Measurement made easy
Compact device for high-precision measurement of mass and volume flow, density, temperature and concentration with just one device

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
- Lower pressure loss, self-draining
- Global approvals for explosion protection
- MID / OIML approval for legal metrology

Integrated VeriMass device verification and diagnosis
- Predictive maintenance in the process
- Extended maintenance cycles
- Reduced maintenance effort

CoriolisMaster Software Tools
- DensiMass for concentration measurements, net mass and volume flow calculations
- FillMass for filling applications

CoriolisMaster FCH100
- For hygienic applications
Overview – models

Figure 1: FCB1xx / FCH1xx

<table>
<thead>
<tr>
<th>Model number</th>
<th>FCB1xx for standard applications</th>
<th>FCH1xx for hygienic applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flange DIN 2501 / EN 1092-1</td>
<td>DN 10 to 200, PN 40 to 100</td>
<td>—</td>
</tr>
<tr>
<td>Flange ASME B16.5</td>
<td>DN ¼ to 8 in, CL150 to CL1500</td>
<td>—</td>
</tr>
<tr>
<td>JIS flange</td>
<td>DN 10 to 200; JIS 10K to 20K</td>
<td>—</td>
</tr>
<tr>
<td>Pipe fitting DIN 11851</td>
<td>DN 10 to 100 (¼ to 4 in)</td>
<td>DN 15 to 100 (¼ to 4 in)</td>
</tr>
<tr>
<td>Pipe fitting SMS 1145</td>
<td>DN 25 to 80 (1 to 3 in)</td>
<td>—</td>
</tr>
<tr>
<td>Tri-clamp DIN 32676 (ISO 2852)</td>
<td>DN 15 to 100 (¼ to 4 in)</td>
<td>DN 20 to 100 (¼ to 4 in)</td>
</tr>
<tr>
<td>Tri-clamp BPE</td>
<td>DN ¼ to 4 in</td>
<td>DN ¼ to 4 in</td>
</tr>
<tr>
<td>Female thread DIN ISO 228 and ASME B 1.20.1</td>
<td>DN 15; PN 100</td>
<td>—</td>
</tr>
<tr>
<td>Other connections</td>
<td>On request</td>
<td>On request</td>
</tr>
<tr>
<td>Wetted material</td>
<td>Stainless steel 1.4435 or 1.4404 (AISI 316L), nickel-alloy C4 / C22 (optional)</td>
<td>Stainless steel, polished 1.4404 (AISI 316L) or 1.4435 (AISI 316L)</td>
</tr>
<tr>
<td>Approvals and certificates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosion protection ATEX / IECEx</td>
<td>Zone 0, 1, 2, 21, 22</td>
<td>Zone 0, 1, 2, 21, 22</td>
</tr>
<tr>
<td>Explosion protection conforming to cFMus</td>
<td>Class I Div. 1, Class I Div. 2, Zone 0, 1, 2, 21</td>
<td>Class I Div. 1, Class I Div. 2, Zone 0, 1, 2, 21</td>
</tr>
<tr>
<td>Hygiene approvals</td>
<td>—</td>
<td>FDA compliant</td>
</tr>
<tr>
<td>Legal metrology</td>
<td>Type-tested for legal metrology in accordance with MID / OIML R117</td>
<td></td>
</tr>
<tr>
<td>Additional approvals</td>
<td>Available at <a href="http://www.abb.com/flow">www.abb.com/flow</a> or upon request</td>
<td></td>
</tr>
</tbody>
</table>
### Overview – models

<table>
<thead>
<tr>
<th>Model number</th>
<th>FCB130</th>
<th>FCB150</th>
<th>FCH130</th>
<th>FCH150</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measuring accuracy for liquids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass flow*</td>
<td>0.4 %, 0.25 % and 0.2 %</td>
<td>0.1 % and 0.15 %</td>
<td>0.4 %, 0.25 % and 0.2 %</td>
<td>0.1 % and 0.15 %</td>
</tr>
<tr>
<td>Volume flow*</td>
<td>0.15 % and ±0.11 %</td>
<td>0.15 % and ±0.11 %</td>
<td>0.4 %, 0.25 % and 0.2 %</td>
<td>0.15 % and ±0.11 %</td>
</tr>
<tr>
<td>Density</td>
<td>0.01 kg/l</td>
<td>• 0.002 kg/l</td>
<td>0.01 kg/l</td>
<td>• 0.002 kg/l</td>
</tr>
<tr>
<td></td>
<td>• 0.001 kg/l (optional)</td>
<td>• 0.0005 kg/l</td>
<td>• 0.001 kg/l (optional)</td>
<td>• 0.0005 kg/l</td>
</tr>
<tr>
<td>Temperature</td>
<td>1 K</td>
<td>0.5 K</td>
<td>1 K</td>
<td>0.5 K</td>
</tr>
<tr>
<td><strong>Measuring accuracy for gases</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring accuracy for gases*</td>
<td>1 %</td>
<td>0.5 %</td>
<td>1 %</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Permissible measuring medium temperature</td>
<td>−50 to 160 °C (−58 to 320 °F)</td>
<td>−50 to 205 °C (−58 to 400 °F)</td>
<td>−50 to 160 °C (−58 to 320 °F)</td>
<td>−50 to 205 °C (−58 to 400 °F)</td>
</tr>
<tr>
<td>Permissible ambient temperature</td>
<td>−40 to 70 °C (−40 to 158 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>11 to 30 V DC, nominal voltage: 24 V DC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP rating in accordance with EN 60529</td>
<td>IP 65 / IP 67 / IP 68 (immersion depth: 5 m), NEMA 4X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Modbus® RTU, RS485</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs in serial production</td>
<td>• Digital output 1: passive</td>
<td>• Digital output 2: passive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External output zero return</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External totalizer reset</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow measurement in forward flow and reverse flow direction</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empty pipe detection</td>
<td>Yes, based on preconfigured density alarm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-monitoring and diagnosis</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field optimization for flow and density</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentration measurement ‘DensiMass’</td>
<td>Yes, optional on models FCB150 and FCH150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘FillMass’ filling function</td>
<td>Yes, optional on models FCB150 and FCH150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;VeriMass&quot; diagnosis function</td>
<td>Yes, optional</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Indication of accuracy in % of the measured value (% of meas.val.)
General data

Device description

The CoriolisMaster FCB100, FCH100 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, frequency or binary outputs.

The CoriolisMaster FCB100, FCH100 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.
- Ex approval 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.

VeriMass erosion monitor

The integrated diagnosis function VeriMass allows the status of the meter tube to be monitored. This enables changes due to material erosion and the formation of deposits on the meter tube walls to be identified at an early stage. If the set limit value is exceeded, an alarm is triggered, for example via the programmable digital output or HART, depending on the configuration. The limit value for the erosion monitor can be set either automatically or manually.

Automatic adjustment

The transmitter monitors the sensor's driver current over a prolonged period and creates a 'fingerprint' for the relevant application. The transmitter generates a corresponding tolerance value for deviations in the driver current. The transmitter compares the behavior of the driver current with the generated fingerprint and triggers the relevant error message in the event of prolonged deviations.

Manual adjustment

For applications where automatic adjustment of the erosion monitor does not provide a satisfactory result, the erosion monitor can be adjusted manually. For more information, please contact ABB Service or the sales organization.

Devices for legal metrology in accordance with MID / OIML R117

The Coriolis mass flowmeters CoriolisMaster FCBx50 / FCHx50 are type-tested for legal metrology in accordance with MID / OIML R117 in accuracy class 0.3. Additional information can be found on the corresponding certificate. The certificate is available in the download area at www.abb.com/flow. Please the optional order code 'CML' when ordering. Please observe the additional remarks in the operating and commissioning instruction.

