Data Sheet DS/FCB100/FCH100-EN Rev. B

CoriolisMaster FCB130, FCB150, FCH130, FCH150
Coriolis Mass Flowmeter

Compact device for flow measurement of liquids and gases

Measurement made easy

CoriolisMaster – flow measurements easily mastered

The ideal transmitter for system integration

- Modbus for quick and comprehensive communication
- Two fast digital outputs that can be configured as pulse outputs, frequency outputs or binary outputs

Extremely precise measurement of mass flows and volume flow rates , density, temperature and concentration with only one device for a minimal investment

Minimal life-cycle costs

The FCH100 for all hygienic applications – EHEDG-certified

Low pressure loss, no moving parts, no wear

Self-draining; no media remains in the piping

Global approval for explosion protection and hygienic applications

"DensiMass" concentration software

"FillMass" batch function

CoriolisMaster FCB130, FCB150, FCH130, FCH150
Coriolis Mass Flowmeter

Overview – models

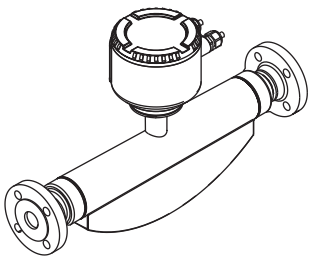

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Fig. 1: FCB1xx / FCH1xx

Model number	FCB1xx for standard applications	FCH1xx for hygienic applications
Process connections		
— Flange DIN 2501/EN 1092-1	DN 10 … 200, PN 40 … 100	-
— Flange ASME B16.5	DN 1/4" … 8" PN CL150 … CL600	-
— Threaded pipe fitting conforming to DIN 11851	DN 10 … 100 (1/4" … 4")	DN 15 … 80 (1/2" … 3")
— Tri-Clamp	DIN 32676 (ISO 2852) BPE Tri-Clamp DN 10 … 100 (1/4" … 4")	DIN 32676 (ISO 2852) BPE Tri-Clamp DN 10 … 100 (1/4" … 4")
— Other connections	On request	On request
Wetted materials	Stainless steel Nickel alloy C4 / C22 (optional)	Stainless steel, polished 1.4404 (AISI 316L) or 1.4435 (AISI 316L)
Approvals and certificates		
— Explosion protection ATEX / IECEx	Zone 0, 1, 2, 21, 22	Zone 0, 1, 2, 21, 22
— Explosion protection cFMus	Class I Div. 1, Class I Div. 2, Zone 0, 1, 2, 20, 21	Class I Div. 1, Class I Div. 2, Zone 0, 1, 2, 20, 21
— Hygiene approvals	-	EHEDG, FDA compliant
— Further approvals	Available on our website abb.com/flow or on request	

Measuring accuracy for liquids	FCB130	FCB150	FCH130	FCH150
— Mass flow [1]	0.4 % and 0.25 %	0.1 % and 0.15 %	0.4 % and 0.25 %	0.1 % and 0.15 %
— Volume flow [1]	0.4 % and 0.25 %	0.15%	0.4 % and 0.25 %	0.15%
— Density	0.01 kg/l	— 0.002 kg/l — 0.001 kg/l (optional) — 0.0005 kg/l [2]	0.01 kg/l	— 0.002 kg/l — 0.001 kg/l (optional) — 0.0005 kg/l [2]
— Temperature	1 K	0.5 K	1 K	0.5 K
Measuring accuracy for gases [1]	1%	0.5%	1%	0.5%
Permissible measuring medium temperature	-50 ... 160 °C (-58 ... 320 °F)	-50 ... 205 °C (-58 ... 400 °F)	-50 ... 160 °C (-58 ... 320 °F)	-50 ... 205 °C (-58 ... 400 °F)
Power supply	11 … 30 V DC			
IP rating according to EN 60529	IP 64, IP 65, IP 67, IP 68 and NEMA 4X / Type 4X			
Communication	Modbus RTU, RS485			
Outputs in serial production	— Digital output 1: passive — Digital output 2: passive			
External output zero return	Yes			
External totalizer reset	Yes			
Forward/reverse flow metering	Yes			
Empty pipe detection	Yes, based on preconfigured density alarm			
Self-monitoring and diagnosis	Yes			
Field optimization for flow and density	Yes			
Concentration measurement "DensiMass"	Yes, optional on models FCB150 and FCH150			
"FillMass" batch function	Yes, optional on models FCB150 and FCH150			

1) Indication of accuracy in % of the measured value (% of measured value)
2) Measuring accuracy following on-site calibration under operating conditions

CoriolisMaster FCB130, FCB150, FCH130, FCH150
Coriolis Mass Flowmeter

General data

Device description

The CoriolisMaster FCB130, FCB150, FCH130, FCH150 is the low-cost and simple ABB mass flowmeter with the new DSP transmitter.
The device is equipped with a Modbus interface and two fast digital outputs that can be configured as pulse outputs, frequency outputs or
binary outputs.

The CoriolisMaster FCB130, FCB150, FCH130, FCH150 operates in accordance with the Coriolis principle.The design offers the following benefits:

- Space-saving, robust design.
- Variety of process connections.
- Two digital outputs.
- Communication via Modbus RTU protocol.
- Approval for use in potentially explosive atmospheres.The user can select the "i" or "e" type of protection for the output circuits; the type chosen will depend on the circuits which are connected.The type of protection can be changed even after installation has been completed.

FillMass batch function

Only for FCB150 / FCH150

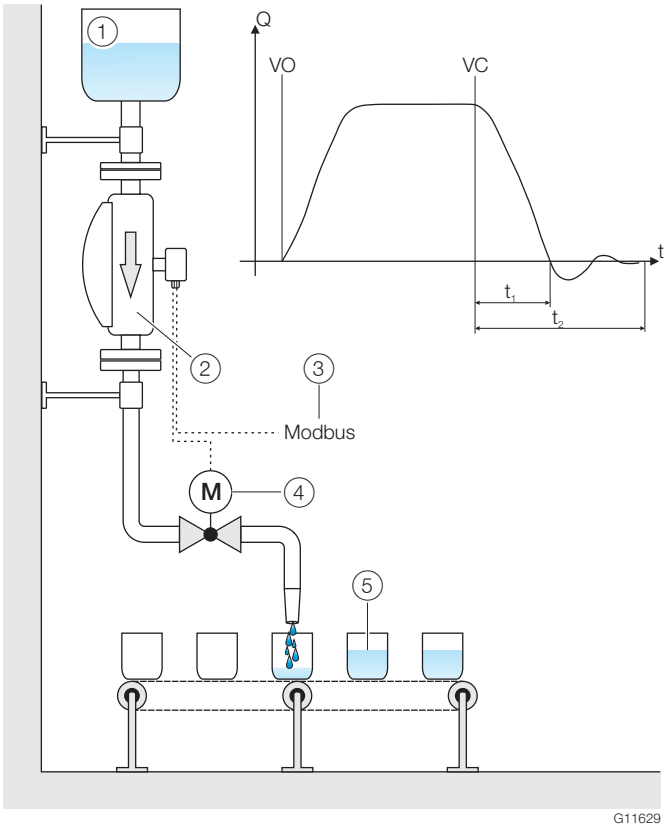

Fig. 2: FillMass batch function
(1) Supply tank (2) Sensor
(3) Filling start / stop switch (4) Filling valve (5) Filling tank

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

The integrated FillMass batch function allows filling processes to be recorded in > 3 seconds.
For this purpose, the filling quantity is given via an adjustable totalizer.
The Modbus interface is used to configure and control the fill function.
The valve is triggered via one of the digital outputs and closed again once the preset filling quantity is reached.
The transmitter measures the overrun quantity and calculates the overrun correction from this.
Additionally, the low flow cut-off can be activated if required.

DensiMass concentration measurement

Only for FCB150 / FCH150

The transmitter can calculate the current concentration from the measured density and temperature using concentration matrices.

The following concentration matrices are preconfigured in the transmitter as standard:

- Concentration of sodium hydroxide in water
- Concentration of alcohol in water
- Concentration of sugar in water
- Concentration of corn starch in water
- Concentration of wheat starch in water

The user can enter two more user-defined matrices containing up to 100 values.

Accuracy of concentration measurement

The accuracy of the concentration measurement is determined in the first instance by the quality of the matrix data entered. However, as the calculation is based on temperature and density (the input variables), the accuracy of the concentration measurement is ultimately determined by the measuring accuracy of temperature and density.

Example:
Density of 0 % alcohol in water at 20 °C (68 °F): 998.23 g/l
Density of 100 % alcohol in water at 20 °C (68 °F): 789.30 g/l

Concentration	Density
100 %	208.93 g/l
0.48 %	1 g/l
0.69 %	2 g/l

The accuracy class of the density measurement thus directly determines the accuracy of the concentration measurement.

Flowmeter sensor

General installation conditions

Installation location and assembly

Note the following points when selecting the installation location and when mounting the sensor:

- The ambient conditions (IP rating, ambient temperature range T_{amb}) of the device must be adhered to at the installation location.
- Sensors and transmitters must not be exposed to direct sunlight.If necessary, provide a suitable means of sun protection on site. The limit values for the ambient temperature $T_{ambient}$ must be observed.
- For flange devices / wafer-type devices, ensure that the counterflanges of the piping are aligned plane-parallel.Install flange devices / wafer-type devices only with suitable gaskets.
- Prevent the sensor from coming into contact with other objects.
- The device is designed for industrial applications.
  No special EMC protective measures are required if the electromagnetic fields and interference at the installation location of the device comply with "Best Practice" guidelines (in accordance with the standards referred to in the declaration of conformity).
  Maintain a suitable distance from electromagnetic fields and interference that extend beyond the usual dimensions.

Gaskets

Note the following points when selecting and mounting gaskets:

- Only gaskets made from a material that is compatible with the measuring media and measuring media temperature may be used.
- Gaskets must not extend into the flow area, since possible turbulence may influence the accuracy of the device.

Calculating pressure loss

Pressure loss is determined by the properties of the medium and the flow.
Documents to help with the calculation of pressure loss can be accessed from www.abb.com/flow.

Brackets and supports

No special supports or damping are required for the device when the device is used and installed as intended.
In systems designed in accordance with "Best Practice" guidelines, the forces acting on the device are already sufficiently absorbed.This is also true of devices installed in series or in parallel.
For heavier devices, it is advisable to use additional supports / brackets on site.Doing this prevents damage to the process connections and piping from lateral forces.
Please observe the following points:

- Mount two supports or brackets symmetrically in the immediate vicinity of the process connections.
- Do **not** attach the sensor to the housing (e.g. using clamps).

Inlet sections

The sensor does not require any inlet sections.
The devices can be installed directly before/after manifolds, valves or other equipment, provided that no cavitation is caused by this equipment.

Mounting position

The flowmeter operates in any mounting position.
Depending on the measuring medium (liquid or gas) and the measuring medium temperature, certain mounting positions are preferable to others.For this purpose, consider the following examples.
The preferred flow direction is indicated by the arrow on the sensor.The flow will be displayed as positive.
The specified measuring accuracy can be achieved only in the calibrated flow direction (for feed flow calibration, this is only in the direction of the arrow; for the optional feed flow and return flow calibration, this can be in both flow directions).

Liquid measuring media

Observe the following points to avoid measuring errors:

- The meter tubes must always be completely filled with the measuring medium.
- The gases dissolved in the measuring medium must not leak out.To safeguard this, a minimum back pressure of 0.2 bar (2.9 psi) is recommended.
- The minimum vapor pressure of the measuring medium must be maintained when there is negative pressure in the meter tube or when liquids are gently simmering.
- During operation, there must be no phase transitions in the measuring medium.

Vertical installation

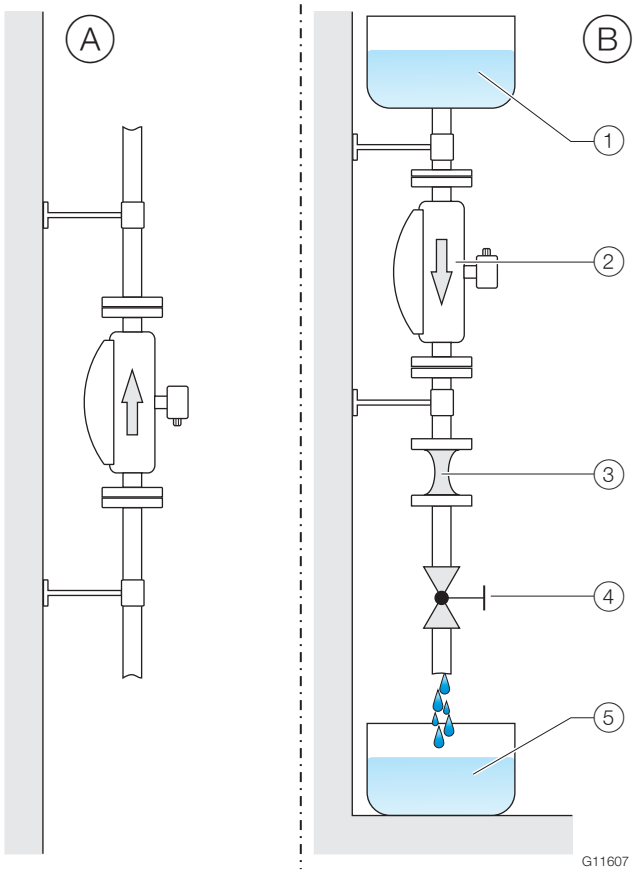

Fig. 3: Vertical installation
(1) Supply tank (2) Sensor
(3) Piping constriction / orifice plate (4) Turn-off device
(5) Filling tank

(A) Vertical installation in a riser

For vertical installation in a riser, no special measures are required.

(B) Vertical installation in a downpipe

For vertical installation in a downpipe, a piping constriction or an orifice plate must be installed below the sensor.Doing this prevents the sensor from draining during the measurement.

Horizontal installation

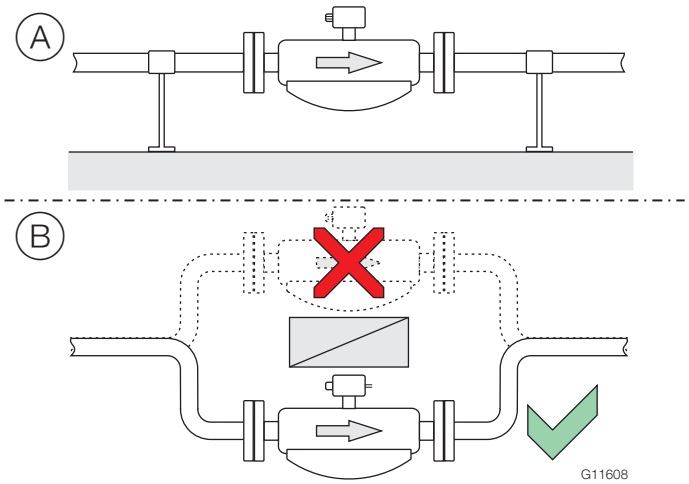

Fig. 4 Horizontal installation

(A) For liquid measuring media and horizontal installation, the transmitter and terminal box must point upward.
(B) Installing the sensor at the highest point of the piping leads to an increased number of measuring errors due to the accumulation of air or the formation of gas bubbles in the meter tube.

Gaseous measuring media

Observe the following points to avoid measuring errors:

- Gases must be dry and free of liquids and condensates.
- Avoid the accumulation of liquids and the formation of condensate in the meter tube.
- During operation, there must be no phase transitions in the measuring medium.

Vertical installation

For vertical installation, no special measures are required.

