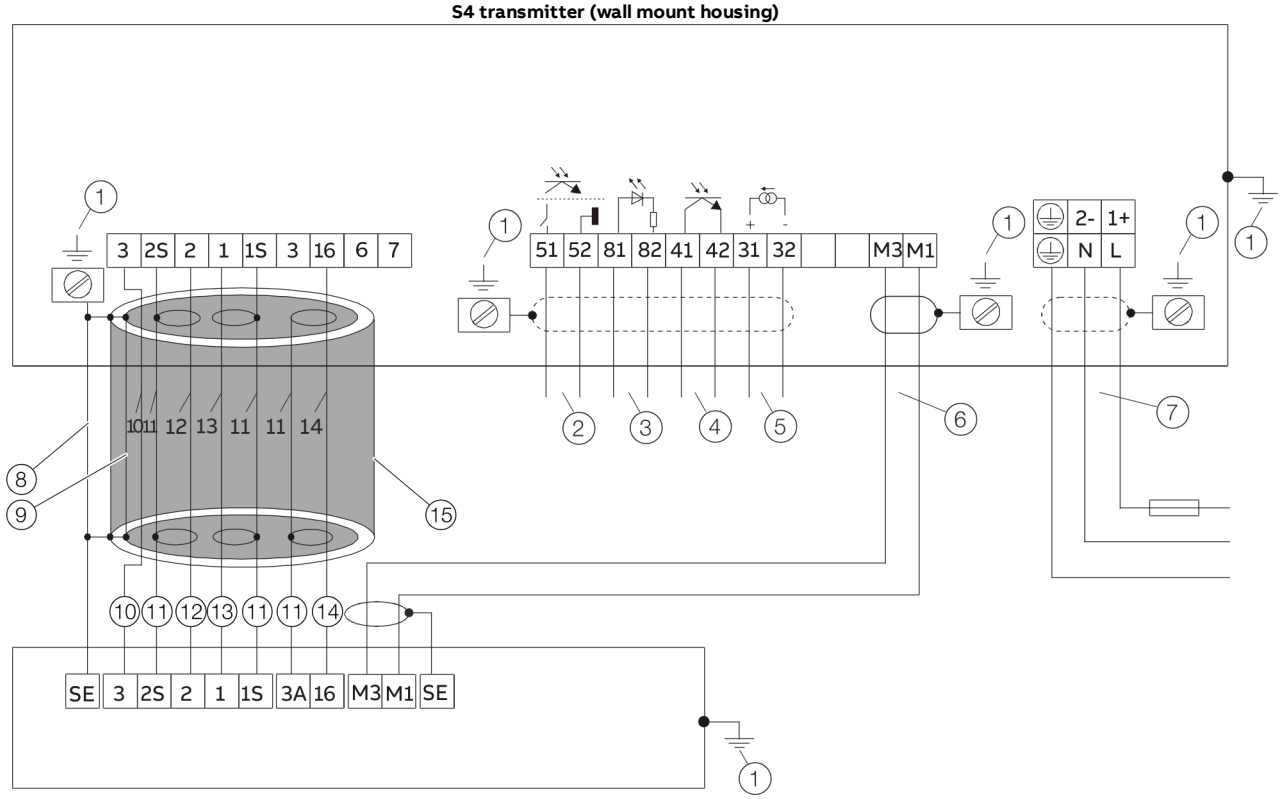
The required DTMs are contained on the DAT200 Asset Vision Basic DVD or in the DTM Library. They can also be downloaded from www.abb.com/flow.