Note

Use in accordance with API / AGA standards is also possible.
... General data

Enhanced Coriolis Control (ECC) function

The Enhanced Coriolis Control (ECC) function has been specially developed for demanding applications, such as:
- Liquids with gas phase
- Liquids with rapidly changing densities
- Fill operations with surge phases at the beginning or end
- Liquids with high viscosity

After the ECC function is activated, the device applies a particularly quick control algorithm to control the oscillating tubes in the device and therefore provide significantly better behavior in the applications listed above.

In addition, the ECC function offers a special noise suppression filter for mass flow measurement and density measurement.

In the case of particularly demanding applications, disruptions can thus be actively filtered and the measurement can be implemented in a considerably more stable manner.

For the filters, a variety of time constants between 0.5 s and 8 s can be selected.

Since Coriolis mass flowmeters measure the mass flow and density separately, the CoriolisMaster features a separate filter each for mass flow measurement and density measurement.

Applications in accordance with API (American Petroleum Institute)

For applications in accordance with API Chapter 5.6, the CoriolisMaster FCB100, FCH100 provides special parameters:
- Calibration Pressure: Measuring medium pressure at which the device was calibrated at ABB.
- Calibration Temp.: Measuring medium temperature at which the device was calibrated at ABB.
- Pressure Level: Parameters for entry of the current operating pressure in the device by the user.
- Flow Compens. factor: Display / output of the current compensation factor for mass flow calculation.
- Density Comp. factor: Display / output of the current compensation factor for density calculation.
- P.Comp.Status (PECI): In accordance with API, the user can set the following states:
  - 1: CT: Compensation in the Coriolis flowmeter based on the current pressure entered in the ‘Pressure Level’ parameter.
  - 2: TD: Compensation in the Coriolis flowmeter switched off – compensation is performed externally (Tertiary Device)
  - 3: OS: Compensation in the Coriolis flowmeter switched off – compensation is not performed on site (Off Site)
  - 4: NA: Compensation in the Coriolis flowmeter switched off – compensation is not deemed to be necessary, since the device is operating at a pressure for which the device has been proved.
Concentration measurement DensiMass

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 maize starch in water
- Concentration of wheat starch in water

In addition, the user can enter two user-defined matrices:

- Up to 100 values with one matrix
- Up to 50 values per matrix with two matrices

Calculating standard volumes and standard densities of liquids

If a suitable matrix is available, the DensiMass function also allows the measured volume to be corrected for any selected temperature.

The measured density can also be corrected for a given temperature.

However, this is only possible when measuring liquids and after entering an appropriate matrix.

This correction can also be performed using the default matrices (see above).

The calculated standard volumes and standard densities can also be issued for all other process variables.

The software ‘DensiMatrix’ is available for the easy input of the matrix.

Accuracy of the 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 the temperature and the 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

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 %</td>
<td>208.93 g/l</td>
</tr>
<tr>
<td>0.48 %</td>
<td>1 g/l</td>
</tr>
<tr>
<td>0.96 %</td>
<td>2 g/l</td>
</tr>
<tr>
<td>0.24 %</td>
<td>0.5 g/l</td>
</tr>
</tbody>
</table>

Thus, the accuracy class of the density measurement directly determines the accuracy of the concentration measurement.
... General data

FillMass batch function

Only for FCB150 / FCH150

The integrated FillMass fill function allows filling operations with filling times of \( > 3 \) s.

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.
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 $T_{\text{ambient}}$) 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 ambient temperature $T_{\text{ambient}}$ must be adhered to.
- On flange devices, ensure that the counterflanges of the piping are aligned plane parallel. Only install flange devices 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’ (in accordance with the standards listed in the declaration of conformity).

Maintain a suitable distance from electromagnetic fields and interference that extend beyond the usual dimensions.

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’, 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 fasten any supports or brackets to the housing of the flowmeter sensor.

Seals
Users are responsible for selecting and mounting suitable gaskets (material, shape).
Note the following points when selecting and mounting gaskets:

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

Calculating pressure loss
Pressure loss depends on the properties of the medium and the flow rate.
A good aid for pressure loss calculation is the Online ABB Product Selection Assistant (PSA) for flow at www.abb.com/flow-selector.

Inlet section
The sensor does not require any inlet section. 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 forward flow calibration, this is only in the direction of the arrow; for the optional forward flow and reverse flow calibration, this can be in both flow directions).
... Flowmeter sensor

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

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

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

Horizontal installation

For liquid measuring media and horizontal installation, the transmitter and terminal box must point upward. If a self-draining installation is required, the sensor must be mounted at an incline of ≥ 30°.

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.

If there is a risk of condensate formation when using gaseous measuring media, note the following:
Ensure that condensates cannot accumulate in front of the sensor.
If this cannot be avoided, we recommend that the sensor is installed vertically with a downward flow direction.

Vertical installation
For vertical installation, no special measures are required.

Horizontal installation

For gaseous measuring media and horizontal installation, the transmitter and terminal box must point downward.

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.

Turn-off devices for the zero point adjustment

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
- At least on the inlet side when the transmitter is mounted in vertical position.
- In order to perform balancing during an ongoing process, it is advisable to mount a bypass pipe.
... Flowmeter sensor

**Sensor insulation**

The sensor may only be insulated in conjunction with the option TE1 'Extended tower length for sensor insulation' or TE2 'Extended tower length – insulation capacity with dual gasket,' as shown in Figure 7.

**Heat tracing of the sensor**

When operating the sensor in conjunction with heat tracing, the temperature at point C (Figure 7) 100 °C (212 °F) may not be exceeded at any time!

**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 or horizontal mounting position at a 30° incline is used. Refer to Liquid measuring media on page 10.

- The combination of process connections and gaskets selected by the operator may comprise only EHEDG-compliant components. Please note the information in the latest version of the EHEDG Position Paper: 'Hygienic Process connections to use with hygienic components and equipment' in this regard.

- The pipe fitting in accordance with DIN 11851 is approved for use in conjunction with an EHEDG-compliant gasket.

**Devices for legal metrology in accordance with MID / OIML R117**

The Coriolis mass flowmeters CoriolisMaster FCBx50 / FCHx50 are type-tested for legal metrology in accordance with MID / OIML R117 in accuracy class 0.3.

Additional information can be found on the corresponding certificate. The certificate is available in the download area at [www.abb.com/flow](http://www.abb.com/flow).

**Installation in accordance with MID / OIML R117 (example)**

On devices for legal metrology in accordance with MID / OIML R117, the hardware write protection must be activated after commissioning. This prevents a change in the parameterization of the devices.

To prevent deactivation of the hardware write protection or other manipulations during operation, the transmitter housing and the sensor housing connection box (with remote mount design) must be sealed. For this purpose, a seal kit is available at ABB. For the assembly of the seal, please observe the separate 'IN/FCX100/FCX400/MID/OIML-XA' instructions.
Designs

Figure 9: Sensor

Nominal diameter and measuring range

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Q&lt;sub&gt;max&lt;/sub&gt; in kg/h (lb/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 15 (½ in)</td>
<td>0 to 8,000 (0 to 17,637)</td>
</tr>
<tr>
<td>DN 25 (1 in)</td>
<td>0 to 35,000 (0 to 77,162)</td>
</tr>
<tr>
<td>DN 50 (2 in)</td>
<td>0 to 90,000 (0 to 198,416)</td>
</tr>
<tr>
<td>DN 80 (3 in)</td>
<td>0 to 250,000 (0 to 551,156)</td>
</tr>
<tr>
<td>DN 100 (4 in)</td>
<td>0 to 520,000 (0 to 1,146,404)</td>
</tr>
<tr>
<td>DN 150 (6 in)</td>
<td>0 to 860,000 (0 to 1,895,975)</td>
</tr>
</tbody>
</table>

Recommended flow range

Fluids:
- The recommended flow range is 5 to 100 % of Q<sub>max</sub>.
- Flow rates < 1 % of Q<sub>max</sub> should be avoided.