Horizontal installation

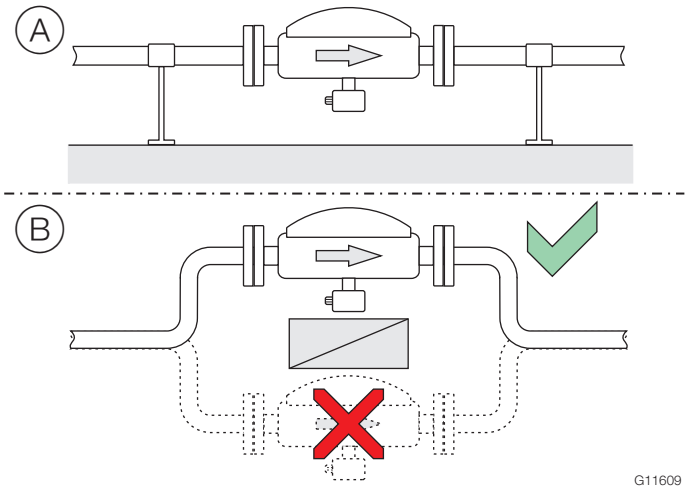

Fig. 5 Horizontal installation

(A) For gaseous measuring media and horizontal installation, the transmitter and terminal box must point downward.
(B) Installing the sensor at the lowest point of the piping leads to an increased number of measuring errors due to the accumulation of liquid or the formation of condensates in the meter tube.

Mounting position dependent on the measuring medium temperature

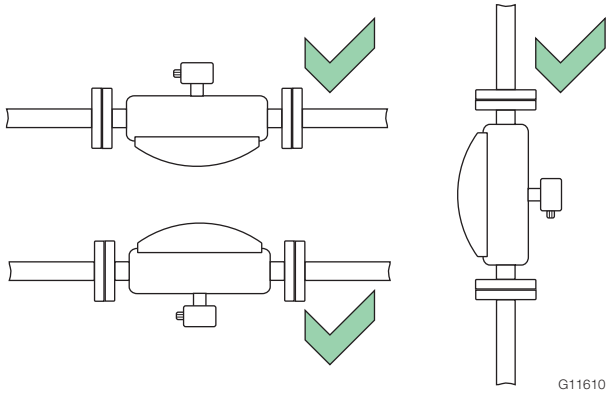

Fig. 6 Mounting positions when T_{medium} is -50 ... 120 °C (-58 ... 248 °F)

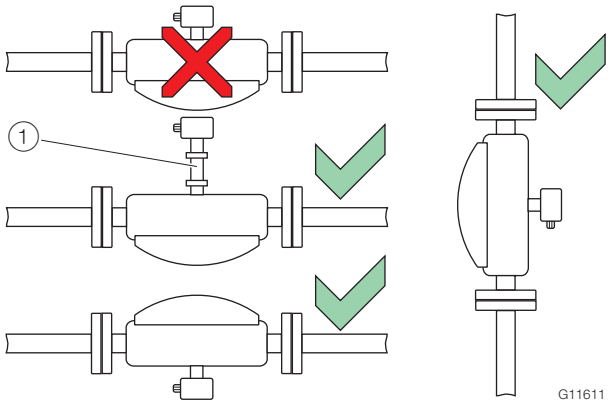

Fig. 7: Mounting positions when T_{medium} is -50 ... 205 °C (-58 ... 401 °F)
(1) Sensor with option TE1 "extended tower length"

In conjunction with option TE1 "extended tower length", the sensor can also be used at measuring medium temperatures of -50 … 205 °C (-58 … 401 °F) with the terminal box pointing upward.

Sensor insulation

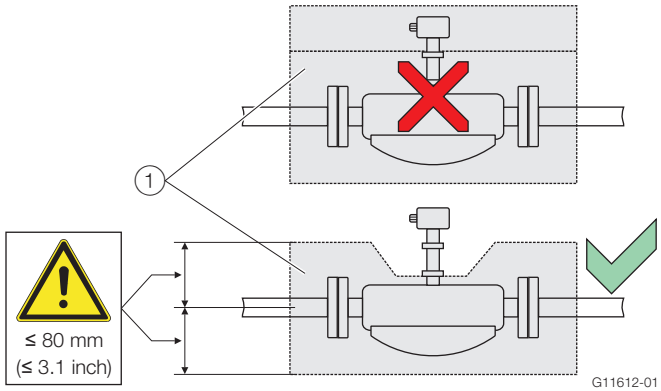

Fig. 8: Installation when T_{medium} is -50°... 205 °C (-58 ... 401 °F)
(1) Insulation

The sensor may be insulated only in conjunction with option TE1 "extended tower length", as shown in Fig. 8.

Turn-off devices for zero point balancing

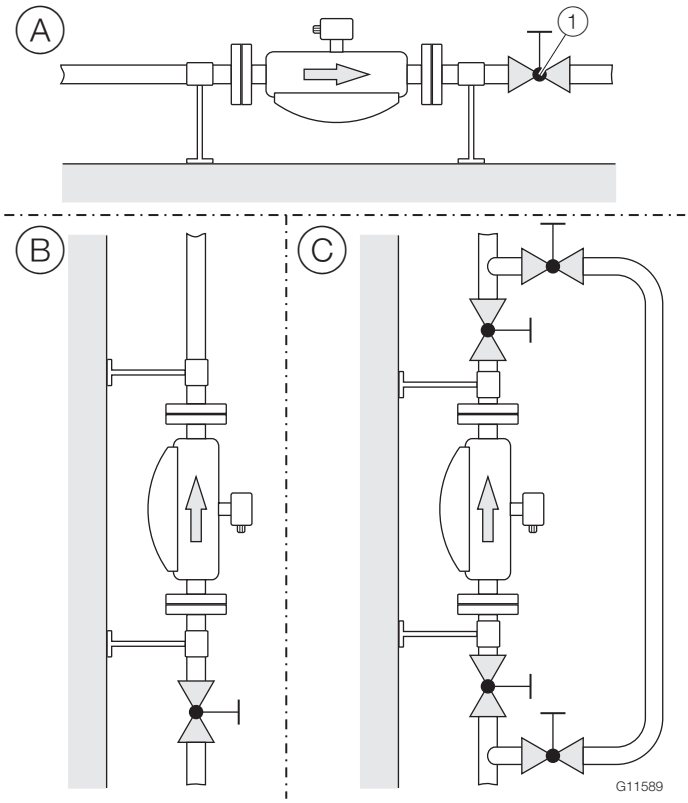

Fig. 9: Mounting options for turn-off devices (example)
(1) Turn-off device

To guarantee the conditions for zero point balancing under operating conditions, turn-off devices are required in the piping:

- at least on the outlet side when the transmitter is mounted in horizontal position "(A)".
- at least on the inlet side when the transmitter is mounted in vertical position "(B)".

In order to perform balancing during an ongoing process, it is advisable to mount a bypass pipe as shown in "(C)".

Installation in EHEDG-compliant installations

⚠ WARNING

Risk of poisoning!

Bacteria and chemical substances can contaminate or pollute pipeline systems and the materials they are made of. In EHEDG-compliant installations, the instructions below must be observed.

- The required self-draining functionality of the sensor can only be guaranteed when the vertical mounting position is used (see also Fig. 3 on page 7).
- The combination of process connections and gaskets selected by the operator may comprise only EHEDG-compliant components.Note the information in the current version of the EHEDG Position Paper entitled "Hygienic Process connections to use with hygienic components and equipment".
- The pipe fitting in accordance with DIN 11851 is approved for use in conjunction with an EHEDG-compliant gasket.

Designs

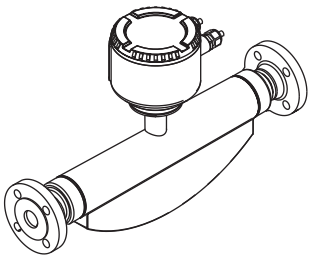

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Fig. 10: Sensor

Nominal diameter and measuring range

Nominal diameter	Q_{max} in kg/h (lb/h)
DN 15 (1/2“)	0 … 8,000 (0 … 17,637)
DN 25 (1“)	0 … 35,000 (0 … 77,162)
DN 50 (2“)	0 … 90,000 (0 … 198,416)
DN 80 (3“)	0 … 250,000 (0 … 551,156)
DN 100 (4“)	0 … 520,000 (0 … 1,146,404)
DN 150 (6“)	0 … 860,000 (0 … 1,895,975)

Recommended flow range

Fluids:

— The recommended flow range is 5 … 100 % of Q_{max}.
— Flows < 1 % of Q_{max} should be avoided.

Gases:

— The flow velocity of gases in the meter tube should not exceed 0.3 Mach (approx. 100 m/s (328 ft/s)).
— Flow velocities above 80m/s may lead to increased repeatability values.
— The maximum flow range of gases is determined by the operating density. Dimensioning guidelines are available at www.abb.com/flow.

Measuring accuracy

Reference conditions

Calibration fluid	Water — Temperature: 25 °C (77 °F) ±5 K — Pressure: 2 … 4 bar (29 … 58 psi)
Ambient temperature	25 °C (77 °F) +10 K / -5 K
Power supply	Line voltage according to name plate U_N ±1 %
Warm-up phase	30 minutes
Installation	— Installation according to chapter titled “Installation instructions” and “Mounting positions” — No visible gas phase — No external mechanical or hydraulic disturbances, particularly cavitation
Output calibration	Pulse output

Measured error

The measured error is calculated as follows for the flow:

Scenario 1:

If

$$\text{Flow} \geq \frac{\text{Zero stability}}{(\text{base accuracy} / 100)}$$

Then:

— Maximum measured error:
± base accuracy as % of measured value
— Repeatability:
± 1/2 x base accuracy as % of measured value

Scenario 2:

If

$$\text{Flow} < \frac{\text{Zero stability}}{(\text{base accuracy} / 100)}$$

Then:

— Maximum measured error:
± (zero stability / measured value) x 100 % of measured value
— Repeatability:
± 1/2 x (zero stability / measured value) x 100% of measured value

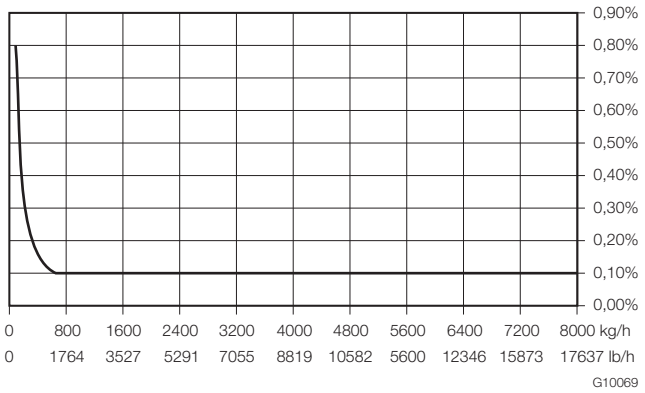


Fig. 11: Calculation of measured error FCB150 DN15 (example)

Measurement dynamic	Flow	Maximum measured error
100:1	80 kg/h (176.4 lb/h)	0.8 % o.r.
50:1	160 kg/h (352.7 lb/h)	0.4 % o.r.
10:1	800 kg/h (1763.7 lb/h)	0.1 % o.r.
2:1	4000 kg/h (8818.5 lb/h)	0.1 % o.r.
1:1	8000 kg/h (17637 lb/h)	0.1 % o.r.

Measured error and base accuracy for liquids

	FCx130	FCx150
Mass flow	± 0.4 % of rate ± 0.25 % of rate	± 0.15 % of rate ± 0.1 % of rate
Volume flow	± 0.4 % of rate ± 0.25 % of rate	± 0.15 % of rate
Density	0.010 kg/l [1]	0.002 kg/l [1] 0.001 kg/l [2] 0.0005 kg/l (option) [3]
Repeatability for flow	See chapter „Measured error“ on page 10.	
Repeatability for density	0.002 kg/l	0.002 kg/l [1] 0.001 kg/l [2] 0.00025 kg/l (option) [3]
Temperature	1 K	0.5 K

1) For the density range from 0.5 ... 1.8 kg/dm³
2) As 1 and for the medium temperature range from -10 ... 50 °C (14 ... 122 °F)
3) As 2 and following field adjustment under operating conditions

Measured error and base accuracy for gases

	FCx130	FCx150
Mass flow	± 1 % of rate	± 0.5 % of rate
Temperature	1 K	0.5 K

Zero stability

Nominal diameter	kg/h (lb/h)
DN 15 (1/2“)	0.64 (1.41)
DN 25 (1“)	2.16 (4.76)
DN 50 (2“)	7.20 (15.87)
DN 80 (3“)	20 (44)
DN 100 (4“)	41.6 (91.7)
DN 150 (6“)	68.8 (151.68)

Effect of the temperature of the medium being measured

For the flow, less than ± 0.0015 % of Q_{max} / 1 K.
For the density, less than 0.0001 kg/dm³ / 1 K.

Effect of the operating pressure

Nominal diameter	Flow [% of measurement / bar]	Density [kg/dm³ / bar]
DN 15 (1/2“)	-0.002	No effect
DN 25 (1“)	-0.013	0.00035
DN 50 (2“)	-0.010	0.00027
DN 80 (3“)	-0.006	0.00019
DN 100 (4“)	-0.009	0.00024
DN 150 (6“)	-0.035	0.00045

Technical data

Pressure loss

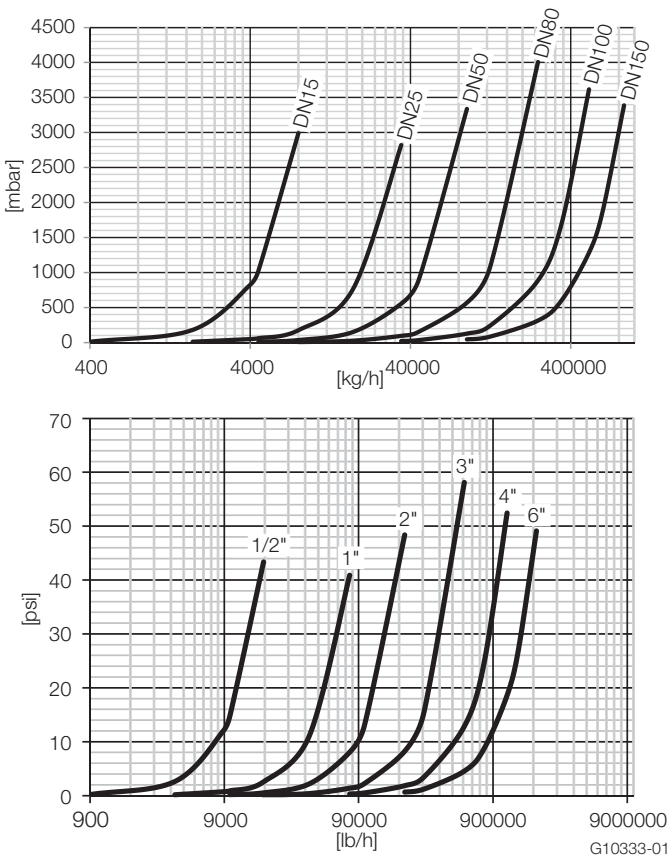


Fig. 12: Pressure loss curve (measured with water, viscosity: 1 mPas)

Viscosity range

If you are working with dynamic viscosities ≥ 1 Pas (1000 mPas = 1000 cP), please contact ABB.

Temperature limits °C (°F)

NOTE

When using the device in potentially explosive atmospheres, note the additional temperature information in the chapters entitled „Use in potentially explosive atmospheres according to ATEX and IECEx“ on page 37 and „Use in potentially explosive atmospheres in accordance with cFMus“ on page 40.

Temperature range of the medium being measured

- FCx130: -50 … 160 °C (-58 … 320 °F)
- FCx150: -50 … 205 °C (-58 … 401 °F)

Ambient temperature range

- Standard: -20 … 55 °C (-4 … 131 °F)
- Optional: -40 … 55 °C (-40 … 131 °F)

Process connections

For an overview of the available process connection variants, see the chapter entitled „Overview – models“ on page 2.