… Transmitter

Electrical connections

Standard DN 3 to DN 1000 (1/10 to 40”)

S4 transmitter (wall mount housing)



Sensor

1. Functional ground (busbar)
2. Pulse output[1)]
3. Switch input[1)]
4. Switch output[1)]
5. Current output[1)]
6. Magnetic coil cable:
   shielded 2 x 1 mm2 CE type 227 TEC 74
   ABB order no. D173D147U01, 10 m included in shipment, standard
7. Power supply
   Low voltage: 100 … 230 V AC, terminals L, N, ⏚
   Extra-low voltage: 20.4 …26.4 V AC;
   20.4 … 31.2 V DC
   Terminals 1+, 2-, ⏚
   Frequency: 47 Hz ≤ f ≤ 53 Hz; 50 Hz power supply
   56 Hz ≤ f ≤ 64 Hz; 60 Hz power supply
8. Steel shielding
9. Aluminum foil
10. Yellow
11. Shield
12. Blue
13. Red
14. White
15. Shielded signal cable:
    ABB order no. D173D025U01, 10 m included in delivery

Figure 32: Electrical connection sensor standard DN 10 … DN 1000 (⅜ … 40”)

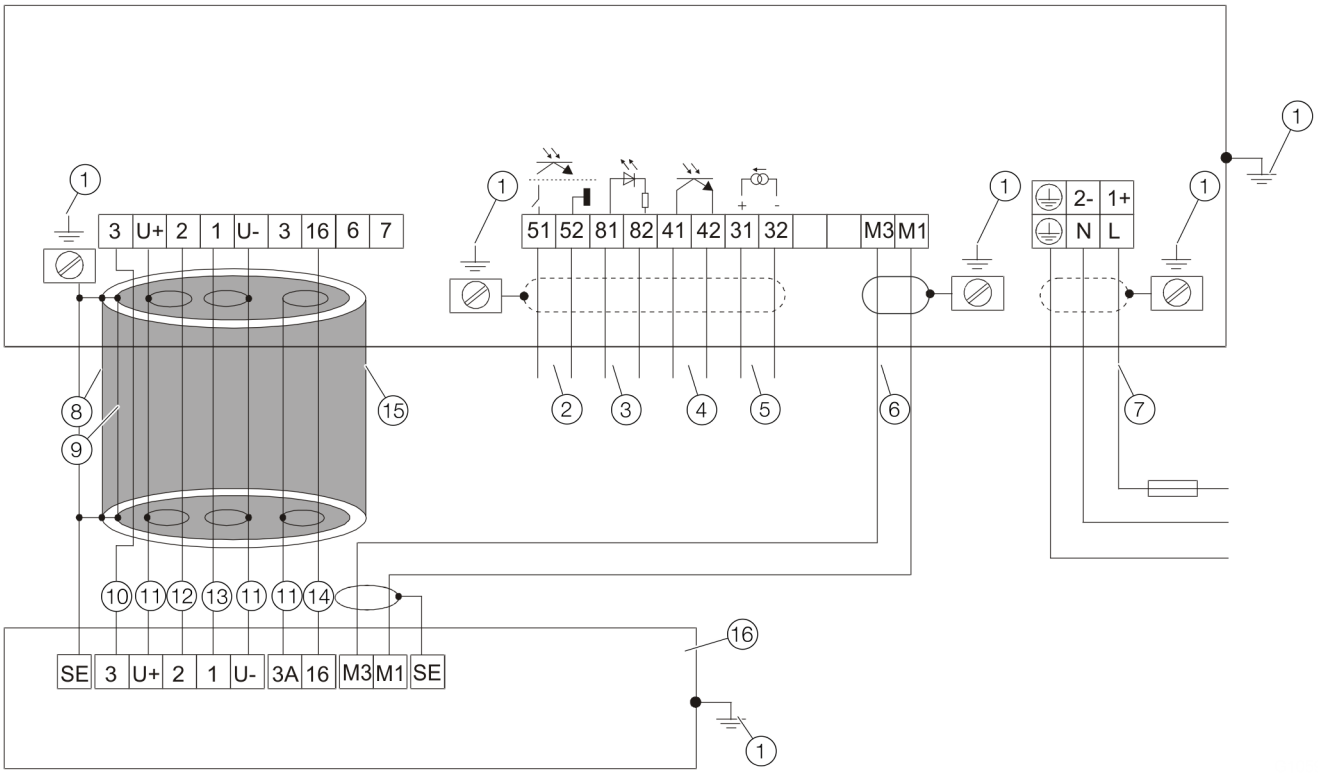
1) See the chapter ‘Connection examples for peripherals’ in the operating instruction and/or on the data sheet

Note

We recommend that shielded output cables be used with the shields connected to the functional ground at one end.