Gases:
- The flow velocity of gases in the meter tube should not up-scale 0.3 mach (approx. 100 m/s (328 ft/s)).
- Increased deviation in repeatability should be expected from a flow velocity of approx. 80 m/s (262 ft/s).
- The maximum flow range of gases depends on the operating density. Appropriate dimensioning guidelines are available at www.abb.com/flow.

Measuring accuracy

Reference conditions

<table>
<thead>
<tr>
<th>Calibration fluid</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temperature: 25 °C (77 °F) ± 5 K</td>
<td></td>
</tr>
<tr>
<td>• Pressure: 2 to 4 bar (29 to 58 psi)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>25 °C (77 °F) ±10 K / ±5 K</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Line voltage in accordance with name plate U&lt;sub&gt;0&lt;/sub&gt; ± 1 %</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Warm-up phase</th>
<th>30 min</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Installation</th>
<th>Installation in accordance with Assembly Notes and Mounting positions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• No visible gas phase</td>
</tr>
<tr>
<td></td>
<td>• No external mechanical or hydraulic disturbances, particularly no cavitation</td>
</tr>
</tbody>
</table>

Output calibration

Pulse output

Measured error and repeatability

The measured error and repeatability are calculated as follows for the flow:

**Scenario 1:**

If

\[
\text{Flow rate} \geq \text{Zero stability} \quad \text{(base accuracy / 100)}
\]

Then:
- Maximum measured error:
  \[
  \pm \text{base accuracy as % of measured value.}
  \]
- Repeatability:
  \[
  \pm \frac{1}{2} \times \text{base accuracy as % of measured value.}
  \]

**Scenario 2:**

If

\[
\text{Flow rate} < \text{Zero stability} \quad \text{(base accuracy / 100)}
\]

Then:
- Maximum measured error:
  \[
  \pm \left( \frac{\text{zero point stability}}{\text{measured value}} \right) \times 100 \% \text{ of measured value.}
  \]
- Repeatability:
  \[
  \pm \frac{1}{2} \times \left( \frac{\text{zero point stability}}{\text{measured value}} \right) \times 100 \% \text{ of measured value.}
  \]
**Figure 10: Measured error FCx150 DN 15 (example)**

<table>
<thead>
<tr>
<th>Flowrate Range</th>
<th>Measured Error</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>100:1 80 kg/h (176.4 lb/h)</td>
<td>≤ 0.8 %</td>
<td>0.4 %</td>
</tr>
<tr>
<td>50:1 160 kg/h (352.7 lb/h)</td>
<td>≤ 0.4 %</td>
<td>0.2 %</td>
</tr>
<tr>
<td>10:1 800 kg/h (1763.7 lb/h)</td>
<td>≤ 0.1 %</td>
<td>0.05 %</td>
</tr>
<tr>
<td>2:1 4000 kg/h (8818.5 lb/h)</td>
<td>≤ 0.1 %</td>
<td>0.05 %</td>
</tr>
<tr>
<td>1:1 8000 kg/h (17637 lb/h)</td>
<td>≤ 0.1 %</td>
<td>0.05 %</td>
</tr>
</tbody>
</table>

**FCx150 – high accuracy**

<table>
<thead>
<tr>
<th>Flowrate Range</th>
<th>Measured Error</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>100:1 80 kg/h (176.4 lb/h)</td>
<td>≤ 0.5 %</td>
<td>0.25 %</td>
</tr>
<tr>
<td>50:1 160 kg/h (352.7 lb/h)</td>
<td>≤ 0.25 %</td>
<td>0.122 %</td>
</tr>
<tr>
<td>10:1 800 kg/h (1763.7 lb/h)</td>
<td>≤ 0.1 %</td>
<td>0.05 %</td>
</tr>
<tr>
<td>2:1 4000 kg/h (8818.5 lb/h)</td>
<td>≤ 0.1 %</td>
<td>0.05 %</td>
</tr>
<tr>
<td>1:1 8000 kg/h (17637 lb/h)</td>
<td>≤ 0.1 %</td>
<td>0.05 %</td>
</tr>
</tbody>
</table>

* Enter measured error and repeatability as % of measured value

---

**Measured error and base accuracy for liquids**

<table>
<thead>
<tr>
<th>Order code flow calibration</th>
<th>FCx130</th>
<th>FCx150</th>
<th>FCx150 – high accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, E, J, K, N</td>
<td>C, D, L, M</td>
<td>D, M</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order code density calibration</th>
<th>1</th>
<th>3, 4</th>
<th>5</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Mass flow*</th>
<th>± 0.4 %</th>
<th>± 0.25 %</th>
<th>± 0.1 %</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Volume flow*</th>
<th>± 0.4 %</th>
<th>± 0.25 %</th>
<th>± 0.11 %</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Density</th>
<th>0.010 kg/l**</th>
<th>0.002 kg/l**</th>
<th>0.0005 kg/l**</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Repeatability for flow rate</th>
<th>See tables on page 14.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Mass flow*</th>
<th>± 1 %</th>
<th>± 0.5 %</th>
<th>± 0.15 %</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Volume flow*</th>
<th>± 0.4 %</th>
<th>± 0.25 %</th>
<th>± 0.11 %</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Density</th>
<th>0.002 kg/l**</th>
<th>0.002 kg/l**</th>
<th>0.00025 kg/l**</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Temperature</th>
<th>1 K</th>
<th>0.5 K</th>
<th>0.2 K</th>
</tr>
</thead>
</table>

**Measured error and base accuracy for gases**

<table>
<thead>
<tr>
<th>Order code flow calibration</th>
<th>FCx130</th>
<th>FCx150</th>
<th>FCx150 – high accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, E, J, K, N</td>
<td>C, D, L, M</td>
<td>D, M</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order code density calibration</th>
<th>1</th>
<th>3, 4</th>
<th>5</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Mass flow*</th>
<th>± 1 %</th>
<th>± 0.5 %</th>
<th>± 0.5 %</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Temperature</th>
<th>1 K</th>
<th>0.5 K</th>
<th>0.2 K</th>
</tr>
</thead>
</table>

* Enter measured error and base accuracy as % of measured value
** For the density range from 0.5 to 1.8 kg/dm³
Zero stability

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>FCx130</th>
<th>FCx150</th>
<th>FCx150 – high accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order code flow calibration</td>
<td>A, E, J, K</td>
<td>C, D, L, M</td>
<td>D, M</td>
</tr>
<tr>
<td>Order code density calibration</td>
<td>1, 3, 4, 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effect of the measuring medium temperature

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>FCx130</th>
<th>FCx150</th>
<th>FCx150 – high accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order code flow calibration</td>
<td>A, E, J, K, N</td>
<td>C, D, L, M</td>
<td>D, M</td>
</tr>
<tr>
<td>Order code density calibration</td>
<td>1, 3, 4, 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effect of the operating pressure

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Flow*</th>
<th>Density [kg/dm³ / bar]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 15 (½ in)</td>
<td>-0.002 %</td>
<td>No effect</td>
</tr>
<tr>
<td>DN 25 (1 in)</td>
<td>-0.013 %</td>
<td>0.000035</td>
</tr>
<tr>
<td>DN 50 (2 in)</td>
<td>-0.010 %</td>
<td>0.000027</td>
</tr>
<tr>
<td>DN 80 (3 in)</td>
<td>-0.006 %</td>
<td>0.000019</td>
</tr>
<tr>
<td>DN 100 (4 in)</td>
<td>-0.009 %</td>
<td>0.000024</td>
</tr>
<tr>
<td>DN 150 (6 in)</td>
<td>-0.035 %</td>
<td>0.000045</td>
</tr>
</tbody>
</table>

* Influence of operating pressure as % of measured value per bar

Viscosity range

For dynamic viscosities ≥ 1 Pas (1000 mPas = 1000 cP), please consult ABB.
... Flowmeter sensor

Temperature limits °C (°F)

Notice
When using the device in potentially explosive atmospheres, note the additional data in Use in potentially explosive atmospheres in accordance with ATEX and IECEx on page 45 and Use in potentially explosive atmospheres in accordance with cFMus on page 48!