Pressure rating

The maximum permissible operating pressure is determined by the respective process connection, the temperature of the medium to be measured, the screws, and the gasket material. For an overview of the available pressure ratings, see the chapter entitled „Overview – models“ on page 2.

Enclosure as protective device (optional)

Standard:

- Maximum burst pressure 60 bar (870 psi).

Optional:

- Increased burst pressures up to 100 bar (1450 psi), possible for nominal diameters DN 15 ... 100 (1/2" … 4").
- Increased burst pressures up to 150 bar (2175 psi), possible for nominal diameters DN 15 ... 80 (1/2" … 3").
- Flushing connections are available on request.

Pressure Equipment Directive

Conformity assessment according to Category III, fluid group 1, gas

Note the corrosion resistance of the meter tube materials in relation to the measuring medium.

Installation lengths in accordance with NAMUR standards

The CoriolisMaster FCB130, FCB150, FCH130, FCH150 is the ideal device for use in accordance with NAMUR standards. While also conforming to other standards, the device can be ordered with installation lengths in accordance with NAMUR standards.The corresponding ordering option is S5.
The exact lengths can be found in the tables in the chapter entitled „Devices DN 15 ... 150 in NAMUR standard installation lengths“ on page 25.

Materials for the transmitter terminal box

Housing
— Aluminum EN AC-44200 (YL104)
or
— Stainless steel 1.4409 (ASTM CF3M)

Housing color	
— Center section:	RAL 7012
— Cover:	RAL 9002
Varnish layer thickness:	80 ... 120 µm

Materials for flowmeter sensors

Wetted parts
Stainless steel
— 1.4404 (AISI 316L)
Stainless steel, polished
— 1.4404 (AISI 316L) or 1.4435 (AISI 316L) certified to EHEDG with flowmeter sensor material (AISI 316L)
— Nickel-Alloy C4[1)] (2.4610) oder Nickel-Alloy C22[1)] (2.4602)
Optional: Manufacture in accordance with NACE MR0175 and MR0103 (ISO 15156)

Housing[2)]
Stainless steel 1.4404 (AISI 316L), 1.4301 (AISI 304), 1.4308 (ASTM CF8)

1) Hastelloy C is a registered trademark of Haynes International. Nickel-Alloy C4 and C22 is equal to Hastelloy C4 and Hastelloy C22.
2) If the sensor wetted parts are Nickel-Alloy based, parts of the sensor housing are Nickel-Alloy based too.

Material load for process connections

Design	Nominal diameter	PS_{max}	TS_{max}	TS_{min}
Threaded pipe connection (DIN 11851)	DN 15 ... 40 (1/2 ... 1 1/2“)	40 bar (580 psi)	140 °C (284 °F)	-40 °C (-40 °F)
	DN 50 ... 100 (2 ... 4“)	25 bar (363 psi)	140 °C (284 °F)	-40 °C (-40 °F)
Tri-Clamp (DIN 32676)	DN 15 ... 50 (1/2 ... 2“)	16 bar (232 psi)	120 °C (248 °F)	-40 °C (-40 °F)
	DN 65 ... 100 (2 1/2 ... 4“)	10 bar (145 psi)	120 °C (248 °F)	-40 °C (-40 °F)

Material load curves for flange devices

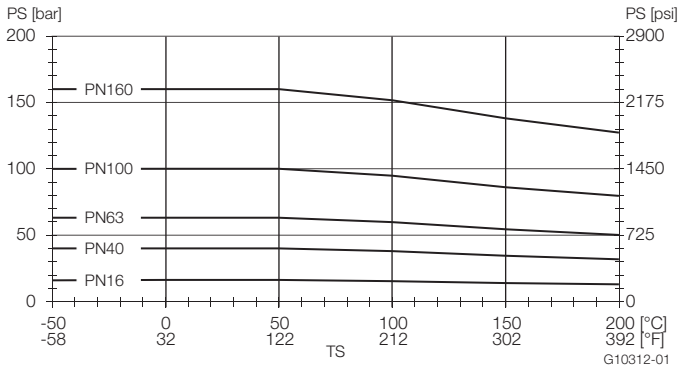


Fig. 13: Stainless steel DIN flange 1.4571 / 1.4404 (316Ti / 316L) up to DN 200 (8“)

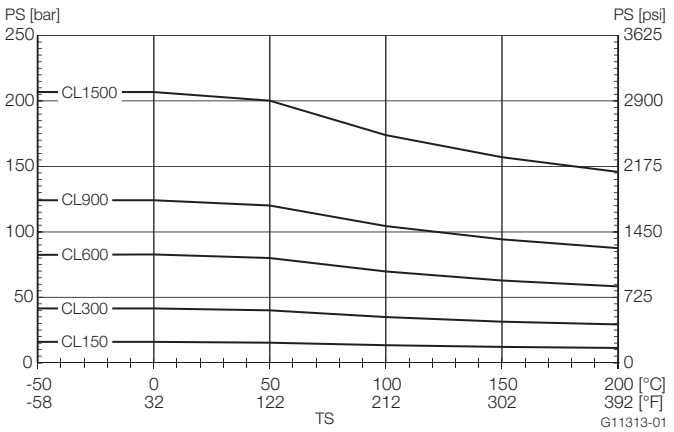


Fig. 14: Stainless steel ASME flange 1.4571 / 1.4404 (316Ti / 316L) up to DN 200 (8“)

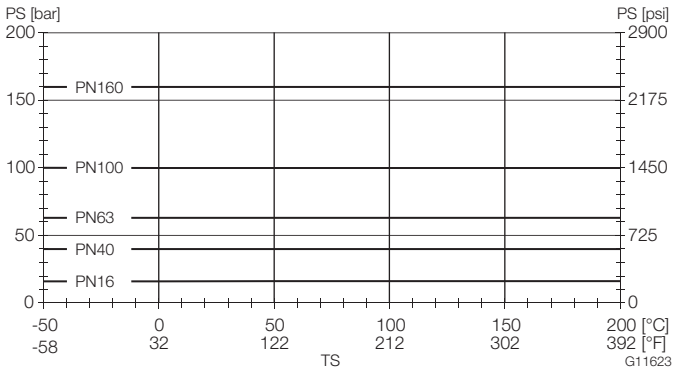


Fig. 15: DIN flange Nickel-Alloy C4 (2.4610) or Nickel-Alloy C22 up to DN 200 (8“)

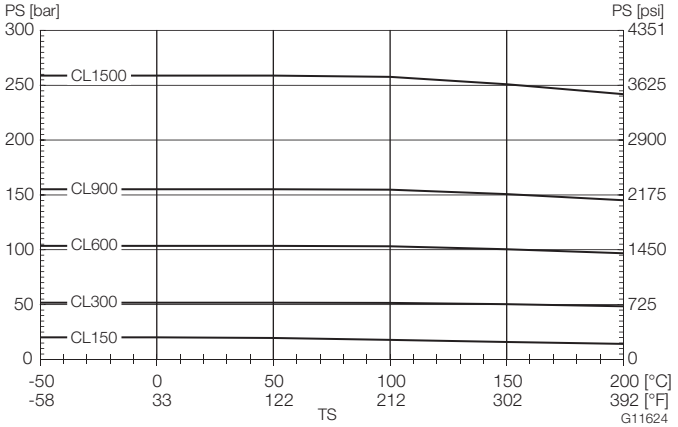


Fig. 16: ASME flange Nickel-Alloy C4 (2.4610) or Nickel-Alloy C22 up to DN 200 (8“)

Electrical connections

Models FCB130, FCB150, FCH130 and FCH150

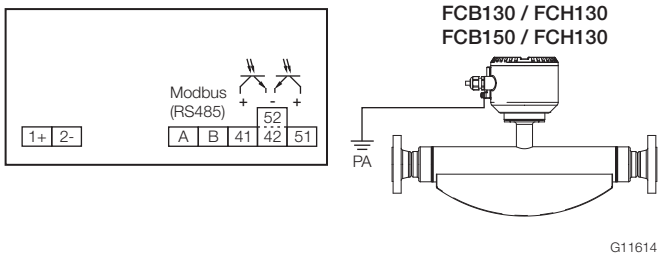


Fig. 17: Electrical connection
PA = Potential equalization

Connections for the power supply

DC voltage supply	
Terminal	**Function / comments**
1+	+
2-	-

Connections for the outputs

Terminal	Function / comments
A / B	**Modbus RTU (RS485)**
41 / 42	**Passive digital output DO1** The output can be configured as a pulse output, frequency output or switch output.
51 / 52	**Passive digital output DO2** The output can be configured as a pulse output, frequency output or switch output.

Electrical data for inputs and outputs

NOTE

When using the device in potentially explosive atmospheres, note the additional connection information in the chapters entitled „Use in potentially explosive atmospheres according to ATEX and IECEx“ on page 37 and „Use in potentially explosive atmospheres in accordance with cFMus“ on page 40!

Digital outputs DO1 / DO2

These can be configured via Modbus as pulse outputs, frequency outputs or binary outputs.

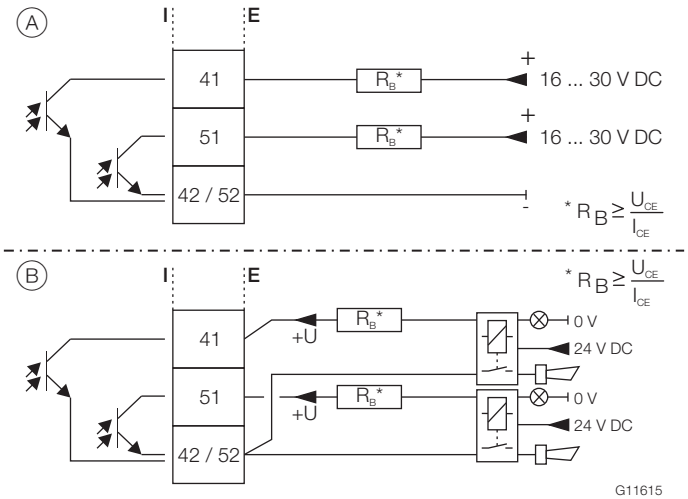


Fig. 18: Passive digital outputs (I = internal, E = external)
(A) Passive digital output configured as a pulse output or frequency output
(B) Passive digital output configured as a binary output

Note the following points when connecting to peripheral equipment:

- Terminals 42 / 52 have the same potential. Digital outputs DO1 / DO2 are not electrically isolated from each other.
- If using a mechanical counter, it is advisable to set a pulse width of ≥ 30 ms and a maximum frequency of fmax ≤ 3 kHz.

Digital output configured as a pulse output	
fmax	10 kHz
Pulse width	0.1 … 2000 ms
Pulse factor	0.001 … 1000 pulses / unit
Electrical data "closed"	0 V ≤ UCEL ≤ 3 V, 2 mA ≤ ICEL ≤ 30 mA
Electrical data "open"	16 V ≤ UCEH ≤ 30 V DC, 0 mA ≤ ICEH ≤ 0.2 mA

Digital output configured as a frequency output	
fmax	10 kHz

Digital output configured as a binary output	
Electrical data "closed"	0 V ≤ UCEL ≤ 3 V, 2 mA ≤ ICEL ≤ 30 mA
Electrical data "open"	16 V ≤ UCEH ≤ 30 V DC, 0 mA ≤ ICEH ≤ 0.2 mA

Power supply

Supply voltage	11 … 30 V DC (ripple: ≤ 5 %)
Power consumption	S ≤ 5 VA

When connecting the devices, note the voltage drop on the cable.The operating voltage on the device must not be less than 11 V.

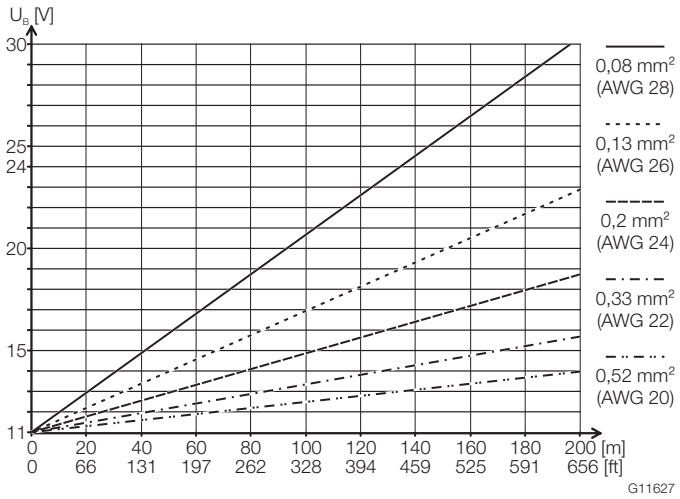


Fig. 19: Maximum cable lengths (examples)
U_B = supply voltage, L = cable length

Modbus protocol

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

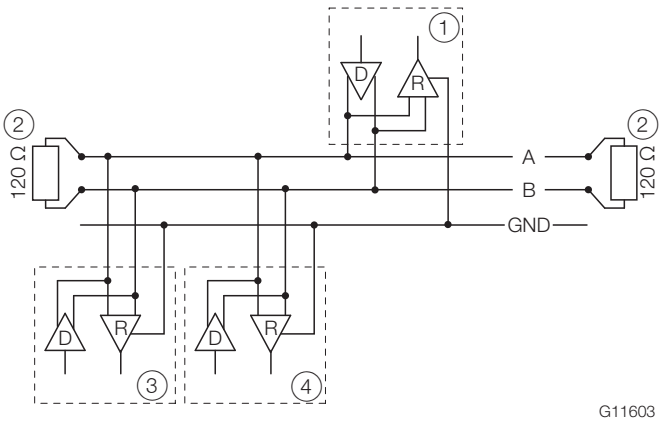


Fig. 20: Communication via the Modbus protocol
(1) Modbus master (2) Terminating resistor (3) Modbus slave 1
(4) Modbus slave n ... 32

Modbus protocol	
Configuration	Via the Modbus interface or via the local operating interface in connection with Asset Vision Basic (DAT200) and a corresponding Device Type Manager (DTM)
Transmission	Modbus RTU - RS485 serial connection
Baud rate	2400, 4800, 9600, 19,200, 38,400, 56,000, 57,600, 115,200 baud Factory setting: 9,600 baud
Parity	None, even, odd Factory setting: odd
Stop bit	One, two Factory setting: One
IEEE format	Little endian, big endian Factory setting: Little endian
Typical response time	< 100 ms
Response delay time	0 ... 200 milliseconds Factory setting: 10 milliseconds

Cable specification

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

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

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

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

A category 5 cable can be used for Modbus RS485 up to a maximum length of 600 m (1968 ft). For the symmetrical pairs in RS485 systems, a surge impedance of more than 100 Ω is preferred, especially at a baud rate of 19,200 and above.

Dimensions

Meter tube inside diameter

Inner diameters of the meter tubes of Coriolis mass flowmeter CoriolisMaster FCB130, FCB150, FCH130, FCH150.