With preamplifier DN 3 to DN 1000 (1/10 to 40")

S4 transmitter (wall mount housing)



1. Functional ground (busbar)
2. Pulse output[1)]
3. Switch input[1)]
4. Switch output[1)]
5. Current output[1)]
6. Magnetic coil cable:
   shielded 2 x 1 mm2 CE type 227 TEC 74
   ABB order no. D173D147U01, 10 m included in shipment, standard
7. Power supply
   Low voltage: 100 to 230 V AC, terminals L, N,
   Extra-low voltage: 20.4 to 26.4 V AC;
   20.4 to 31.2 V DC
   Terminals 1+, 2-,
   Frequency: 47 Hz ≤ f ≤ 53 Hz; 50 Hz power supply
   56 Hz ≤ f ≤ 64 Hz; 60 Hz power supply
8. Steel shielding
9. Aluminum foil
10. Yellow
11. Shield
12. Blue
13. Red
14. White
15. Shielded signal cable:: ABB order no. D173D025U01, 10 m included in delivery
16. with preamplifier (always at DN 3 to DN 8 [1/10 to 5/16"])

Figure 33: Electrical connection sensor with preamplifier DN 3 to DN 1000 (1/10 to 40"), transmitter field mount housing

1) See the chapter 'Connection examples for peripherals' in the operating instruction and/or on the data sheet

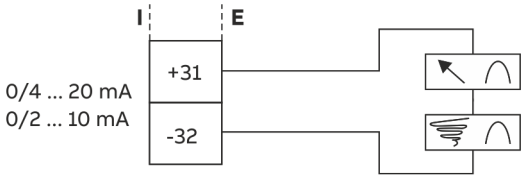
Note

- We recommend that shielded output cables be used with the shields connected to the functional ground at one end.
- If the sensor is equipped with a preamplifier for low conductivity or in nominal diameter range of DN 3 to DN 8 (1/10 to 5/16"), the shieldings of the signal wires must be connected to terminals U+ and U− on both the sensor and the transmitter.

… Transmitter

Connection examples for peripherals (incl. HART)

Current output

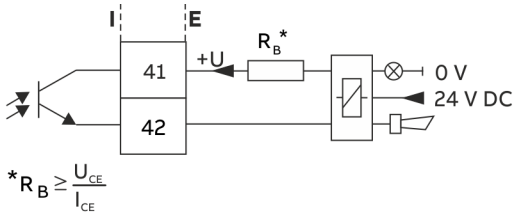


I internal E external

Figure 34: Current output active with / without HART protocol (4 ... 20 mA)

Current output active with / without HART protocol (4 ... 20 mA)	
Terminals	31, 32
Current output	can be selected via software
Function	Active 0/4 ... 20 mA (0 Ω ≤ RB ≤ 560 Ω) 0/2 ... 10 mA (0 Ω ≤ RB ≤ 1120 Ω) (for HART only 4 ... 20 mA)

Switch output



I internal E external

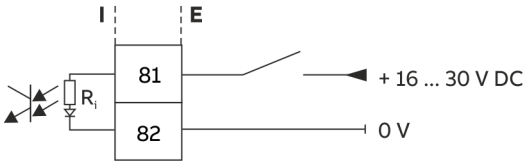
Figure 35: Switch output for system monitoring, Max. / Min. alarm for empty meter tube or forward / reverse signal

Switch output for system monitoring	
Terminals	41, 42
Current output	can be selected via software
Function	Passive • ‘closed’: 0 V ≤ UCEL ≤ 2 V, 2 mA ≤ ICEL ≤ 220 mA • ‘open’: 16 V ≤ UCEH ≤ 30 V, 0 mA ≤ ICEH ≤ 2 mA

Note

Horn and alarm light are shown only as examples. Other suitable devices such as bells, sirens, buzzers, etc., can also be used.