Measuring medium temperature $T_{\text{medium}}$
- FCx130: -50 to 160 °C (-58 to 320 °F)
- FCx150: -50 to 205 °C (-58 to 401 °F)

Ambient temperature $T_{\text{amb.}}$
- -40 to 70 °C (-40 to 158 °F)

Note
In devices with order code 'Extended tower length – TE3', from an ambient temperature of ≥ 65 °C (149 °F), the measuring medium temperature must be limited to a maximum of 140 °C (284 °F).

Process connections
For an overview of available process connection versions, see Overview – models on page 3.

Pressure ratings
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 available pressure ratings, see Overview – models on page 3.

Housing as a protective device (optional)

Order code PR5
Maximum burst pressure 60 bar (870 psi)

Optional order code PR6 and PR7 on request
- Increased burst pressures up to 100 bar (1450 psi), possible for nominal diameters DN 15 to 100 (½ to 4 in.).
- Increased burst pressures up to 150 bar (2175 psi), possible for nominal diameters DN 15 to 80 (½ to 3 in.).
- Purge connections are available on request.

Installation lengths in accordance with NAMUR standards
The CoriolisMaster FCB100, FCH100 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 (order code ‘Process connection – S5 / S7’).

The exact installation lengths can be found in the tables in Devices DN 15 to 150 in NAMUR standard installation lengths (order option S5, S7) on page 32.

Materials for the transmitter terminal box

<table>
<thead>
<tr>
<th>Housing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aluminum EN AC-44200 (YL104)</td>
</tr>
<tr>
<td>or</td>
<td>Stainless steel 1.4409 (ASTM CF3M)</td>
</tr>
<tr>
<td>Housing color (only for aluminum housing)</td>
<td>RAL 9002</td>
</tr>
</tbody>
</table>

Layer thickness of the paint: 80 to 120 µm

Pressure Equipment Directive
Conformity assessment in accordance with Category III, fluid group 1, gas
Note the corrosion resistance of the meter tube materials in relation to the measuring medium.
Materials for the sensor

**Wetted components**

Stainless steel
- 1.4404 (AISI 316L)
Stainless steel, polished
- 1.4404 (AISI 316L) or 1.4435 (AISI 316L) certified in accordance with EHEDG with sensor material (AISI 316L)
- C4 nickel alloy* (2.4610) or C22 nickel alloy* (2.4602)

Optional: Manufacture in accordance with NACE MR0175 and MR0103 (ISO 15156)

**Sensor housing**

Stainless steel 1.4404 (AISI 316L), 1.4301 (AISI 304), 1.4308 (ASTM CF8)

* Hastelloy® C is a registered trademark of Haynes International. C4 and C22 nickel alloys are equivalent to Hastelloy® C4 and Hastelloy® C22.

** If the wetted parts of the sensor are made from nickel alloy then parts of the sensor housing (splitter) are also manufactured from nickel alloy. However, the prevailing parts remain manufactured from the specified material.

Roughness for flanges in accordance with EN 1092-1, ASME and JIS

<table>
<thead>
<tr>
<th>Design</th>
<th>Nominal diameter</th>
<th>Pressure rating</th>
<th>Mean roughness value Ra</th>
<th>Mean roughness value Ra</th>
<th>Mean roughness value Ra</th>
<th>Rz</th>
<th>Rz</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 1092-1 B1</td>
<td></td>
<td>≤ PN 40</td>
<td>3.2 to 12.5 µm</td>
<td>0.8 to 3.2 µm</td>
<td>3.2 to 12.5 µm</td>
<td>0.8 to 3.2 µm</td>
<td>12.5 to 50.0 µm</td>
</tr>
<tr>
<td>EN 1092-1 B2</td>
<td></td>
<td>≥ PN 63</td>
<td></td>
<td></td>
<td></td>
<td>12.5 to 50.0 µm</td>
<td>3.2 to 12.5 µm</td>
</tr>
<tr>
<td>Pipe fitting (DN 1185)</td>
<td>DN 15 to DN 40 (½ to 1½ in)</td>
<td>40 bar (290 psi) (580 psi)</td>
<td>140 °C (284 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DN 50 to DN 100 (2 to 4 in)</td>
<td>25 bar (290 psi) (363 psi)</td>
<td>140 °C (284 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe fitting (SMS 1145)</td>
<td>DN 25 to DN 80 (1 to 3 in)</td>
<td>6 bar (290 psi) (87 psi)</td>
<td>140 °C (284 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tri-Clamp (DN 32676)</td>
<td>DN 15 to DN 50 (½ to 2 in)</td>
<td>16 bar (290 psi) (232 psi)</td>
<td>120 °C (248 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DN 65 to DN 100 (2½ to 4 in)</td>
<td>10 bar (290 psi) (145 psi)</td>
<td>120 °C (248 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASME BPE Clamp (&lt; DN 80 (&lt; 3 in)</td>
<td>17.1 bar (290 psi) (248 psi)</td>
<td>121 °C (249.8 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DN 80 (&lt; 3 in)</td>
<td>15.5 bar (290 psi) (224.8 psi)</td>
<td>121 °C (249.8 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DN 100 (&lt; 4 in)</td>
<td>12.9 bar (290 psi) (187.1 psi)</td>
<td>121 °C (249.8 °F)</td>
<td>−40 °C (−40 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Material load for process connections

**Note**
You can reference the availability of the different process connections in the Online ABB Product Selection Assistant (PSA) for flow [www.abb.com/flow-selector](http://www.abb.com/flow-selector).

- Not all connections shown here are available in all the devices and designs.
- The permissible material load of the device can additionally differ from the material load of the connection. The permissible limit values (pressure rating / measuring medium temperature $T_{medium}$) can be found on the name plate.
... Flowmeter sensor

Material load curves for flange devices

Figure 12: Stainless steel DIN flange 1.4571 / 1.4404 (316Ti / 316L) to DN 200 (8 in.)

Figure 13: Stainless steel ASME flange 1.4571 / 1.4404 (316Ti / 316L) up to DN 200 (8 in.)

Figure 14: Nickel alloy DIN flange C4 (2.4610) or nickel alloy C22 (2.4602) up to DN 200 (8 in.)

Figure 15: Nickel alloy ASME flange C4 (2.4610) or nickel alloy C22 (2.4602) up to DN 200 (in.)