Nominal diameter	Inner diameter of the meter tube
DN 15 (1/2")	2 x 8 mm (2 x 0,31 inch)
DN 25 (1")	2 x 16 mm (2 x 0,63 inch)
DN 50 (2")	2 x 23,7 mm (2 x 0,93 inch)
DN 80 (3")	2 x 36,62 mm (2 x 1,44 inch)
DN 100 (4")	2 x 52,51 mm (2 x 2,07 inch)
DN 150 (6")	2 x 68,9 mm (2 x 2,71 inch)

Devices with meter tube nominal diameter DN 15 ... 50 and flange DN 10 ... 65

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

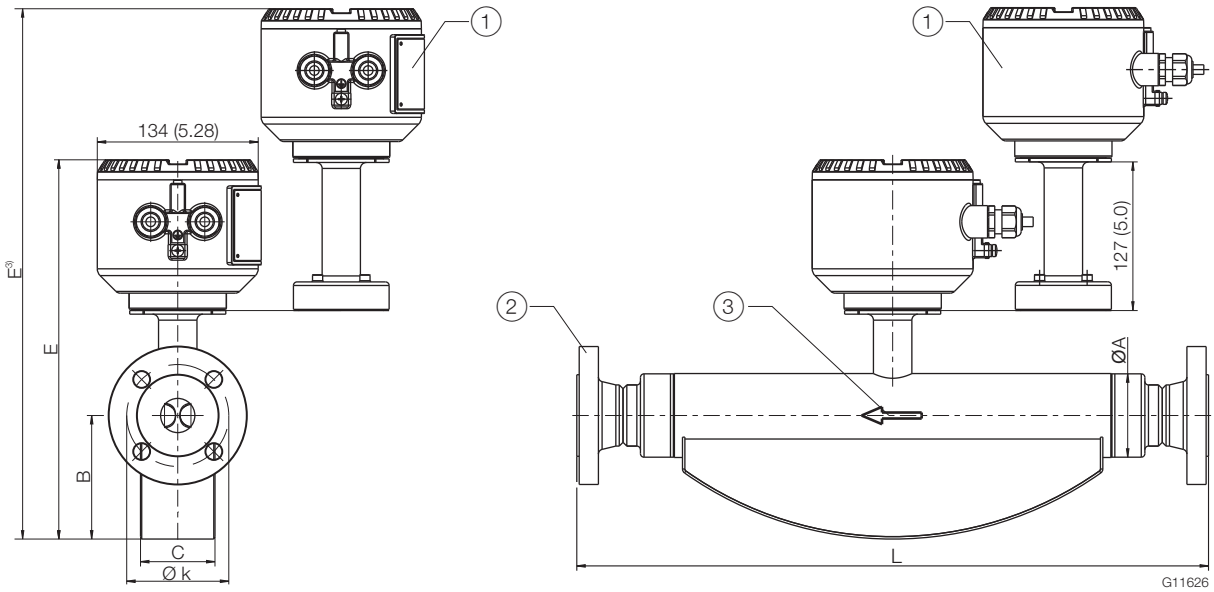


Fig. 21

(1) **Option TE1 "Extended tower length" or option PR4 / PR5 / PR6 / PR7 "Pressure-resistant sensor housing"**

(2) **Flange in accordance with EN 1092-1, ASME B16.5, ISO 7005 (connection dimensions for ASME flanges in accordance with ASME B16.5)**

(3) **Flow direction**

Sensor with measuring agents made from stainless steel									
Dimensions for sensors featuring meter tubes with nominal diameter DN 15 (1/2")								Approx. weight	
DN / process connection		L	Ø k	Ø A	B	C	E	Aluminum[1]	Stainless steel[2]
10 (3/8)	PN 40 (EN 1092-1)	385 (15.2)	60 (2.4)	44.5 (1.8)	77 (3.0)	46 (1.8)	278 / 405[3] (10.9 / 15.9[3])	9 / 10[3] (19.8 / 22[3])	12 / 13[3] (26.5 / 28.7[3])
	JIS 10K	385 (15.2)	65 (2.6)						
15 (1/2)	PN 40 (EN 1092-1)	385 (15.2)	65 (2.6)						
	PN 63 (EN 1092-1) PN 100 (EN 1092-1)	403 (15.9)	75 (3.0)						
	CL150 (ASME B16.5)	435 (17.1)	60.5 (2.4)						
	CL300 (ASME B16.5) CL600 (ASME B16.5)	421 (16.6)	66.7 (2.6)						
	CL900 (ASME B16.5) CL1500 (ASME B16.5)	421 (16.6)	82.6 (3.3)						
	JIS 10K	385 (15.2)	70 (2.8)						
20 (3/4)	PN 40 (EN 1092-1)	421 (16.6)	75 (3.0)						
	CL150 (ASME B16.5)	421 (16.6)	69.9 (2.8)						
	JIS 10K	421 (16.6)	75 (3.0)						

Sensor with measuring agents made from stainless steel									
Dimensions for sensors featuring meter tubes with nominal diameter DN 25 (1")								Approx. weight	
DN / process connection		L	Ø k	Ø A	B	C	E	Aluminum[1]	Stainless steel[2]
20 (3/4)	PN 40 (EN 1092-1)	576 (22.7)	75 (3.0)	69.5 (2.74)	103 (4.06)	62 (2.44)	316 / 443[3] (12.4 / 17.4[3])	11 / 12[3] (24,3 / 26.5[3])	14 / 15[3] (30.9 / 33.1[3])
	CL150 (ASME B16.5)	575 (22.6)	69.9 (2.8)						
	JIS 10K	576 (22.7)	75 (3.0)						
25 (1)	PN 40 (EN 1092-1)	525 (20.7)	85 (3.3)						
	PN 63 (EN 1092-1) PN 100 (EN 1092-1)	564 (22.2)	100 (3.9)						
	CL150 (ASME B16.5)	575 (22.6)	79.2 (3.1)						
	CL300 (ASME B16.5) CL600 (ASME B16.5)	575 (22.6)	88.9 (3.5)						
	CL900 (ASME B16.5) CL1500 (ASME B16.5)	575 (22.6)	82.6 (3.25)						
	JIS 10K	525 (20.7)	90 (3.54)						
40 (1 1/2)	PN 40 (EN 1092-1)	576 (22.7)	110 (4.33)						
	PN 63 (EN 1092-1) PN 100 (EN 1092-1)	572 (22.5)	125 (4.92)						
	CL150 (ASME B16.5)	576 (22.7)	98.6 (3.88)						
	CL300 (ASME B16.5) CL600 (ASME B16.5)	576 (22.7)	114.3 (45.0)						
	JIS 10K	576 (22.7)	105 (4.13)						

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".

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

Sensor with measuring agents made from stainless steel									
Dimensions for sensors featuring meter tubes with nominal diameter DN 50 (2")								Approx. weight	
DN / process connection		L	∅ k	∅ A	B	C	E	Aluminum[1]	Stainless steel[2]
40 (1 1/2)	PN 40 (EN 1092-1)	763 (30)	110 (4.33)	99 (3.9)	125 (4.92)	80 (3.15)	354 / 481[3]	27 / 28[3]	30 / 31[3]
	PN 63 (EN 1092-1) PN 100 (EN 1092-1)	745 (29.33)	125 (4.92)				(13.94 / 18.94[3])	(59,5 / 61,7[3])	(66,1 / 68,3[3])
	CL150 (ASME B16.5)	763 (30)	98.6 (3.88)						
	CL300 (ASME B16.5) CL600 (ASME B16.5)	756 (29.76)	114.3 (4.5)						
	CL900 (ASME B16.5) CL1500 (ASME B16.5)	780 (30.71)	124 (4.88)						
	JIS 10K	763 (30)	105 (4.13)						
50 (2)	PN 40 (EN 1092-1)	715 (28.15)	125 (4.92)						
	PN 63 (EN 1092-1)	745 (29.33)	135 (5.31)						
	PN 100 (EN 1092-1)	757 (29.8)	145 (5.71)						
	CL150 (ASME B16.5)	715 (28.15)	120.7 (4.75)						
	CL300 (ASME B16.5)	763 (30)	127 (5.0)						
	CL600 (ASME B16.5)	773 (30.43)	127 (5.0)						
	CL900 (ASME B16.5) CL1500 (ASME B16.5)	790 (31.1)	165.1 (6.5)						
	JIS 10K	715 (28.15)	120 (4.72)						
65 (2 1/2)	PN 40 (EN 1092-1)	763 (30)	145 (5.71)						
	CL150 (ASME B16.5)	763 (30)	139.7 (5.5)						
	CL900 (ASME B16.5) CL1500 (ASME B16.5)	800 (31.5)	190.5 (7.5)						
	JIS 10K	763 (30)	140 (5.51)						

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".

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

Devices with meter tube nominal diameter DN 80 and flange DN 65 ... 100

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

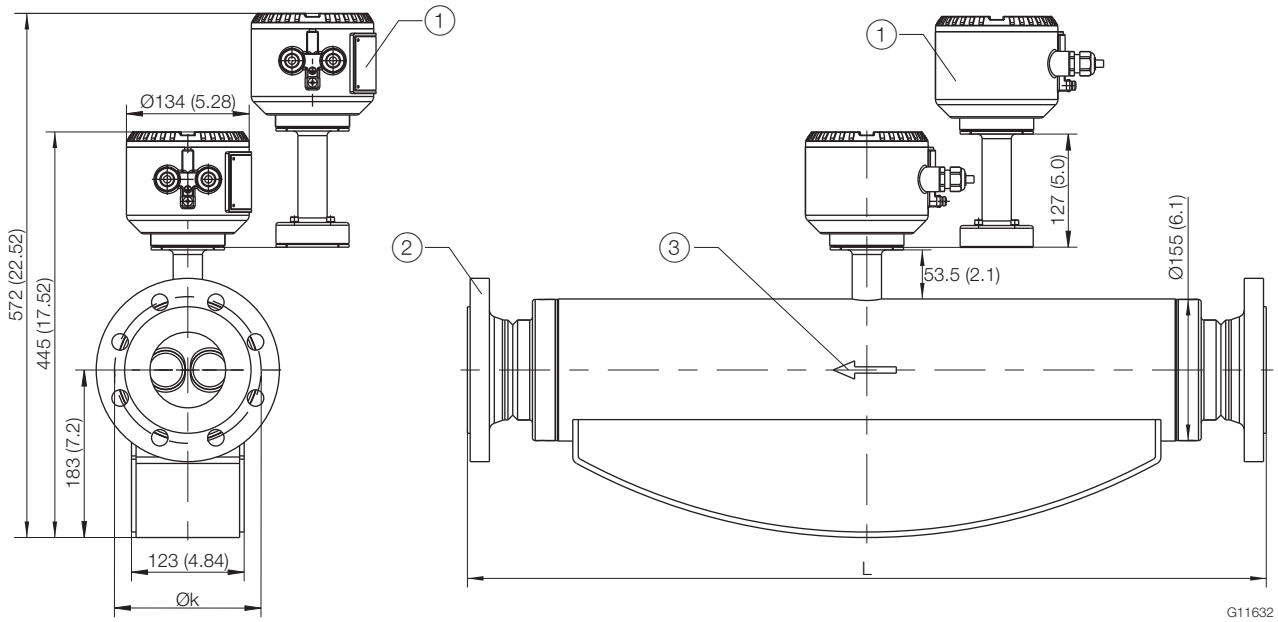


Fig. 22

(1) **Option TE1 "Extended tower length" or option PR4 / PR5 / PR6 / PR7 "Pressure-resistant sensor housing"**

(2) **Flange in accordance with EN 1092-1, ASME B16.5, ISO 7005 (connection dimensions for ASME flanges in accordance with ASME B16.5)**

(3) **Flow direction**

Sensor with measuring agents made from stainless steel					
Dimensions for sensors featuring meter tubes with nominal diameter DN 80 (3")				Approx. weight	
DN / process connection		L	Ø k	Aluminum[1]	Stainless steel[2]
65 (2 1/2“)	PN 16 (EN 1092-1)	—[4]	—[4]	—[4]	—[4]
	PN 40 (EN 1092-1)	910 (35.83)	145 (5.71)	70 / 71[3] (154.3 / 156.5[3])	73 / 74[3] (160.9 / 163.1[3])
	PN 63 (EN 1092-1)		160 (6.30)	74 / 75[3] (163.1 / 165.4[3])	77 / 78[3] (169.8 / 172.0[3])
	PN 100 (EN 1092-1)		170 (6.69)	78 / 79[3] (172 / 174.2[3])	81 / 82[3] (178.6 / 180.8[3])
	CL150 (ASME B16.5)	—[4]	—[4]	—[4]	—[4]
	CL300 (ASME B16.5)	920 (36.22)	149.4 (5.88)	72 / 73[3] (158.7 / 160.9[3])	75 / 76[3] (163.1 /167.6[3])
	CL600 (ASME B16.5)			73 / 74[3] (160.9 / 163.1[3])	76 / 77[3] (167.6 / 169.8[3])
	CL900 (ASME B16.5)	965 (37.99)	190.5 (7.50)	90 / 91[3] (198.4 / 200.6[3])	93 / 94[3] (205.3 / 207.23[3])
	CL1500 (ASME B16.5)				

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".
4) On request

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

Sensor with measuring agents made from stainless steel					
Dimensions for sensors featuring meter tubes with nominal diameter DN 80 (3")				Approx. weight	
DN / process connection		L	∅ k	Aluminum[1]	Stainless steel[2]
80 (3“)	PN 16 (EN 1092-1)	870 (34.25)	160 (6.30)	70 / 71[3] (154.3 / 156.5[3])	73 / 74[3] (160.9 / 163.1[3])
	PN 40 (EN 1092-1)			71 / 72[3] (156.5 / 158.7[3])	74 / 75[3] (163.1 / 165.4[3])
	PN 63 (EN 1092-1)	910 (35.83)	170 (6.69)	75 / 76[3] (163.1 /167.6[3])	78 / 79[3] (172.0 / 174.2[3])
	PN 100 (EN 1092-1)		180 (7.09)	81 / 82[3] (178.6 / 180.8[3])	84 / 85[3] (185.2 / 187.4[3])
	CL150 (ASME B16.5)	880 (34.65)	152.4 (6.00)	71 / 72[3] (156.5 / 158.7[3])	74 / 75[3] (163.1 / 165.4[3])
	CL300 (ASME B16.5)	895 (35.24)	168.1 (6.62)	75 / 76[3] (163.1 /167.6[3])	78 / 79[3] (172.0 / 174.2[3])
	CL600 (ASME B16.5)	920 (36.22)		78 / 79[3] (172.0 / 174.2[3])	81 / 82[3] (178.6 / 180.8[3])
	CL900 (ASME B16.5)	1100 (43.31)	190.5 (7.50)	90 / 91[3] (198.4 / 200.6[3])	93 / 94[3] (205.3 / 207.23[3])
	CL1500 (ASME B16.5)	1130 (44.49)	203.2 (8.00)	102 / 103[3] (224.9 / 227.0[3])	105 / 106[3] (231.5 / 233.7[3])
100 (4“)	PN 16 (EN 1092-1)	875 (34.45)	190 (7.48)	71 / 72[3] (156.5 / 158.7[3])	74 / 75[3] (163 / 165.3[3])
	PN 40 (EN 1092-1)			73 / 74[3] (161 / 163[3])	76 / 77[3] (167.6 / 170[3])
	PN 63 (EN 1092-1)	1060 (41.73)	200 (7.87)	82 / 83[3] (180.8 / 183.0[3])	85 / 86[3] (187.4 / 189.6[3])
	PN 100 (EN 1092-1)	1080 (42.52)	210 (8.27)	90 / 91[3] (198.4 / 200.6[3])	93 / 94[3] (205.3 / 207.23[3])
	CL150 (ASME B16.5)	—[4]	—[4]	—[4]	—[4]
	CL300 (ASME B16.5)	1075 (42.32)	200.2 (7.88)	87 / 88[3] (191.8 / 194.0[3])	90 / 91[3] (198.4 / 200.6[3])
	CL600 (ASME B16.5)	1100 (43.31)	215.9 (8.50)	97 / 98[3] (213.9 / 216.1[3])	100 / 101[3] (220.5 / 222.7[3])
	CL900 (ASME B16.5)	1130 (44.49)	234.9 (9.25)	107 / 108[3] (235.9 / 238.1[3])	110 / 111[3] (242.5 / 244.7[3])
	CL1500 (ASME B16.5)	1150 (45.28)	241.3 (9.50)	122 / 123[3] (269.0 / 271.2[3])	125 / 126[3] (275.6 / 277.8[3])