Switch input



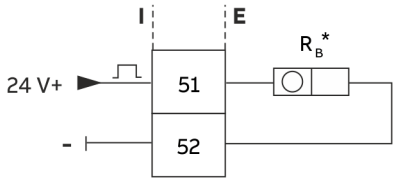
I internal E external

Figure 36: Switch input for external totalizer reset and external zero return

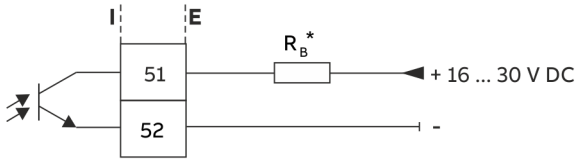
Switch input, passive	
Terminals	81, 82
Current output	can be selected via software
Function	Passive • ‘On’: 16 V ≤ UKL ≤ 30 V • ‘Off’: 0 V ≤ UKL ≤ 2 V Ri = 2 kΩ

Pulse output

Active pulse output



Pulse output, passive, optocoupler



$$*R_B \geq \frac{U_{CE}}{I_{CE}}$$

I internal E external

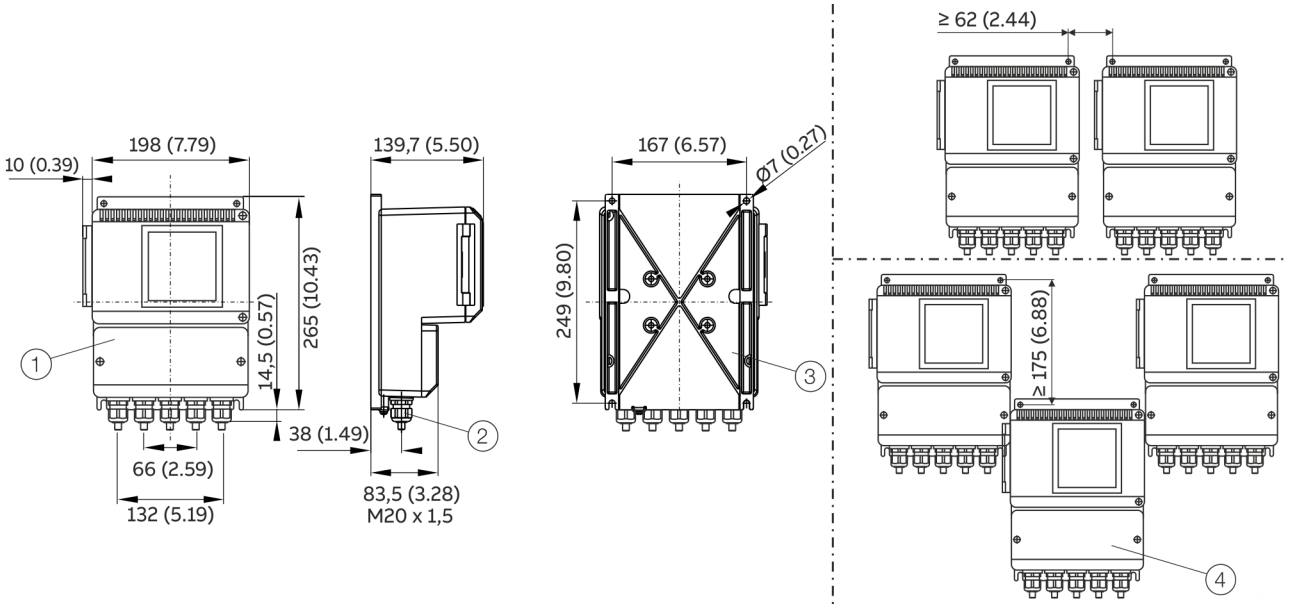
Figure 37: Pulse output, active and passive, optoelectronic coupler