Figure 16: Stainless steel JIS B2220 flange 1.4435 or 1.4404 (AISI 316L), nickel alloy C4 (2.4610) or nickel alloy C22 (2.4602)
Electrical connections

Models FCB130, FCB150, FCH130 and FCH150

PA Potential equalization

Figure 17: Electrical connection

Connections for the power supply

<table>
<thead>
<tr>
<th>DC voltage</th>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>2−</td>
<td>−</td>
</tr>
</tbody>
</table>

Connections for the outputs

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A / B</td>
<td>Modbus® RTU (RS485)</td>
</tr>
<tr>
<td>41 / 42</td>
<td>Passive digital output DO1</td>
</tr>
<tr>
<td></td>
<td>The output can be configured as a pulse output, frequency output or switch output.</td>
</tr>
<tr>
<td>51 / 52</td>
<td>Passive digital output DO2</td>
</tr>
<tr>
<td></td>
<td>The output can be configured as a pulse output or switch output.</td>
</tr>
</tbody>
</table>

Electrical data for inputs and outputs

Notice
When using the device in potentially explosive atmospheres, note the additional data in Use in potentially explosive atmospheres in accordance with ATEX and IECEx on page 45 and Use in potentially explosive atmospheres in accordance with cFMus on page 48!

Power supply

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>11 to 30 V DC (ripple: ≤ 5 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>S ≤ 5 VA</td>
</tr>
</tbody>
</table>

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

Figure 18: Maximum cable lengths (examples)
… Flowmeter sensor

Digital output 41 / 42, 51 / 52
Can be configured via Modbus.

![Diagram of digital output configuration](image)

**Binary output (passive)**

<table>
<thead>
<tr>
<th>Terminals</th>
<th>41 / 42, 51 / 52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output ‘closed’</td>
<td>0 V ≤ U_{CEL} ≤ 3 V</td>
</tr>
<tr>
<td></td>
<td>2 mA ≤ I_{CEL} ≤ 30 mA</td>
</tr>
<tr>
<td>Output ‘open’</td>
<td>16 V ≤ U_{CEH} ≤ 30 V DC</td>
</tr>
<tr>
<td></td>
<td>0 mA ≤ I_{CEH} ≤ 0.2 mA</td>
</tr>
<tr>
<td>Switching function</td>
<td>Configurable</td>
</tr>
</tbody>
</table>

**Note**

- Digital output 51 / 52 **cannot** be configured as a frequency output.
- Terminals 42 / 52 have the same potential. Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other.
- If you are using a mechanical counter, we recommend setting a pulse width of ≥ 30 ms and a maximum frequency of \( f_{\text{max}} \leq 3 \text{ kHz} \).

**Pulse / frequency output (passive)**

<table>
<thead>
<tr>
<th>Terminals</th>
<th>41 / 42 (pulse / frequency output)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output ‘closed’</td>
<td>0 V ≤ U_{CEL} ≤ 3 V</td>
</tr>
<tr>
<td></td>
<td>For ( f &lt; 2.5 \text{ kHz} ): 2 mA ≤ I_{CEL} ≤ 30 mA</td>
</tr>
<tr>
<td></td>
<td>For ( f &gt; 2.5 \text{ kHz} ): 10 mA ≤ I_{CEL} ≤ 30 mA</td>
</tr>
<tr>
<td>Output ‘open’</td>
<td>16 V ≤ U_{CEH} ≤ 30 V DC</td>
</tr>
<tr>
<td></td>
<td>0 mA ≤ I_{CEH} ≤ 0.2 mA</td>
</tr>
<tr>
<td>( f_{\text{max}} )</td>
<td>10.5 kHz</td>
</tr>
<tr>
<td>Pulse width</td>
<td>0.1 to 2000 ms</td>
</tr>
</tbody>
</table>
Digital communication

Modbus® communication

Note

The Modbus® protocol is an unsecured protocol, as such the intended application should be assessed to ensure that these protocols are suitable before implementation.

Modbus is an open standard owned and administrated by an independent group of device manufacturers styled the Modbus Organization (www.modbus.org).

Using the Modbus protocol allows devices made by different manufacturers to exchange information via the same communication bus, without the need for any special interface devices to be used.

<table>
<thead>
<tr>
<th>Modbus protocol</th>
<th>V1 / V2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals</td>
<td>Modbus RTU - RS485 serial connection</td>
</tr>
<tr>
<td>Configuration</td>
<td>Via the Modbus Interface or via the local operating interface in connection with Asset Vision Basic (DAT200) and a corresponding Device Type Manager (DTM)</td>
</tr>
<tr>
<td>Transmission</td>
<td>Modbus RTU - RS485 serial connection</td>
</tr>
<tr>
<td>Baud rate</td>
<td>2400, 4800, 9600, 19200, 38400, 56000, 57600, 115200 baud</td>
</tr>
<tr>
<td>Parity</td>
<td>None, even, odd</td>
</tr>
<tr>
<td>Stop bit</td>
<td>One, two</td>
</tr>
<tr>
<td>IEEE format</td>
<td>Little endian, big endian</td>
</tr>
<tr>
<td>Typical response time</td>
<td>&lt; 100 ms</td>
</tr>
<tr>
<td>Response delay time</td>
<td>0 to 200 milliseconds</td>
</tr>
</tbody>
</table>

Figure 20: Communication with the Modbus protocol

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 mm² (AWG 26), the maximum length is 1000 m (3280 ft).
- When using a 4-core cable as a 2-wire wiring system, the maximum length must be halved.
- The spur lines must be short, a maximum of 20 m (66 ft).
- When using a distributor with ‘n’ connections, each branch must have a maximum length of 40 m (131 ft) divided by ‘n.’

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

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

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

Dimensions

Meter tube inside diameter

Inside diameter of the meter tube of the Coriolis mass flowmeter CoriolisMaster FCB100, FCH100.

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Meter tube inside diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 15 (½ in)</td>
<td>2 × 8 mm (2 x 0.31 in)</td>
</tr>
<tr>
<td>DN 25 (1 in)</td>
<td>2 × 16 mm (2 x 0.63 in)</td>
</tr>
<tr>
<td>DN 50 (2 in)</td>
<td>2 × 23.7 mm (2 x 0.93 in)</td>
</tr>
<tr>
<td>DN 80 (3 in)</td>
<td>2 × 36.62 mm (2 x 1.44 in)</td>
</tr>
<tr>
<td>DN 100 (4 in)</td>
<td>2 × 52.51 mm (2 x 2.07 in)</td>
</tr>
<tr>
<td>DN 150 (6 in)</td>
<td>2 × 68.9 mm (2 x 2.71 in)</td>
</tr>
</tbody>
</table>
Devices with meter tube nominal diameter DN 15 to 50 and flange DN 10 to 65
Sensor with wetted parts made from stainless steel.
All dimensions and weights are specified in mm (in) or kg (lb).