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".
4) On request

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

Devices with meter tube nominal diameter DN 100 and flange DN 80 ... 100

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

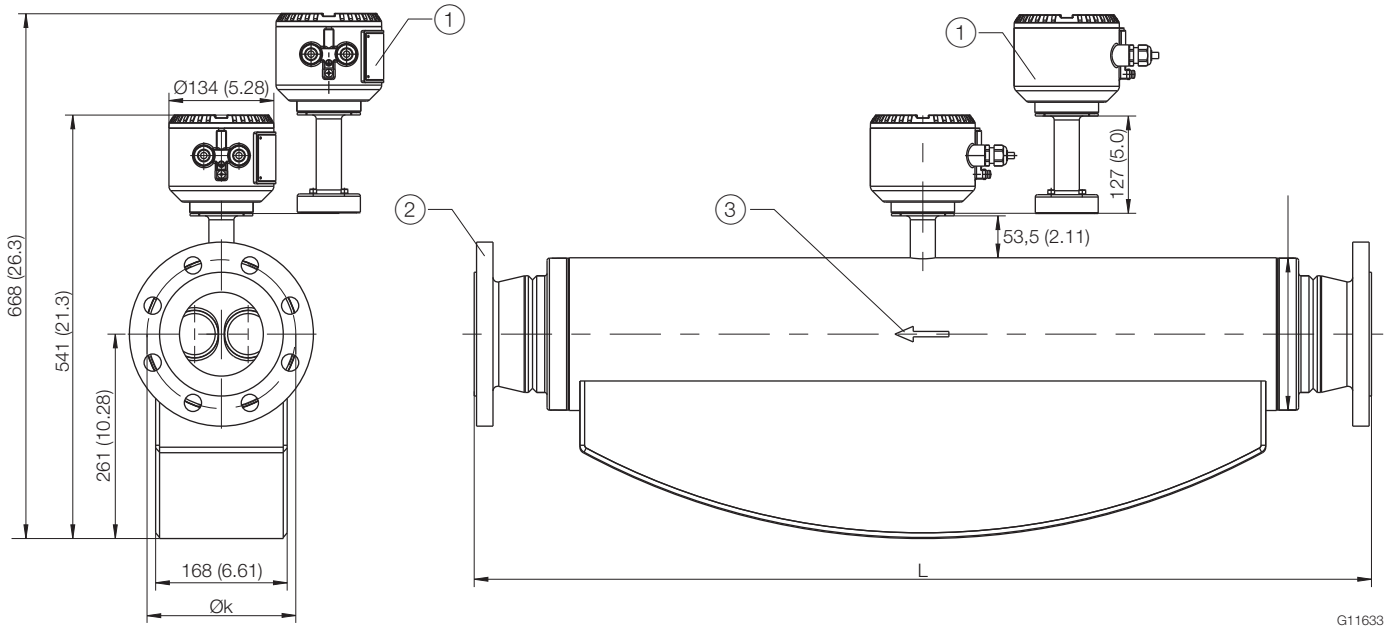


Fig. 23

(1) **Option TE1 "Extended tower length" or option PR4 / PR5 / PR6 / PR7 "Pressure-resistant sensor housing"**

(2) **Flange in accordance with EN 1092-1, ASME B16.5, ISO 7005 (connection dimensions for ASME flanges in accordance with ASME B16.5)**

(3) **Flow direction**

Sensor with measuring agents made from stainless steel					
Dimensions for sensors featuring meter tubes with nominal diameter DN 100 (4")				Approx. weight	
DN / process connection		L	Ø k	Aluminum[1)]	Stainless steel[2)]
80 (3“)	PN 16 (EN 1092-1)	1222 (48.11)	160 (6.30)	122 / 1233) (269 / 2713))	124 / 1263) (273 / 2783))
	PN 40 (EN 1092-1)			123 / 1243) (271 /2733))	125 / 1263) (276 / 2783))
	PN 63 (EN 1092-1)	1234 (48.58)	170 (6.69)	127 / 1283) (280 / 2823))	129 / 1303) (284 / 2873)
	PN 100 (EN 1092-1)		180 (7.09)	129 / 1303) (284 / 2873))	131 / 1323) (289 / 2913))
	CL150 (ASME B16.5)	1244 (48.98)	152.4 (6.00)	124 / 1253) (273 / 2763))	126 / 1273) (278 / 2803))
	CL300 (ASME B16.5)		168.1 (6.62)	132 / 1333) (291 / 2933))	134 / 1353) (295 / 2983))
	CL600 (ASME B16.5)		168.1 (6.62)	135 / 1363) (298 / 3003))	137 / 1383) (302 / 3043))
	CL900 (ASME B16.5)	1130 (44.49)	190.5 (7.50)	138 / 1393) (304 / 3063))	140 / 1413) (307 / 3113))
	CL1500 (ASME B16.5)	1360 (45.67)	203.2 (8.00)	150 / 1513) (331 / 3353))	152 / 1533) (355 / 3373))

Sensor with measuring agents made from stainless steel					
Dimensions for sensors featuring meter tubes with nominal diameter DN 100 (4")				Approx. weight	
DN / process connection		L	Ø k	Aluminum[1)]	Stainless steel[2)]
100 (4“)	PN 16 (EN 1092-1)	1122 (44.17)	180 (7.09)	119 / 1203) (262 / 2653))	122 / 1233) (269 / 2713))
	PN 40 (EN 1092-1)	1144 (45.04)	190 (7.48)	122 / 1233) (269 / 2713))	125 / 1263) (276 / 2783))
	PN 63 (EN 1092-1)	1304 (51.34)	138 (5.43)	129 / 1303) (248 / 2873))	132 / 1333) (291 / 2933))
	PN 100 (EN 1092-1)	1334 (52.52)	150 (5.91)	137 / 1383) (302 / 3043))	140 / 1413) (309 / 3113))
	CL150 (ASME B16.5)	1144 (45.04)	190.5 (7.50)	123 / 1243) (271 / 2733))	126 / 1273) (278 / 2803))
	CL300 (ASME B16.5)	1324 (52.13)	200.2 (7.88)	135 / 1363) (298 / 3003))	138 / 1393) (304 / 3063))
	CL600 (ASME B16.5)	1354 (53.31)	215.9 (8.50)	137 / 1383) (302 / 3043))	140 / 1413) (309 / 3113))
	CL900 (ASME B16.5)	1380 (54.33)	234.9 (9.25)	157 / 1583) (346 / 3483))	159 / 160 (350 / 3533))
	CL1500 (ASME B16.5)	1400 (55.12)	241.3 (9.50)	171 / 1723) (377 / 3793))	173 / 1743) (381 / 3843))
150 (6“)	PN 16 (EN 1092-1)	1300 (51.18)	240 (9.44)	128 / 1293) (282 / 2843))	130 / 1313) (287 / 2893))
	PN 40 (EN 1092-1)		250 (9.84)	136 / 1373) (300 / 3023))	138 / 1393) (304 / 3063))

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".

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

Devices with meter tube nominal diameter DN 150 and flange DN 150

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

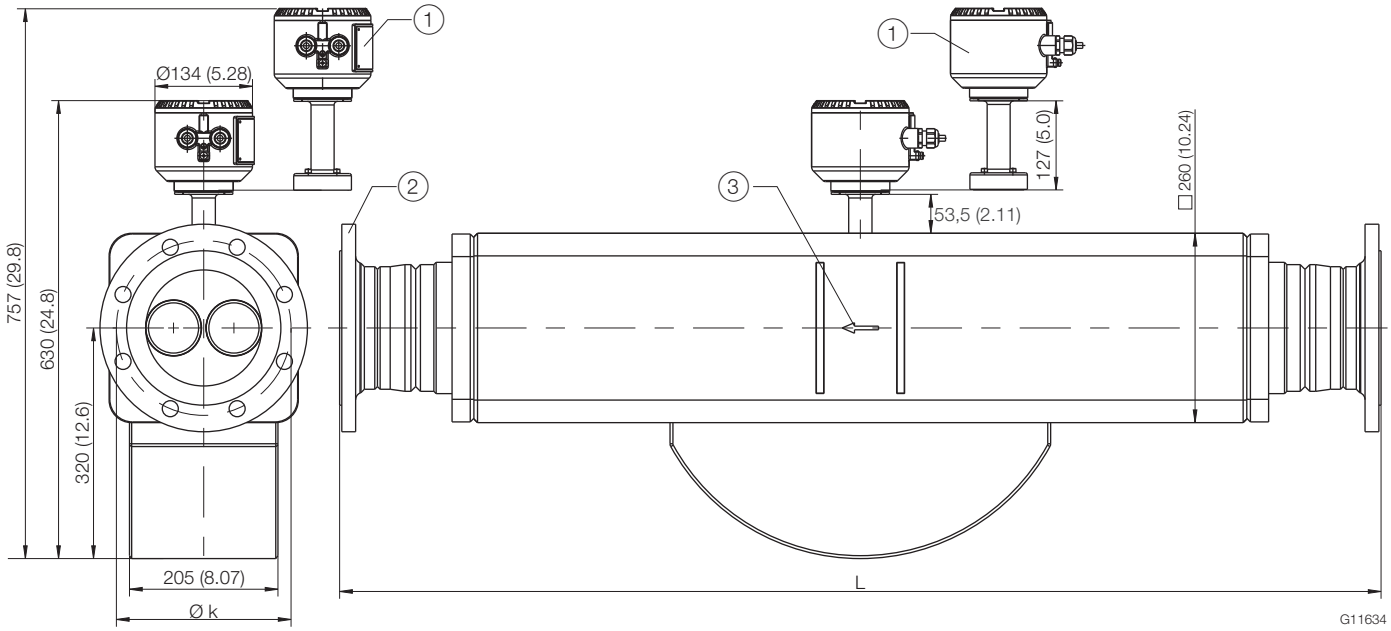


Fig. 24

(1) **Option TE1 "Extended tower length" or option PR4 / PR5 / PR6 / PR7 "Pressure-resistant sensor housing"**

(2) **Flange in accordance with EN 1092-1, ASME B16.5, ISO 7005 (connection dimensions for ASME flanges in accordance with ASME B16.5)**

(3) **Flow direction**

Sensor with measuring agents made from stainless steel					
Dimensions for sensors featuring meter tubes with nominal diameter DN 150 (6")				Approx. weight	
DN / process connection		L	Ø k	Aluminum[1]	Stainless steel[2]
150 (6“)	PN 16 (EN 1092-1)	1421 (55.94)	240 (9.45)	174 / 175[3] (384 / 386[3])	177 / 178[3] (390 / 392[3])
	PN 40 (EN 1092-1)	1461 (57.52)	250 (9.84)	182 / 183[3] (401 / 403[3])	185 / 186[3] (407 / 410[3])
	CL150 (ASME B16.5)	1485 (58.46)	241.3 (9.50)	181 / 182[3] (399 / 401[3])	184 / 185[3] (405 / 408[3])
	CL300 (ASME B16.5)	1505 (59.25)	269.7 (10.62)	199 / 200[3] (439 / 441[3])	202 / 203[3] (455 / 448[3])
	CL600 (ASME B16.5)	1555 (61.22)	292.1 (11.50)	221 / 222[3] (487 / 489[3])	224 / 225[3] (494 / 496[3])
	CL900 (ASME B16.5)	1605 (63.19)	317.5 (12.5)	245 / 246[3] (540 / 542[3])	248 / 249[3] (547 / 549[3])
	CL1500 (ASME B16.5)	1665 (65.55)		287 / 288 [3] (633 / 635[3])	290 / 291[3] (639 / 642[3])

1) Devices with transmitter housing made from aluminum.
2) Devices with transmitter housing made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".

Tolerance for dimension L: +0 / -5 mm (+0 / -0.2 inch)

Devices DN 15 ... 150 in NAMUR standard installation lengths (order option S5)

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

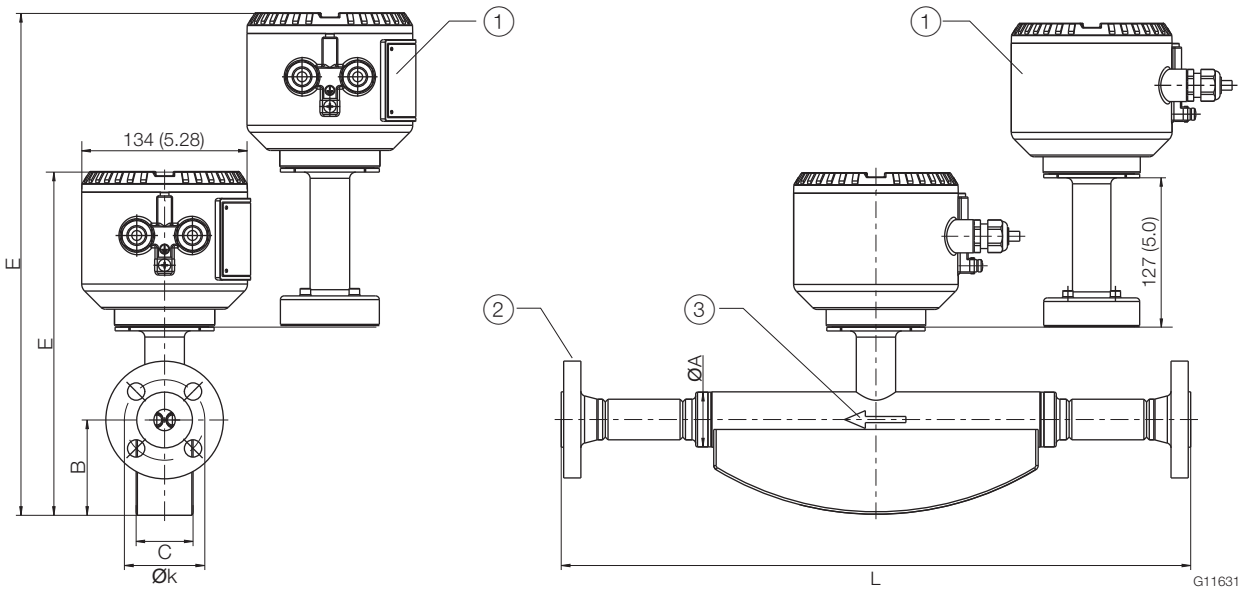


Fig. 25

(1) **Option TE1 "Extended tower length" or option PR4 / PR5 / PR6 / PR7 "Pressure-resistant sensor housing"**

(2) **Flange in accordance with EN 1092-1** (3) **flow direction**

Sensor with measuring agents made from stainless steel									
Meter tube	Process connection	L	Ø k	Ø A	B	C	E	Approx. weight	
								Aluminum[1]	Stainless steel[2]
DN 15 (1/2“)	DN 15 (1/2“) / PN 40 (EN 1092-1)	510 (20.08)	60 (2.4)	44.5 (1.8)	77 (3.0)	46 (1.8)	278 / 405[3] (10.9 / 15.9[3])	9.5 / 10.5[3] (20.9 / 23.2[3])	12.5 / 13.5[3] (27.6 / 29.8[3])
DN 25 (1“)	DN 25 (1“) / PN 40 (EN 1092-1)	600 (23.62)	75 (3.0)	69.5 (2.74)	103 (4.06)	62 (2.44)	317 / 444[3] (12.5 / 17.5[3])	11 / 12[3] (24.3 / 26.53))	14 / 15[3] (30.9 / 33.1[3])
DN 50 (1“)	DN 50 (1“) / PN 40 (EN 1092-1)	715 (28.15)	125 (4.92)	99 (3.9)	125 (4.92)	80 (3.15)	354 / 481[3] (13.94 / 18.94[3])	27 / 28[3] (59.5 / 61.7[3])	30 / 313) (66.1 / 68.3[3])
DN 80 (3")	DN 80 (3") / PN 40 (EN 1092-1)	915 (36.02)	160 (6.30)	155 (6.1)	183 (7.2)	123 (4.84)	445 / 572[3] (17.52 / 22.52[3])	70 / 71[3] (154 / 157[3])	73 / 74[3] (161 / 163[3])
DN 100 (4")	DN 100 (4") / PN 16 (EN 1092-1)	1400 (55.12)	180 (7.09)	195 (7.68)	261 (10.28)	168 (6.61)	541 / 668[3] (21.3 / 26.3[3])	119 / 120[3] (262 / 265[3])	122 / 123[3] (269 / 271[3])
DN 150 (6")	DN 150 (6") / PN 16 (EN 1092-1)	1700 (66.93)	240 (9.45)	260 (10.24)	320 (12.6)	205 (8.07)	630 / 757[3] (24.8 / 29.8[3])	174 / 175[3] (384 / 386[3])	177 / 178[3] (390 / 392[3])

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".