Current output active with / without HART protocol (4 ... 20 mA)	
Terminals	51, 52
Current output	can be selected via software
Operating mode	Active / passive, selectable via jumper (see ‘Commissioning’ chapter in operating instruction)
f_{max}	5 kHz
f_{min}	0.00016 Hz
Adjustment range	Pulse / unit, pulse width (observe dynamic limits)
Function	Active • 150 Ω ≤ load < 10 kΩ: pulse width ≤ 50 ms, max. pulse frequency ≤ 3 Hz, • 500 Ω ≤ load < 10 kΩ pulse width ≤ 0.1 ms, max. pulse frequency: 5 kHz
	Passive • ‘closed’: 0 V ≤ U_{CEL} ≤ 2 V, 2 mA ≤ I_{CEL} ≤ 220 mA • ‘open‘: 16 V ≤ U_{CEH} ≤ 30 V, 0 mA ≤ I_{CEH} ≤ 2 mA

… Transmitter

Dimensions

Transmitter housing and suggested installation method



1. Field mount housing with window
2. Cable gland M20 x 1.5
3. Mounting holes for pipe mounting set, for 2” pipe mounting; mounting set available on request (order no. 612B091U07)
4. IP rating IP 67

Figure 38: Dimensions transmitter housing – dimensions in mm (inch)

Ordering information

Accuracy 0.5% of rate, for FSM4000-SE21 / -SE41

Main order number										
FSM4000-S4 External Converter	**S4-**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**XX**
Housing										
Field housing (cable gland M20 x 1.5)		A								
Field housing (cable gland 1/2 in. NPT)		B								
Power Supply										
100 ... 230 V AC			G							
16,8 ... 26,4 V AC / 16,8 ... 31,2 V DC			K							
Display										
Magnetic stick operation and display illuminated				A						
Input / Output Options										
Current output active + Pulse output active + Contact input + Contact output					01[1]					
Current output active + Pulse output active + Contact input + Contact output + HART					02					
Current output active + Pulse output passive + Contact input + Contact output					03[1]					
Current output active + Pulse output passive + Contact input + Contact output + HART					04					
Others					99					
Application										
Extended diagnostics						1				
For Flowmeter Sensor										
SE2_, SE4_							1[2]			
DS2_, DS4_, 10DS3111, 10DI1425, 10D142							2[3]			
Certificates										
Standard								0		
Name Plate Language / Type										
German / Adhesive foil									G	
English / Adhesive foil									E	
French / Adhesive foil									F	
German / Stainless steel									J	
English / Stainless steel									K	
French / Stainless steel									L	
Design Level / Software Level										
(Specified by ABB)										XX

1) Not with low voltage power supply (code K)

2) The external FRAM is in the terminal box of the associated flowmeter sensor on delivery

3) In this variant, the external FRAM already is plugged into the converter with the values Cz = 0 % and Cs = 100 %.

… Transmitter

… Ordering information

Additional order number

Additional order number		
FSM4000-S4 External Converter	**XX**	**XXX**
Language of Documentation		
German	M1	
English	M5	
Russian	MB	
Language package Western Europe / Scandinavia (Languages: FR, ES, DA, IT, NL, PT, SV, FI)	MW	
Language package Eastern Europe (Languages: EL, CS, ET, HU, HR, LT, LV, PL, SK, SL, RO, BG)	ME	
Others	MZ	
Other Usage Certifications		
Without		CG0

Installation set for 2” pipe mounting in field-mount housing

Figure 39: Part number: 3KXF081100L0001

Trademarks

HART is a registered trademark of FieldComm Group, Austin, Texas, USA

Sales **Service**

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/flow

D184S073U02

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