**Standard Version**

**Marine version – CL1**

1. ‘Extended tower length – TE1, TE2’ option or ‘Pressure rating of sensor secondary housing – PR5, PR6, PR7’ option
2. Flange in accordance with EN 1092-1, ASME B16.5, ISO 7005 (connection dimensions for ASME flanges in accordance with ASME B16.5 (ANSI))

* Standard version: devices with ‘Extended tower length – TE1, TE2’ option or ‘Pressure rating of sensor secondary housing’ option
** Marine version – CL1: devices with ‘Extended tower length – TE3’ option

Figure 1: Remote mount design
### Flowmeter sensor

**Meter tube nominal diameter DN 15 (1/2 in)**

<table>
<thead>
<tr>
<th>DN / process connection</th>
<th>L</th>
<th>Ø k</th>
<th>Ø A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>E1</th>
<th>Weight max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 (1/4 in)</td>
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| 15 (3/8 in)             |     |     |      |      |      |      |       |             |
| PN 40 (EN 1092-1 B1)    | 385 | 15.2| 65   | 2.6  |      |      |       |             |
| PN 63 (EN 1092-1 B2)    | 403 | 15.9| 75   | 3.0  |      |      |       |             |
| PN 100 (EN 1092-1 B2)   | 403 | 15.9| 75   | 3.0  |      |      |       |             |
| CL150 (ASME B16.5)      | 435 | 17.1| 60.5 | 2.4  |      |      |       |             |
| CL300 (ASME B16.5)      | 421 | 16.6| 66.5 | 2.6  |      |      |       |             |
| CL600 (ASME B16.5)      | 421 | 16.6| 82.6 | 3.3  |      |      |       |             |
| CL900 (ASME B16.5)      | 421 | 16.6| 82.6 | 3.3  |      |      |       |             |
| CL1500 (ASME B16.5)     | 421 | 16.6| 75   | 3.0  |      |      |       |             |

| 20 (¾ in)               |     |     |      |      |      |      |       |             |
| PN 40 (EN 1092-1 B1)    | 385 | 15.2| 70   | 2.8  |      |      |       |             |
| PN 63 (EN 1092-1 B2)    | 421 | 16.6| 75   | 3.0  |      |      |       |             |
| PN 100 (EN 1092-1 B2)   | 421 | 16.6| 69.9 | 2.8  |      |      |       |             |
| CL150 (ASME B16.5)      | 421 | 16.6| 75   | 3.0  |      |      |       |             |

**Meter tube nominal diameter DN 25 (1 in)**

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| 40 (1½ in)              |     |     |      |      |      |      |       |             |
| PN 40 (EN 1092-1 B1)    | 576 | 22.7| 110  | 4.33 |      |      |       |             |
| PN 63 (EN 1092-1 B2)    | 576 | 22.7| 125  | 4.92 |      |      |       |             |
| PN 100 (EN 1092-1 B2)   | 576 | 22.7| 125  | 4.92 |      |      |       |             |
| CL150 (ASME B16.5)      | 576 | 22.7| 98.6 | 3.88 |      |      |       |             |
| CL300 (ASME B16.5)      | 576 | 22.7| 114.3| 45.0 |      |      |       |             |
| CL600 (ASME B16.5)      | 576 | 22.7| 114.3| 45.0 |      |      |       |             |
| JIS 10K                 | 576 | 22.7| 105  | 4.13 |      |      |       |             |

* Standard version: devices with ‘Extended tower length – TE1, TE2’ option or ‘Pressure rating of sensor secondary housing’ option

** Marine version – CL1: devices with ‘Extended tower length – TE3’ option

Tolerance for dimension L: +0 / −3 mm (+0 / −0.018 in)
### Meter tube nominal diameter DN 50 (2 in)

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<th>Ø A</th>
<th>B</th>
<th>C</th>
<th>E</th>
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<th>Weight max.</th>
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<td>125 (4.92)</td>
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* Standard version: devices with 'Extended tower length – TE1, TE2' option or 'Pressure rating of sensor secondary housing' option

** Marine version – CL1: devices with 'Extended tower length – TE3' option

Tolerance for dimension L: +0 / −3 mm (+0 / −0.018 in)
... Flowmeter sensor

Devices with meter tube nominal diameter DN 80 and flange DN 65 to 100
Sensor with wetted parts made from stainless steel.
All dimensions and weights are specified in mm (in) or kg (lb).

Standard Version

Marine version – CL1

1. 'Extended tower length – TE1, TE2' option or 'Pressure rating of sensor secondary housing – PR5, PR6, PR7' option
2. Flange in accordance with EN 1092-1, ASME B16.5, ISO 7005 (connection dimensions for ASME flanges in accordance with ASME B16.5 (ANSI))
3. Flow direction
4. 'Extended tower length – TE3' option

Figure 2: Remote mount design
### Meter tube nominal diameter DN 80 (3 in)

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<th>Weight max.</th>
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<td>180 (7.09)</td>
<td>75 (165.4)</td>
</tr>
<tr>
<td>PN 63 (EN 1092-1 B2)</td>
<td>1060 (41.73)</td>
<td>200 (7.87)</td>
<td>86 (189.6)</td>
</tr>
<tr>
<td>PN 100 (EN 1092-1 B2)</td>
<td>1080 (42.52)</td>
<td>210 (8.27)</td>
<td>94 (207.2)</td>
</tr>
<tr>
<td>CL150 (ASME B16.5)</td>
<td>880 (34.65)</td>
<td>190.5 (7.5)</td>
<td>77 (169.8)</td>
</tr>
<tr>
<td>CL300 (ASME B16.5)</td>
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<td>200.2 (7.88)</td>
<td>91 (200.6)</td>
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<tr>
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<td>215.9 (8.50)</td>
<td>101 (222.7)</td>
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<tr>
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<td>234.9 (9.25)</td>
<td>111 (244.7)</td>
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<tr>
<td>CL1500 (ASME B16.5)</td>
<td>1150 (45.28)</td>
<td>241.3 (9.50)</td>
<td>126 (277.8)</td>
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<tr>
<td>JIS 10K</td>
<td>1060 (41.7)</td>
<td>175 (6.9)</td>
<td>86 (189.6)</td>
</tr>
</tbody>
</table>

* On request

Tolerance for dimension L: +0 / −3 mm (+0 / −0.018 in)
... Flowmeter sensor

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

Sensor with wetted parts made from stainless steel.

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

Figure 3: Remote mount design
### Meter tube nominal diameter DN 100 (4 in)

<table>
<thead>
<tr>
<th>DN / process connection</th>
<th>L</th>
<th>Ø k</th>
<th>Weight max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 (3 in)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PN 16 (EN 1092-1 B1)</td>
<td>122 (48.11)</td>
<td>160 (6.30)</td>
<td>126 (278)</td>
</tr>
<tr>
<td>PN 40 (EN 1092-1 B1)</td>
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<td></td>
<td>126 (278)</td>
</tr>
<tr>
<td>PN 63 (EN 1092-1 B2)</td>
<td>1234 (48.58)</td>
<td>170 (6.69)</td>
<td>130 (287)</td>
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<tr>
<td>PN 100 (EN 1092-1 B2)</td>
<td>180 (7.09)</td>
<td>132 (291)</td>
<td></td>
</tr>
<tr>
<td>CL150 (ASME B16.5)</td>
<td>1244 (48.98)</td>
<td>152.4 (6.00)</td>
<td>127 (280)</td>
</tr>
<tr>
<td>CL300 (ASME B16.5)</td>
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<td>168.1 (6.62)</td>
<td>135 (298)</td>
</tr>
<tr>
<td>CL600 (ASME B16.5)</td>
<td></td>
<td>168.1 (6.62)</td>
<td>138 (304)</td>
</tr>
<tr>
<td>CL900 (ASME B16.5)</td>
<td>1470 (57.87)</td>
<td>190.5 (7.50)</td>
<td>141 (311)</td>
</tr>
<tr>
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<td>1500 (59.05)</td>
<td>203.2 (8.00)</td>
<td>153 (337)</td>
</tr>
<tr>
<td>JIS 10K</td>
<td>1275 (50.20)</td>
<td>150 (5.91)</td>
<td>123 (271)</td>
</tr>
<tr>
<td>100 (4 in)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PN 16 (EN 1092-1 B1)</td>
<td>1122 (44.17)</td>
<td>180 (7.09)</td>
<td>123 (271)</td>
</tr>
<tr>
<td>PN 40 (EN 1092-1 B1)</td>
<td>1144 (45.04)</td>
<td>190 (7.48)</td>
<td>126 (278)</td>
</tr>
<tr>
<td>PN 63 (EN 1092-1 B2)</td>
<td>1304 (51.34)</td>
<td>138 (5.43)</td>
<td>133 (293)</td>
</tr>
<tr>
<td>PN 100 (EN 1092-1 B2)</td>
<td>1334 (52.52)</td>
<td>150 (5.91)</td>
<td>141 (311)</td>
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<tr>
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<td>1144 (45.04)</td>
<td>190.5 (7.50)</td>
<td>127 (280)</td>
</tr>
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<td>CL300 (ASME B16.5)</td>
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<td>200.2 (7.88)</td>
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<td>215.9 (8.50)</td>
<td>141 (311)</td>
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<td>234.9 (9.25)</td>
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<td>241.3 (9.50)</td>
<td>174 (384)</td>
</tr>
<tr>
<td>JIS 10K</td>
<td>1150 (45.28)</td>
<td>175 (6.89)</td>
<td>126 (278)</td>
</tr>
<tr>
<td>150 (6 in)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PN 16 (EN 1092-1 B1)</td>
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<td>240 (9.44)</td>
<td>131 (289)</td>
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<tr>
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<td>1330 (52.36)</td>
<td>250 (9.84)</td>
<td>139 (306)</td>
</tr>
<tr>
<td>CL150 (ASME B16.5)</td>
<td>241.3 (9.50)</td>
<td>137 (302)</td>
<td></td>
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<tr>
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<td>1435 (56.50)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>JIS 10K</td>
<td>240 (9.44)</td>
<td>130 (287)</td>
<td></td>
</tr>
</tbody>
</table>