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

Devices with meter tube nominal diameter DN 15 ... 80 and connections in accordance with DIN 11851, DIN 32676, DIN ISO 228, ASME BPE and ASME B 1.20.1

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

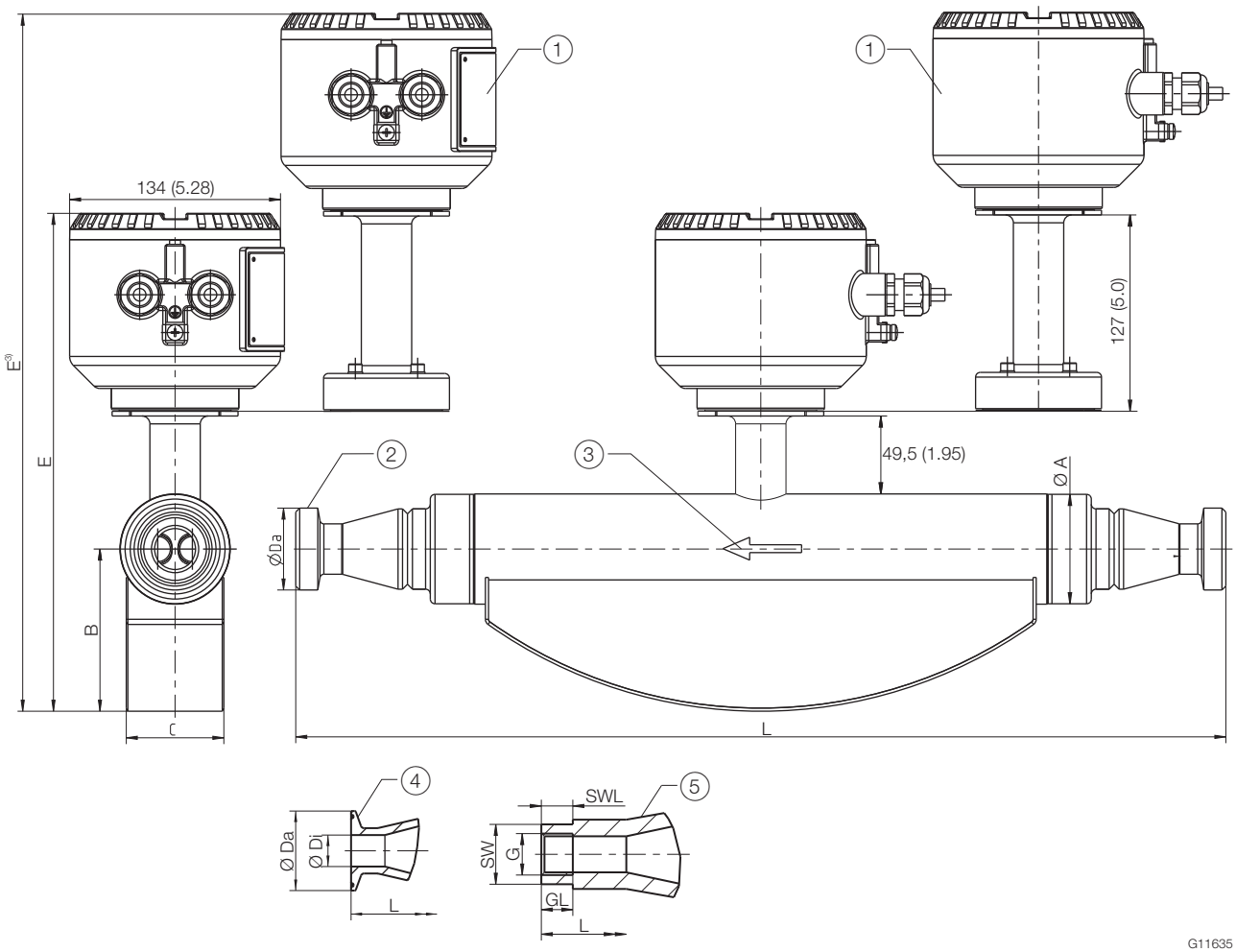


Fig. 26

(1) **Option TE1 "Extended tower length" or option PR4 / PR5 / PR6 / PR7 "Pressure-resistant sensor housing"**
(2) **Threaded spud in accordance with DIN 11851** (3) **Flow direction** (4) **Terminal in accordance with DIN 32676 and ASME BPE**
(5) **Internal-thread connection in accordance with DIN ISO 228 and ASME B 1.20.1**

Sensor with measuring agents made from stainless steel

Dimensions for sensors featuring meter tubes with nominal diameter DN 15 ... 80 (1/2" ... 3") and process connection in accordance with DIN 11851

Meter tube	Process connection		L	∅ DA	∅ Di	∅ A	B	C	E	Approx. weight	
DN	DN	PN								Aluminum[1]	Stainless steel[2]
15 (1/2“)	10 (3/8“)	40	413 (16.3)	RD 28x1/8"	10 (0.39)	44.5 (1.75)	77 (3.03)	46 (1.81)	278 / 405[3] (10.94 / 15.94[3])	9 / 10[3] (20 / 22[3])	12 / 13[3] (27 / 29[3])
	15 (1/2“)			RD 34x1/8"	16 (0.63)						
	20 (3/4“)			RD 44x1/6"	20 (0.79)						
25 (1“)	20 (3/4“)		590 (23.2)	RD 44x1/6"	20 (0.79)	69.5 (2.74)	103 (4.06)	62 (2.44)	317 / 444[3] (12.48 / 17.48[3])	11 / 12[3] (24 / 27[3])	14 / 15[3] (31 / 33[3])
	25 (1“)			RD 52x1/6"	26 (1.02)						
	40 (1 1/2”)			RD 65x1/6"	38 (1.5)						
50 (2“)	40 (1 1/2”)		763 (30.0)	RD 65x1/6"	38 (1.5)	99 (3.46)	125 (4.92)	80 (3.15)	354 / 481[3] (13.94 / 18.94[3])	27 / 28[3] (60 / 62[3])	30 / 31[3] (66 / 68[3])
	50 (2“)	25	740 (29.1)	RD 78x1/6"	50 (1.97)						
	65 (2 1/2“)			RD 95x1/6"	66 (2.6)						
80 (3“)	65 (2 1/2“)		990 (39.0)	RD 95x1/6"	66 (2.6)	155 (6.10)	183 (7.20)	123 (4.84)	445 / 572[3] (17.52 / 22.52[3])	68 / 69[3] (150 / 152[3])	71 / 72[3] (157 / 159[3])
	80 (3“)		940 (37.0)	RD 110x1/4"	81 (3.19)						
	100 (4“)			RD 130x1/4"	100 (3.94)						

Sensor with measuring agents made from stainless steel

Dimensions for sensors featuring meter tubes with nominal diameter DN 15 ... 80 (1/2" ... 3") and process connection in accordance with DIN 32676

Meter tube	Process connection		L	∅ DA	∅ Di	∅ A	B	C	E	Approx. weight	
DN	DN	PN								Aluminum[1]	Stainless steel[2]
15 (1/2“)	10 (3/8“)	40	410 (16.1)	34 (1.34)	10 (0.39)	44.5 (1.75)	77 (3.03)	46 (1.81)	278 / 405[3] (10.94 / 15.94[3])	9 / 10[3] (20 / 22[3])	12 / 13[3] (27 / 29[3])
	15 (1/2“)				16 (0.63)						
	20 (3/4“)				20 (0.79)						
25 (1“)	20 (3/4“)		590 (23.2)		20 (0.79)	69.5 (2.74)	103 (4.06)	62 (2.44)	317 / 444[3] (12.48 / 17.48[3])	11 / 12[3] (24 / 27[3])	14 / 15[3] (31 / 33[3])
	25 (1“)			50.5 (1.99)	26 (1.02)						
	40 (1 1/2”)				38 (1.5)						
50 (2“)	40 (1 1/2”)		763 (30.0)		38 (1.5)	99 (3.46)	125 (4.92)	80 (3.15)	354 / 481[3] (13.94 / 18.94[3])	27 / 28[3] (60 / 62[3])	30 / 31[3] (66 / 68[3])
	50 (2“)	25	740 (29.1)	64 (2.52)	50 (1.97)						
	65 (2 1/2“)			91 (3.58)	66 (2.6)						
80 (3“)	65 (2 1/2“)	10	950 (37.4)		66 (2.6)	155 (6.10)	183 (7.20)	123 (4.84)	445 / 572[3] (17.52 / 22.52[3])	68 / 69[3] (150 / 152[3])	71 / 72[3] (157 / 159[3])
	80 (3“)		910 (35.83)	106 (4.17)	81 (3.19)						
	100 (4“)			119 (4.69)	100 (3.94)						

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".

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

Sensor with measuring agents made from stainless steel

Dimensions for sensors featuring meter tubes with nominal diameter DN 15 ... 80 (1/2" ... 3") and process connection in accordance with ASME BPE

Meter tube	Process connection		L	∅ DA	∅ Di	∅ A	B	C	E	Approx. weight	
DN	DN	PN								Aluminum[1]	Stainless steel[2]
15 (1/2")	3/8"-Type A	10	–	–	–	44.5 (1.75)	77 (3.03)	46 (1.81)	278 / 405[3] (10.94 / 15.94[3])	9 / 10[3] (20 / 22[3])	12 / 13[3] (27 / 29[3])
	1/2"-Type A		433 (17.05)	25 (0.98)	9.4 (0.37)						
	3/4"-Type A		–	–	–						
25 (1")	3/4"-Type A		–	–	–	69.5 (2.74)	103 (4.06)	62 (2.44)	317 / 444[3] (12.48 / 17.48[3])	11 / 12[3] (24 / 27[3])	14 / 15[3] (31 / 33[3])
	1"-Type B		590 (23.23)	50.4 (1.98)	22.1 (0.87)						
	1 1/2"-Type B		–	–	–						
50 (2")	1 1/2"-Type B		–	–	–	99 (3.46)	125 (4.92)	80 (3.15)	354 / 481[3] (13.94 / 18.94[3])	27 / 28[3] (60 / 62[3])	30 / 31[3] (66 / 68[3])
	2"-Type B		740 (29.13)	63.9 (2.52)	47.5 (1.87)						
	2 1/2"-Type B		–	–	–						
80 (3")	2 1/2"-Type B		950 (37.40)	77.4 (3.05)	60.2 (2.37)	155 (6.10)	183 (7.20)	183 (7.20)	445 / 572[3] (17.52 / 22.52[3])	68 / 69[3] (150 / 152[3])	71 / 72[3] (157 / 159[3])
	3"-Type B		910 (35.83)	90.9 (3.19)	72.9 (2.87)						
	4"-Type B		910 (35.83)	118.9 (4.68)	97.4 (3.83)						

Sensor with measuring agents made from stainless steel

Dimensions for sensors featuring meter tubes with nominal diameter DN 15 ... 80 (1/2" ... 3") and process connection in accordance with DIN ISO 228 and ASME B 1.20.1

Meter tube	Process connection		L	GL	WS[4]	WS L	∅ A	B	C	E	Approx. weight	
DN	DN / G	PN									Aluminum[1]	Stainless steel[2]
15 (1/2")	8 (1/4") / G 1/4"	100	450 (17.72)	10 (0.39)	19	10 (0.39)	44.5 (1.75)	77 (3.03)	46 (1.81)	278 / 405[3] (10.94 / 15.94[3])	9 / 10[3] (20 / 22[3])	12 / 13[3] (27 / 29[3])
	15 (1/2") / G 1/2"			13.5 (0.53)	27	15 (0.59)						
	25 (1") / G 1"		490 (19.29)	17 (0.67)	50	20 (0.79)						
	15 (1/2") / 1/2" NPT		450 (17.72)	15.6 (0.61)	27	15 (0.59)						

1) Devices with terminal boxes made from aluminum.
2) Devices with terminal boxes made from stainless steel.
3) Devices with option TE1 "extended tower length" or option PR4 / PR5 / PR6 / PR7 "pressure-resistant sensor housing".
4) Dimension SW: Width across flats specified in mm.

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

Sensor with measuring agents made from C4 or C22 nickel alloy

For devices with measuring agents made from C4 or C22 nickel alloy, the installation length (L) is different from previous tables. All other dimensions and the weight are unchanged. All dimensions specified in mm (inch).

Dimensions for sensors with process connection in accordance with EN 1092-1 and ASME B16.5 (ANSI)

Meter tube nominal diameter	Process connection	L							
		EN 1092-1				ASME CL			JIS 10K
		PN 16	PN 40	PN 63	PN 100	CL150	CL300	CL600	
DN 15 (1/2“)	DN 10 (1/4“)	—	449 (17.7)	449 (17.7)	449 (17.7)	—	—	—	449 (17.7)
	DN 15 (1/2“)	—	442 (17.4)	442 (17.4)	442 (17.4)	442 (17.4)	442 (17.4)	442 (17.4)	442 (17.4)
	DN 20 (3/4“)	—	428 (16.9)	428 (16.9)	428 (16.9)	428 (16.9)	428 (16.9)	428 (16.9)	428 (16.9)
DN 25 (1“)	DN 20 (3/4“)	—	646 (25.4)	646 (25.4)	646 (25.4)	646 (25.4)	646 (25.4)	646 (25.4)	646 (25.4)
	DN 25 (1“)	—	614 (24.2)	614 (24.2)	614 (24.2)	614 (24.2)	614 (24.2)	614 (24.2)	614 (24.2)
	DN 40 (1 1/2“)	—	576 (22.7)	576 (22.7)	576 (22.7)	576 (22.7)	576 (22.7)	576 (22.7)	576 (22.7)
DN 50 (2“)	DN 40 (1 1/2“)	—	814 (32.0)	814 (32.0)	814 (32.0)	814 (32.0)	814 (32.0)	814 (32.0)	814 (32.0)
	DN 50 (2“)	—	764 (30.1)	764 (30.1)	764 (30.1)	764 (30.1)	764 (30.1)	764 (30.1)	764 (30.1)
	DN 65 (2 1/2“)	—	819 (32.2)	819 (32.2)	819 (32.2)	792 (31.2)	792 (31.2)	792 (31.2)	819 (32.2)
DN 80 (3“)	DN 65 (2 1/2“)	—	1021 (40.2)	1021 (40.2)	1021 (40.2)	1021 (40.2)	1021 (40.2)	1021 (40.2)	1021 (40.2)
	DN 80 (3“)	—	971 (38.2)	—	971 (38.2)	971 (38.2)	971 (38.2)	971 (38.2)	971 (38.2)
	DN 100 (4“)	971 (38.2)	971 (38.2)	971 (38.2)	971 (38.2)	971 (38.2)	971 (38.2)	971 (38.2)	971 (38.2)
DN 100 (4“)	DN 80 (3“)	1357 (53.4)	1357 (53.4)	1357 (53.4)	1357 (53.4)	1357 (53.4)	1357 (53.4)	1357 (53.4)	1357 (53.4)
	DN 100 (4“)	1280 (50.4)	1280 (50.4)	1280 (50.4)	1280 (50.4)	1280 (50.4)	1280 (50.4)	1280 (50.4)	1280 (50.4)
	DN 150 (6“)	1261 (49.6)	1261 (49.6)	1261 (49.6)	1261 (49.6)	1261 (49.6)	1261 (49.6)	1261 (49.6)	1261 (49.6)
DN 150 (6“)	DN 100 (4“)	1592 (62.7)	1592 (62.7)	1632 (64.3)	1632 (64.3)	1592 (62.7)	1632 (64.3)	1632 (64.3)	1592 (62.7)
	DN 150 (6“)	1502 (59.1)	1502 (59.1)	1542 (60.7)	1542 (60.7)	1502 (59.1)	1542 (60.7)	1542 (60.7)	1502 (59.1)

L dimension tolerance:

- Meter tube nominal diameter DN 15 ... 50 (1/2" ... 2"): +0 / -3 mm (+0 / -0.018 inch)
- Meter tube nominal diameter DN 80 (3"): +0 / -5 mm (+0 / -0.2 inch)
- Meter tube nominal diameter DN 100 ... 150 (4" ... 6"): +0 / -8 mm (+0 / -0.31 inch)

CoriolisMaster FCB130, FCB150, FCH130, FCH150
Coriolis Mass Flowmeter

Ordering information

NOTE

For dependancies and limiations please check the online Product Selection Assistant at www.abb.com/flow-selector.