Tolerance for dimension L: +0 / −3 mm (+0 / −0.018 in)
Devices with meter tube nominal diameter DN 150 and flange DN 100 to DN 200

Sensor with wetted parts made from stainless steel.

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

---

### Flowmeter sensor

1. 'Extended tower length – TE1, TE2' option or 'Pressure rating of sensor secondary housing – PR5, PR6, PR7' option
2. Flange in accordance with EN 1092-1, ASME B16.5, ISO 7005
   (connection dimensions for ASME flanges in accordance with ASME B16.5 (ANSI))
3. Flow direction
4. 'Extended tower length – TE3' option

---

Figure 4: Remote mount design
<table>
<thead>
<tr>
<th>DN / process connection</th>
<th>L</th>
<th>k</th>
<th>Weight max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 (6 in)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PN 16 (EN 1092-1 B1)</td>
<td>1569 (61.77)</td>
<td>180 (7.09)</td>
<td>175 (386)</td>
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<tr>
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<td>1599 (62.95)</td>
<td>190 (7.48)</td>
<td>179 (395)</td>
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<tr>
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<td>1630 (64.17)</td>
<td>190.5 (7.50)</td>
<td>182 (401)</td>
</tr>
<tr>
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<td>1650 (64.96)</td>
<td>200.2 (7.88)</td>
<td>188 (414)</td>
</tr>
<tr>
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<td>1675 (65.94)</td>
<td>215.9 (8.50)</td>
<td>198 (437)</td>
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<td>1705 (67.13)</td>
<td>234.9 (9.25)</td>
<td>208 (459)</td>
</tr>
<tr>
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<td>1725 (67.91)</td>
<td>241.3 (9.50)</td>
<td>223 (492)</td>
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<td>1421 (55.94)</td>
<td>240 (9.45)</td>
<td>178 (392)</td>
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<td>250 (9.84)</td>
<td>186 (410)</td>
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<td>1485 (58.46)</td>
<td>241.3 (9.50)</td>
<td>185 (408)</td>
</tr>
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<td>269.7 (10.62)</td>
<td>203 (448)</td>
</tr>
<tr>
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<td>1555 (61.22)</td>
<td>292.1 (11.50)</td>
<td>225 (496)</td>
</tr>
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<td>1605 (63.19)</td>
<td>317.5 (12.5)</td>
<td>249 (549)</td>
</tr>
<tr>
<td>CL1500 (ASME B16.5)</td>
<td>1665 (65.55)</td>
<td>291 (10.42)</td>
<td>291 (642)</td>
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<tr>
<td>200 (8 in)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PN 40 (EN 1092-1 B1)</td>
<td>1637 (64.45)</td>
<td>320 (12.6)</td>
<td>209 (461)</td>
</tr>
<tr>
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<td>1650 (64.96)</td>
<td>298.5 (11.75)</td>
<td>204 (450)</td>
</tr>
<tr>
<td>CL300 (ASME B16.5)</td>
<td>1670 (65.75)</td>
<td>330.2 (13.0)</td>
<td>229 (505)</td>
</tr>
<tr>
<td>CL600 (ASME B16.5)</td>
<td>1730 (68.11)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>JIS10K</td>
<td>1585 (62.4)</td>
<td>290 (11.42)</td>
<td>195 (430)</td>
</tr>
</tbody>
</table>

Tolerance for dimension L: +0 / −3 mm (+0 / −0.018 in)
Flowmeter sensor

Devices DN 15 to 150 in NAMUR standard installation lengths (order option S5, S7)
Sensor with wetted parts made from stainless steel.
All dimensions and weights are specified in mm (in) or kg (lb).

---

Standard Version

Marine version – CL1

* Standard version: devices with ‘Extended tower length – TE1, TE2’ option or ‘Pressure rating of sensor secondary housing – PR5, PR6, PR7’ option
** Marine version – CL1: devices with ‘Extended tower length – TE3’ option

Figure 5: Remote mount design
### Devices DN 15 to 150 in NAMUR standard installation lengths

<table>
<thead>
<tr>
<th>Meter tube</th>
<th>Process connection</th>
<th>L</th>
<th>Ø k</th>
<th>Ø A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>E1 Approximate weight</th>
</tr>
</thead>
</table>
| DN 15 (½ in) | DN 15 (½ in) / PN 40 | 510 (20.08) | 60 (2.4) | 44.5 (1.8) | 77 (3.0) | 46 (1.8) | 283 (11.1) | 357** (14.1**)
|             |                    |     |      |      |       |       |       | 13.5 (29.8)          |
| DN 25 (1 in) | DN 25 (1 in) / PN 40 | 600 (23.62) | 75 (3.0) | 69.5 (2.74) | 103 (4.06) | 62 (2.44) | 324 (12.8) | 398** (15.7**)
|             |                    |     |      |      |       |       |       | 15 (33.1)           |
| DN 50 (1 in) | DN 50 (1 in) / PN 40 | 715 (28.15) | 125 (4.92) | 99 (3.9) | 125 (4.92) | 80 (3.15) | 354 (13.9) | 428** (16.9**)
|             |                    |     |      |      |       |       |       | 31 (68.3)           |
| DN 80 (3 in) | DN 80 (3 in) / PN 40 | 915 (36.02) | 160 (6.30) | 155 (6.1) | 183 (7.2) | 123 (4.84) | 445 (17.52) | –123 (163) |
|             |                    |     |      |      |       |       |       | –74 (163)           |
| DN 100 (4 in) | DN 100 (4 in) / PN 16 | 1400 (55.12) | 180 (7.09) | 195 (7.68) | 261 (10.28) | 168 (6.61) | 541 (21.3) | –123 (271) |
|             |                    |     |      |      |       |       |       | –74 (163)           |
| DN 150 (6 in) | DN 150 (6 in) / PN 16 | 1700 (66.93) | 240 (9.45) | 260 (10.24) | 320 (12.6) | 205 (8.07) | 630 (24.8) | –178 (392) |
|             |                    |     |      |      |       |       |       | –123 (271) |

* Standard version: devices with 'Extended tower length – TE1, TE2' option or 'Pressure rating of sensor secondary housing' option

** Marine version – CL1: devices with 'Extended tower length – TE3' option

Tolerance for dimension L: +0 / −3 mm (+0 / −0.018 in)
... Flowmeter sensor

Devices with meter tube nominal diameter DN 15 to 80 and connections in accordance with SMS 1145, DIN 11851, DIN 32676, DIN ISO 228, ASME BPE and ASME B 1.20.1

Sensor with wetted parts made from stainless steel.
All dimensions and weights are specified in mm (in) or kg (lb).