Main ordering information CoriolisMaster FCB130, FCB150

Base model											
CoriolisMaster FCB130 Coriolis Mass Flowmeter	FCB130	XX	XX	XXXXX	XX	XX	X	X	XX	XX	X
CoriolisMaster FCB150 Coriolis Mass Flowmeter	FCB150	XX	XX	XXXXX	XX	XX	X	X	XX	XX	X
Explosion Protection Certification											
General Purpose		Y0									
ATEX / IECEx, (Zone 2 / 22)		A2									
ATEX / IECEx, (Zone 1 / 21)		A1									
cFMus version Class 1 Div. 2 (Zone 2 / 21)		F2									
cFMus version Class 1 Div. 1 (Zone 1 / 21)		F1									
Connection Design / Connection Box Material / Cable Glands											
Integral, defined by Transmitter housing			Y0								
Meter Size / Connection Size											
DN 15 (1/2 in.) / DN 10 (1/4 in.)				015E1							
DN 15 (1/2 in.) / DN 15 (1/2 in.)				015R0							
DN 15 (1/2 in.) / DN 20 (3/4 in.)				015R1							
DN 25 (1 in.) / DN 20 (3/4 in.)				025E1							
DN 25 (1 in.) / DN 25 (1 in.)				025R0							
DN 25 (1 in.) / DN 40 (1-1/2 in.)				025R2							
DN 50 (2 in.) / DN 40 (1-1/2 in.)				050E1							
DN 50 (2 in.) / DN 50 (2 in.)				050R0							
DN 50 (2 in.) / DN 65 (2-1/2 in.)				050R1							
DN 80 (3 in.) / DN 65 (2-1/2 in.)				080E1							
DN 80 (3 in.) / DN 80 (3 in.)				080R0							
DN 80 (3 in.) / DN 100 (4 in.)				080R1							
DN 100 (4 in.) / DN 80 (3 in.)				100E1							
DN 100 (4 in.) / DN 100 (4 in.)				100R0							
DN 100 (4 in.) / DN 150 (6 in.)				100R2							
DN 150 (6 in.) / DN 100 (4 in.)				150E2							
DN 150 (6 in.) / DN 150 (6 in.)				150R0							
DN 150 (6 in.) / DN 200 (8 in.)				150R2							

Continued see next page

Main ordering information

CoriolisMaster FCB130 Coriolis Mass Flowmeter	XX	XX	X	X	XX	XX	X
CoriolisMaster FCB150 Coriolis Mass Flowmeter	XX	XX	X	X	XX	XX	X
Process Connection Type							
Flanges DIN PN 16	D2						
Flanges DIN PN 40	D4						
Flanges DIN PN 63	D5						
Flanges DIN PN 100	D6						
Flanges EN 1092-1 PN 40, NAMUR length (See Chapter „Dimensions“)	S5						
Flanges with groove PN40 EN1092-10-D	S6						
Flanges ANSI / ASME B16.5 Class 150	A1						
Flanges ANSI / ASME B16.5 Class 300	A3						
Flanges ANSI / ASME B16.5 Class 600	A6						
Flanges ANSI / ASME B16.5 Class 900 (p-t rating Cl 600)	A7						
Flanges ANSI / ASME B16.5 Class 1500 (p-t rating Cl 600)	A8						
Flanges JIS 10K	J1						
Tri-Clamp acc. DIN 32676	T1						
Tri-Clamp acc. BPE	T3						
Food industry fittings acc. DIN 11851	F1						
Female NPT thread	N5						
Female G thread	M5						
Others	Z9						
Material of Wetted Parts							
Stainless steel		A1					
Ni-Alloy		C1					
Flow Calibration							
Flow forward +/- 0.40 % of flow rate, Gas 1 % of flow rate		1)	A				
Flow forward +/- 0.25 % of flow rate, Gas 1 % of flow rate		1)	B				
Flow forward +/- 0.15 % of flow rate, Gas 0.,5 % of flow rate		2)	C				
Flow forward +/- 0.1 % of flow rate, Gas 0.5 % of flow rate		2)	D				
Flow forward / reverse +/- 0.40 % of flow rate, Gas 1 % of flow rate		1)	J				
Flow forward / reverse +/- 0.25 % of flow rate, Gas 1 % of flow rate		1)	K				
Flow forward / reverse +/- 0.15 % of flow rate, Gas 0.5 % of flow rate		2)	L				
Flow forward / reverse +/- 0.1 % of flow rate, Gas 0.5 % of flow rate		2)	M				
Others			Z				
Density Calibration							
Density 10 g/l				1)	1		
Density 2 g/l				2)	3		
Density 1 g/l				2)	4		
Others					9		

Continued see next page

CoriolisMaster FCB130, FCB150, FCH130, FCH150
Coriolis Mass Flowmeter

Main ordering information			
CoriolisMaster FCB130 Coriolis Mass Flowmeter	XX	XX	X
CoriolisMaster FCB150 Coriolis Mass Flowmeter	XX	XX	X
Connection Design / Transmitter Housing Type / Transmitter Housing Material / Cable Glands			
Integral / Single compartment / Aluminium / 2 x M20 x 1.5	B1		
Integral / Single compartment / Aluminium / 2 x NPT 1/2 in.	B2		
Integral / Single compartment / Stainless Steel / 2 x M20 x 1.5	T1		
Integral / Single compartment / Stainless Steel / 2 x NPT 1/2 in.	T2		
Others	Z9		
Outputs			
MODBUS, 2 digital outputs (passive)		M2	
Power Supply			
11 … 30 V DC			C

Additional ordering information

CoriolisMaster FCB130 Coriolis Mass Flowmeter		XX	XX
CoriolisMaster FCB150 Coriolis Mass Flowmeter		XX	XX
Certificates			
Test report 2.2 acc. EN 10204 confirmation of material		C1	
Material monitoring with inspection certificate 3.1 acc. EN 10204		C2	
Material monitoring with inspection certificate 3.2 acc. EN 10204		C3	
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204		CN	
Declaration of compliance with the order 2.1 acc. EN 10204		C4	
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test		C6	
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI (confirmation only)		CA	
Pressure test acc. AD2000		CB	
Test package (pressure test, non-destructive test, welder & welding procedure certificate)		CT	
Inspection certificate 3.1 acc. EN 10204 for NDE of welds		C8	
Certificate of accuracy 2.1 acc. EN 10204		CM	
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI (inlclusive heat analysis)		CR	
Others		CZ	
Special Operation Mode			
Standard + DensiMass concentration measurement		2)	N6
Standard + FillMass filling function		2)	N5

Additional ordering information					
CoriolisMaster FCB130 Coriolis Mass Flowmeter	XX	XXX	XX	XXX	XXX
CoriolisMaster FCB150 Coriolis Mass Flowmeter	XX	XXX	XX	XXX	XXX
Documentation Language					
German	M1				
English	M5				
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)	MW				
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)	ME				
Others	MZ				
Pressure Rating of Sensor Secondary Containment					
Maximum burst pressure 6 MPa / 60 bar / 870 psi inclusive tower length extension		PR5			
Maximum burst pressure 10 MPa / 100 bar / 1450 psi inclusive tower length extension		PR6			
Maximum burst pressure 15 MPa / 150 bar / 2175 psi inclusive tower length extension		PR7			
Device Identification Plate					
Stainless steel plate with TAG no.			T1		
Others			TZ		
Ambient Temperature Range					
-40 ... 55 °C (-40 ... 131 °F)				TA8	
Extended Tower Length					
Tower length extension - meter insulation capability					TE1
Tower Length extension dual seal - meter insulation capability					TE2

1) Only with CoriolisMaster FCB130
2) Only with CoriolisMaster FCB150

Accessories

Description	Order no.
FCx1xx Local Operation Interface (LOI) Adapter and cable	3KXS310000L0001
FCB100 Electronics Slide In GP/Div2/ZN2	3KXF002565U0100
FCB100 Electronics Slide In Div1/ZN1	3KXF002565U0200

CoriolisMaster FCB130, FCB150, FCH130, FCH150
Coriolis Mass Flowmeter

NOTE
For dependancies and limiations please check the online Product Selection Assistant at www.abb.com/flow-selector.

Main ordering information CoriolisMaster FCH130, FCH150

Base model											
CoriolisMaster FCH130 Coriolis Mass Flowmeter	FCH130	XX	XX	XXXXX	XX	XX	X	X	XX	XX	X
CoriolisMaster FCH150 Coriolis Mass Flowmeter	FCH150	XX	XX	XXXXX	XX	XX	X	X	XX	XX	X
Explosion Protection Certification							Continued see next page				
General Purpose		Y0									
ATEX / IECEx, (Zone 2 / 22)		A2									
ATEX / IECEx, (Zone 1 / 21)		A1									
cFMus version Class 1 Div. 2 (Zone 2 / 21)		F2									
cFMus version Class 1 Div. 1 (Zone 1 / 21)		F1									
Connection Design / Connection Box Material / Cable Glands											
Integral, defined by Transmitter housing			Y0								
Meter Size / Connection Size											
DN 25 (1 in.) / DN 20 (3/4 in.)				025E1							
DN 25 (1 in.) / DN 25 (1 in.)				025R0							
DN 25 (1 in.) / DN 40 (1-1/2 in.)				025R2							
DN 50 (2 in.) / DN 40 (1-1/2 in.)				050E1							
DN 50 (2 in.) / DN 50 (2 in.)				050R0							
DN 50 (2 in.) / DN 65 (2-1/2 in.)				050R1							
DN 80 (3 in.) / DN 65 (2-1/2 in.)				080E1							
DN 80 (3 in.) / DN 80 (3 in.)				080R0							
DN 80 (3 in.) / DN 100 (4 in.)				080R1							
Process Connection Type											
Tri-Clamp acc. DIN 32676					T1						
Tri-Clamp acc. ASME BPE					T3						
Food industry fittings acc. DIN 11851					F1						
Others					Z9						
Material of Wetted Parts											
Stainless steel, polished 1.4404 / 1.4435 (316L)						H2					

Main ordering information

CoriolisMaster FCH130 Coriolis Mass Flowmeter		X	X	XX	XX	X
CoriolisMaster FCH150 Coriolis Mass Flowmeter		X	X	XX	XX	X
Flow Calibration						
Flow forward +/- 0.40 % of flow rate, Gas 1 % of flow rate	1)	A				
Flow forward +/- 0.25 % of flow rate, Gas 1 % of flow rate	1)	B				
Flow forward +/- 0.15 % of flow rate, Gas 0.5 % of flow rate	2)	C				
Flow forward +/- 0.1 % of flow rate, Gas 0.5 % of flow rate	2)	D				
Flow forward / reverse +/- 0.40 % of flow rate, Gas 1 % of flow rate	1)	J				
Flow forward / reverse +/- 0.25 % of flow rate, Gas 1 % of flow rate	1)	K				
Flow forward / reverse +/- 0.15 % of flow rate, Gas 0.5 % of flow rate	2)	L				
Flow forward / reverse +/- 0.1 % of flow rate, Gas 0.5 % of flow rate	2)	M				
Others		Z				
Density Calibration						
Density 10 g/l		1)	1			
Density 2 g/l		2)	3			
Density 1 g/l		2)	4			
Others			9			
Connection Design / Transmitter Housing Type / Transmitter Housing Material / Cable Glands						
Integral / Single compartment / Aluminium / 2 x M20 x 1.5				B1		
Integral / Single compartment / Aluminium / 2 x NPT 1/2 in.				B2		
Integral / Single compartment / Stainless Steel / 2 x M20 x 1.5				T1		
Integral / Single compartment / Stainless Steel / 2 x NPT 1/2 in.				T2		
Others				Z9		
Outputs						
MODBUS, 2 digital outputs (passive)					M2	
Power Supply						
11 … 30 V DC						C

CoriolisMaster FCB130, FCB150, FCH130, FCH150
Coriolis Mass Flowmeter

Additional ordering information

CoriolisMaster FCH130 Coriolis Mass Flowmeter	XX	XX	XX	XXX	XX	XXX	XXX
CoriolisMaster FCH150 Coriolis Mass Flowmeter	XX	XX	XX	XXX	XX	XXX	XXX
Certificates							
Test report 2.2 acc. EN 10204 confirmation of material	C1						
Material monitoring with inspection certificate 3.1 acc. EN 10204	C2						
Material monitoring with inspection certificate 3.2 acc. EN 10204	C3						
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204	CN						
Declaration of compliance with the order 2.1 acc. EN 10204	C4						
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test	C6						
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI (confirmation only)	CA						
Pressure test acc. AD2000	CB						
Test package (pressure test, non-destructive test, welder & welding procedure certificate)	CT						
Inspection certificate 3.1 acc. EN 10204 for NDE of welds	C8						
Certificate of compliance for calibration 2.1 acc. EN 10204	CM						
Inspection certificate 3.1 acc. EN 10204 for positive material identification PMI (inlclusive heat analysis)	CR						
Others	CZ						
Special Operation Mode							
Standard + DensiMass concentration measurement	2)	N6					
Standard + FillMass filling function	2)	N5					
Documentation Language							
German			M1				
English			M5				
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)			MW				
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)			ME				
Others			MZ				
Pressure Rating of Sensor Secondary Containment							
Maximum burst pressure 6 MPa / 60 bar / 870 psi inclusive tower length extension				PR5			
Maximum burst pressure 10 MPa / 100 bar / 1450 psi inclusive tower length extension				PR6			
Maximum burst pressure 15 MPa / 150 bar / 2175 psi inclusive tower length extension				PR7			
Device Identification Plate							
Stainless steel plate with TAG no.					T1		
Others					TZ		
Ambient Temperature Range							
-40 ... 55 °C (-40 ... 131 °F)						TA8	
Extended Tower Length							
Tower length extension - meter insulation capability							TE1
Tower Length extension dual seal - meter insulation capability							TE2

1) Only with CoriolisMaster FCB130
2) Only with CoriolisMaster FCB150

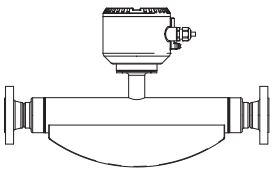
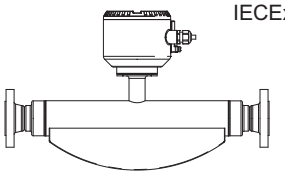
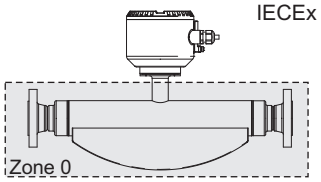
Accessories

Description	Order no.
FCx1xx Local Operation Interface (LOI) Adapter and cable	3KXS310000L0001
FCB100 Electronics Slide In GP/Div2/ZN2	3KXF002565U0100
FCB100 Electronics Slide In Div1/ZN1	3KXF002565U0200

Use in potentially explosive atmospheres according to ATEX and IECEx

NOTE
Further information on the approval of devices for use in potentially explosive atmospheres can be found in the type examination certificates or the relevant certificates at www.abb.com/flow.

Device overview

	Standard / No explosion protection	Zone 2, 21, 22	Zone 1, 21 (Zone 0)
Model number	**FCx1xx Y0**	**FCx1xx A2**	**FCx1xx A1**
— Standard — Zone 2, 21, 22 — Zone 1, 21 — Zone 0	 G11604a	ATEX IECEx  G11604b	ATEX IECEx  G11604c

Ex-marking

NOTE
— Depending on the design, a specific marking in accordance with ATEX or IECEx applies.
— ABB reserves the right to modify the Ex-marking.Refer to the name plate for the exact marking.

Designation for model FCx1xx-A2... in Zone 2	
ATEX	**IECEx**
FM 14 ATEX0017X II 3 G Ex nA mc IIC T6 ... T2 Gc FM 14 ATEX0016X II 2 D Ex tb IIIC T85°C ... T_{medium} Db	IECEx FME 14.0003X Ex nA mc IIC T6 ... T2 Gc Ex tb IIIC T85°C ... T_{medium} Db

Designation for Model FCx1xx-A1 in Zone 1	
ATEX	**IECEx**
FM 14 ATEX0016X II 2/1 G Ex e ia mb IIC T5 ... T2 Ga/Gb $T_{amb.}$max= 55°C II 2/1 G Ex e ia mb IIC T6 ... T2 Ga/Gb $T_{amb.}$max= 50°C II 2 D Ex ia tb IIIC T85°C ... T_{medium} Db Control Installation Drawing No. 3KXF000014G0009	IECEx FME 14.0003X Ex e ia mb IIC T5 ... T2 Ga/Gb $T_{amb.}$max= 55°C Ex e ia mb IIC T6 ... T2 Ga/Gb $T_{amb.}$max= 50°C Ex ia tb IIIC T85°C ... T_{medium} Db Control Installation Drawing No. 3KXF000014G0009

Temperature data

Ambient and process conditions for models FCx1xx...

Ambient temperature		Measuring medium temperature	IP rating / NEMA rating
[T_{amb}]	[$T_{amb, optional}$]	[T_{medium}]	
-20 ... 55 °C (-4 ... 131 °F)	-40 ... 55 °C (-40 ... 131 °F)	-40 … 205 °C (-40 … 400 °F)	IP 64, IP 65, IP 67, IP 68 and NEMA 4X / Type 4X

Measuring medium temperature (Ex data) for models FCx1xx-A1… in zone 1

Ambient temperature [T_{amb}]	≤50 °C (≤122 °F)	≤55 °C (≤131 °F)
Temperature class	Maximum permissible measuring medium temperature [T_{medium}]	
T1	205 °C (400 °F)	205 °C (400 °F)
T2	205 °C (400 °F)	205 °C (400 °F)
T3	195 °C (383 °F)	195 °C (383 °F)
T4	130 °C (266 °F)	130 °C (266 °F)
T5	95 °C (203 °F)	95 °C (203 °F)
T6	80 °C (176 °F)	—

Measuring medium temperature (Ex data) for models FCx1xx-A2… in zone 2

Ambient temperature [T_{amb}]	≤50 °C (≤122 °F)	≤55 °C (≤131 °F)
Temperature class	Maximum permissible measuring medium temperature [T_{medium}]	
T1	205 °C (400 °F)	205 °C (400 °F)
T2	205 °C (400 °F)	205 °C (400 °F)
T3	195 °C (383 °F)	195 °C (383 °F)
T4	130 °C (266 °F)	130 °C (266 °F)
T5	95 °C (203 °F)	95 °C (203 °F)
T6	80 °C (176 °F)	80 °C (176 °F)

Measuring medium temperature (Ex data) for models FCx1xx-A1 ... in Zone 21 and FCx1xx-A2 ... in Zone 22

Ambient temperature [T_{amb}]	≤50 °C (≤122 °F)	≤55 °C (≤131 °F)
Temperature class	Maximum permissible measuring medium temperature [T_{medium}]	
T210°C	205 °C (400 °F)	205 °C (400 °F)
T200°C	195 °C (383 °F)	195 °C (383 °F)
T135°C	130 °C (266 °F)	130 °C (266 °F)
T100°C	95 °C (203 °F)	95 °C (203 °F)
T85°C	80 °C (176 °F)	—

Electrical data
Modbus and digital outputs

Models: FCx1xx-A1, FCx1xx-A2

Outputs	Operating values (general)		Type of protection „nA" (Zone 2)		„e" (Zone 1)		„ia" (Zone 1)					
	U_N [V]	I_N [mA]	U_N [V]	I_N [mA]	U_M [V]	I_M [mA]	U_o [V]	I_o [mA]	P_o [mW]	C_o [nF]	C_o pa [nF]	L_o [mH]
Modbus, aktive Terminals A / B	3	30	3	30	30	30	4.2	150	150	0	0	0
							U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_i pa [nF]	L_i [mH]
							±4.2	150	150	0	0	0
Digital output DO1, passive Terminals 41 / 42	30	25	30	25	30	25	30	25	187	2.4	2.4	0.2
Digital output DO2, passive Terminals 51 / 52	30	25	30	25	30	25	30	25	187	10	0	0.2

All outputs are electrically isolated from one other and from the power supply.
Digital outputs DO1 / DO2 are not electrically isolated from each other. Terminals 42 / 52 have the same potential.

Special connection conditions

The output circuits are designed so that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits.

- It is not permitted to combine intrinsically safe and non-intrinsically safe circuits.
- On intrinsically-safe circuits, equipotential bonding must be in place along the entire length of the cable used for the digital outputs.
- The rated voltage of the non-intrinsically safe circuits is U_M = 30 V.
- Provided that the rated voltage U_M = 30 V is not exceeded if connections are established to non-intrinsically safe external circuits, intrinsic safety is preserved.
- When changing the type of protection, the information in the corresponding chapter entitled "Changing the type of protection" in the operating instructions must be observed.

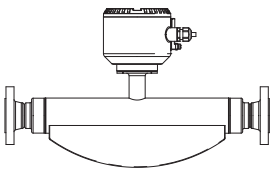
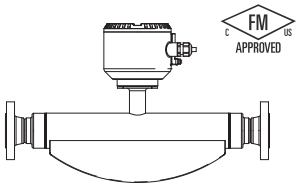
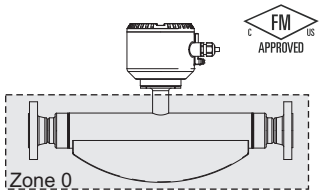
NOTE

If the protective conductor (PE) is connected in the flowmeter's terminal box, you must ensure that no dangerous potential difference can arise between the protective conductor (PE) and the equipotential bonding (PA) in the hazardous area.

Use in potentially explosive atmospheres in accordance with cFMus

NOTE
Further information on the approval of devices for use in potentially explosive atmospheres can be found in the type examination certificates or the relevant certificates at www.abb.com/flow.

Device overview

	Standard / No explosion protection	Class I Div. 2 Zone 2, 21	Class I Div. 1 Zone 0, 1, 20 ,21
Model number	**FCx1xx Y0**	**FCx1xx F2**	**FCx1xx F1**
— Standard — Class I Div. 2 — Class I Div. 1 — Zone 2, 21 — Zone 1, 21 — Zone 0, 20	 G11605a	 G11605b	 G11605c

Ex-marking

NOTE
— Depending on the design, a specific marking in accordance with FM applies.
— ABB reserves the right to modify the Ex-marking.Refer to the name plate for the exact marking.

Marking for model FCx1xx-F2... in zone 2, division 2	
FM (marking for US)	**FM (marking for Canada)**
NI: CL I, DIV2, GPS ABCD, T6 ... T2	NI: CL I, DIV2, GPS ABCD, T6 ... T2
NI: CL II, III, DIV2, GPS EFG, T6 ... T3B	NI: CL II, III, DIV2, GPS EFG, T6 ... T3B
DIP: CL II, Div 1, GPS EFG, T6 ... T3B	DIP: CL II, Div 1, GPS EFG, T6 ... T3B
DIP: CL III, Div 1, 2, T6 ... T3B	DIP: CL III, Div 1, 2, T6 ... T3B
CL I, ZN 2, AEx nA IIC T6 ... T2	Ex nA IIC T6 ... T2
ZN 21 AEx tb IIIC T85°C ... T165°C	See Instructions for T-Class information
See Instructions for T-Class information	

Marking for model FCx1xx-F1... in zone 1, division 1	
FM (marking for US)	**FM (marking for Canada)**
NI: CL I, DIV2, GPS ABCD, T6 ... T2	NI: CL I, DIV2, GPS ABCD, T6 ... T2
NI: CL II, III, DIV2, GPS EFG, T6 ... T3B	NI: CL II, III, DIV2, GPS EFG, T6 ... T3B
XP-IS: CL I, Div 1, GPS BCD, T6 ... T2	XP-IS: CL I, Div 1, GPS BCD, T6 ... T2
DIP: CL II, Div 1, GPS EFG, T6 ... T3B	DIP: CL II, Div 1, GPS EFG, T6 ... T2
DIP: CL III, Div 1, 2, T6 ... T3B	DIP: CL III, Div 1, 2, T6 ... T3B
CL I, ZN 1, AEx d ia IIB+H2 T6 .. T2	Ex d ia IIB+H2 T6 .. T2
ZN 21 AEx ia tb IIIC T85°C to T165°C	Ex ia INTRINSICALLY SAFE SECURITE INTRINSEQUE
See Instructions for T-Class information	See Instructions for T-Class information
Control Installation Drawing No. 3KXF000014G0009	Control Installation Drawing No. 3KXF000014G0009

Temperature data

Ambient and process conditions for models FCx1xx...

Ambient temperature		Measuring medium temperature	IP rating / NEMA rating
[T_{amb}]	[$T_{amb, optional}$]	[T_{medium}]	
-20 ... 55 °C (-4 ... 131 °F)	-40 ... 55 °C (-40 ... 131 °F)	-40 ... 205 °C (-40 ... 400 °F)	IP 64, IP 65, IP 67, IP 68 and NEMA 4X / Type 4X

NOTE

Installl conduit seals within 18 inches (450 mm).

Measuring medium temperature (Ex data) for models FCx1xx-F1... in Class I Div 1, Class I Zone 1

Ambient temperature [T_{amb}]	≤50 °C (≤122 °F)	≤55 °C (≤131 °F)
Temperature class	Maximum permissible measuring medium temperature [T_{medium}]	
T1	205 °C (400 °F)	205 °C (400 °F)
T2	205 °C (400 °F)	205 °C (400 °F)
T3	195 °C (383 °F)	195 °C (383 °F)
T4	130 °C (266 °F)	130 °C (266 °F)
T5	95 °C (203 °F)	95 °C (203 °F)
T6	80 °C (176 °F)	80 °C (176 °F)

Measuring medium temperature (Ex data) for models FCx1xx-F2... in Class I Div 2, Class I Zone 2

Ambient temperature [T_{amb}]	≤50 °C (≤122 °F)	≤55 °C (≤131 °F)
Temperature class	Maximum permissible measuring medium temperature [T_{medium}]	
T1	205 °C (400 °F)	205 °C (400 °F)
T2	205 °C (400 °F)	205 °C (400 °F)
T3	195 °C (383 °F)	195 °C (383 °F)
T4	130 °C (266 °F)	130 °C (266 °F)
T5	95 °C (203 °F)	95 °C (203 °F)
T6	80 °C (176 °F)	80 °C (176 °F)

Messmediumtemperatur (Ex Daten) for models FCx1xx-F1... in Zone 21, Class II / III and FCx1xx-F2... in Zone 22, Class II / III

Ambient temperature [T_{amb}]	≤50 °C (≤122 °F)	≤55 °C (≤131 °F)
Temperature class	Maximum permissible measuring medium temperature [T_{medium}]	
T165°C	160 °C (320 °F)	160 °C (320 °F)
T135°C	130 °C (266 °F)	130 °C (266 °F)
T100°C	95 °C (203 °F)	95 °C (203 °F)
T85°C	80 °C (176 °F)	—

Electrical data
Modbus and digital outputs

Models: FCx1xx-F1, FCx1xx-F2

Outputs	Operating values (general)		Type of protection NI (Div 2, Zone 2)		XP (Div 1, Zone 1)		IS (Div 1, Zone 1)					
	U_N [V]	I_N [mA]	U_N [V]	I_N [mA]	U_M [V]	I_M [mA]	U_o [V]	I_o [mA]	P_o [mW]	C_o [nF]	C_o pa [nF]	L_o [mH]
Modbus, aktive Terminals A / B	3	30	3	30	30	30	4.2	150	150	0	0	0
							U_i [V]	I_i [mA]	P_i [mW]	C_i [nF]	C_i pa [nF]	L_i [mH]
							±4.2	150	150	0	0	0
Digital output DO1, passive Terminals 41 / 42	30	25	30	25	30	25	30	25	187	2.4	2.4	0.2
Digital output DO2, passive Terminals 51 / 52	30	25	30	25	30	25	30	25	187	10	0	0.2

All outputs are electrically isolated from one other and from the power supply.
Digital outputs DO1 / DO2 are not electrically isolated from each other. Terminals 42 / 52 have the same potential.

Special connection conditions

The output circuits are designed so that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits.

- It is not permitted to combine intrinsically safe and non-intrinsically safe circuits.
- On intrinsically-safe circuits, equipotential bonding must be in place along the entire length of the cable used for the digital outputs.
- The rated voltage of the non-intrinsically safe circuits is U_M = 30 V.
- Provided that the rated voltage U_M = 30 V is not exceeded if connections are established to non-intrinsically safe external circuits, intrinsic safety is preserved.
- When changing the type of protection, the information in the corresponding chapter entitled "Changing the type of protection" in the operating instructions must be observed.

NOTE

If the protective conductor (PE) is connected in the flowmeter's terminal box, you must ensure that no dangerous potential difference can arise between the protective conductor (PE) and the equipotential bonding (PA) in the hazardous area.

Trademarks

® Modbus is a registered trademark of the Modbus Organization

Questionnaire

Customer:	**Date:**
Ms. / Mr.:	**Department:**
Telephone:	**Fax:**

Measuring medium:	Liquid content:	Gas content:
Flow rate: (min., max., operating point)	kg/h	
Density: (min., max., operating point)	kg/m^3	
Dynamic viscosity: (min., max., operating point)	mPas/cP	
Fluid temperature: (min., max., operating point)	°C	
Ambient temperature	°C	
Pressure: (min., max., operating point)	bar	
Rate of flow:	☐ Steady	☐ Pulsating
Batch operation:	☐ Yes	☐ No
Concentration calculation:	☐ Yes	☐ No
Transmitter design:	☐ Integral mount design	☐ Remote mount design
Explosion protection:	☐ Yes	☐ No
Power supply:	☐ 100 … 230 V AC, 50/60 Hz	☐ 24 V AC/DC, 50/60 Hz
Electrical outputs:	☐ Current output I: 0/4 … 20 mA ☐ Current output II: 0/4 … 20 mA ☐ Pulse output, active ☐ Pulse output, passive	Communication: ☐ HART protocol
Additional specifications: Pipeline diameter: Process connection:	.....mm	

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