![Flowmeter sensor diagram]

1. ‘Extended tower length – TE1, TE2’ option or ‘Pressure rating of sensor secondary housing – PR5, PR6, PR7’ option
2. Threaded spuds in accordance with DIN 11851 and SMS 1145
3. Flow direction
4. Clamping connection in accordance with DIN 32676 and ASME BPE
5. Female thread connection in accordance with DIN ISO 228 and ASME B 1.20.1

Figure 6: Remote mount design

<table>
<thead>
<tr>
<th>Meter tube</th>
<th>Process connection</th>
<th>Length L</th>
<th>Ø DA</th>
<th>Ø DI</th>
<th>Ø A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>Approximate weight</th>
<th>Aluminum*</th>
<th>Stainless steel**</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (1 in)</td>
<td>25 (1 in)</td>
<td>6</td>
<td>590 (23.2)</td>
<td>40x⅜ in</td>
<td>22.6 (0.89)</td>
<td>69.5</td>
<td>103</td>
<td>62</td>
<td>317 / 444***</td>
<td>11 / 12***</td>
<td>14 / 15***</td>
</tr>
<tr>
<td>40 (1 ½ in)</td>
<td>40 (1 ½ in)</td>
<td>6</td>
<td>763 (30.0)</td>
<td>60x⅜ in</td>
<td>35.5 (1.40)</td>
<td>99</td>
<td>125</td>
<td>80</td>
<td>354 / 481***</td>
<td>27 / 28***</td>
<td>30 / 31***</td>
</tr>
<tr>
<td>50 (2 in)</td>
<td>50 (2 in)</td>
<td>6</td>
<td>740 (29.1)</td>
<td>70x⅜ in</td>
<td>48.5 (1.91)</td>
<td>(3.46)</td>
<td>4.92</td>
<td>(3.15)</td>
<td>(13.94 / 18.94)**</td>
<td>(60 / 62)**</td>
<td>(66 / 68)**</td>
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<tr>
<td>65 (2 ¼ in)</td>
<td>65 (2 ¼ in)</td>
<td>6</td>
<td>65 (2 ¼ in)</td>
<td>85x⅜ in</td>
<td>60.5 (2.38)</td>
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<tr>
<td>80 (3 in)</td>
<td>80 (3 in)</td>
<td>65 (2 ½ in)</td>
<td>990 (39.0)</td>
<td>85x⅜ in</td>
<td>60.5 (2.38)</td>
<td>155</td>
<td>183</td>
<td>123</td>
<td>445 / 572***</td>
<td>68 / 69***</td>
<td>71 / 72***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80 (3 in)</td>
<td>940 (37.0)</td>
<td>98x⅜ in</td>
<td>72.6 (2.86)</td>
<td>(6.10)</td>
<td>(7.20)</td>
<td>(4.84)</td>
<td>(17.52 / 22.52)**</td>
<td>(150 / 152)**</td>
<td>(157 / 159)**</td>
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</tbody>
</table>

* Devices with terminal boxes made from aluminum.
** Devices with terminal boxes made from stainless steel.
*** Devices with ‘Extended tower length’ option or ‘Pressure rating of sensor secondary housing’ option.
### Process connection in accordance with DIN 11851 meter tube nominal diameter DN 15 to 80 (⅛ to 3 in)

<table>
<thead>
<tr>
<th>Meter tube</th>
<th>Process connection</th>
<th>L Ø</th>
<th>DA Ø</th>
<th>Di Ø</th>
<th>A Ø</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>Approximate weight</th>
</tr>
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<tbody>
<tr>
<td>DN (⅛ in)</td>
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<tr>
<td>10 (⅛ in)</td>
<td>40</td>
<td>10</td>
<td>413</td>
<td>16.3</td>
<td>10</td>
<td>(0.39)</td>
<td>44.5</td>
<td>77</td>
<td>3.0346</td>
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<tr>
<td>35 (⅛ in)</td>
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<td></td>
<td></td>
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<tr>
<td>40 (⅛ in)</td>
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<tr>
<td>50 (⅛ in)</td>
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<tr>
<td>75 (⅛ in)</td>
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</tr>
</tbody>
</table>

### Process connection in accordance with DIN 32676 meter tube nominal diameter DN 15 to 80 (⅛ to 3 in)

<table>
<thead>
<tr>
<th>Meter tube</th>
<th>Process connection</th>
<th>L Ø</th>
<th>DA Ø</th>
<th>Di Ø</th>
<th>A Ø</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>Approximate weight</th>
</tr>
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<tbody>
<tr>
<td>DN (⅛ in)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 (⅛ in)</td>
<td>40</td>
<td>10</td>
<td>413</td>
<td>16.3</td>
<td>10</td>
<td>(0.39)</td>
<td>44.5</td>
<td>77</td>
<td>3.0346</td>
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<tr>
<td>15 (⅛ in)</td>
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</tr>
<tr>
<td>20 (⅛ in)</td>
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</tr>
<tr>
<td>25 (⅛ in)</td>
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<tr>
<td>35 (⅛ in)</td>
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</tr>
<tr>
<td>40 (⅛ in)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>50 (⅛ in)</td>
<td></td>
<td></td>
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<tr>
<td>75 (⅛ in)</td>
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<tr>
<td>100 (⅛ in)</td>
<td></td>
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</tr>
</tbody>
</table>

* Devices with terminal boxes made from aluminum.
** Devices with terminal boxes made from stainless steel.
*** Devices with ‘Extended tower length’ option or ‘Pressure rating of sensor secondary housing’ option.

Tolerance for dimension L: +0 / −3 mm (+0 / −0.018 in)
### Flowmeter sensor

Dimensions for sensors featuring meter tubes with nominal diameter DN 15 to 80 (½ to 3 in.) and process connection in accordance with ASME BPE

<table>
<thead>
<tr>
<th>Meter tube</th>
<th>Process connection</th>
<th>L Ø DA</th>
<th>Ø Di</th>
<th>Ø A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>Approximate weight</th>
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<tbody>
<tr>
<td>DN</td>
<td>DN</td>
<td>PN</td>
<td>Aluminum¹</td>
<td>Stainless steel²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 (½ in)</td>
<td>¼ in Type A</td>
<td>10</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>44.5</td>
<td>77 (3.03)</td>
<td>46 (1.81)</td>
</tr>
<tr>
<td></td>
<td>¼ in Type A</td>
<td>433 (17.05)</td>
<td>25 (0.98)</td>
<td>9.4 (0.37)</td>
<td>(1.75)</td>
<td>(10.94 / 15.94³)</td>
<td>(20 / 22³)</td>
<td>(27 / 29³)</td>
</tr>
<tr>
<td></td>
<td>¼ in Type A</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>25 (1 in)</td>
<td>¼ in Type A</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>69.5</td>
<td>103</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>1 in Type B</td>
<td>590 (23.23)</td>
<td>50.4 (1.98)</td>
<td>22.1 (0.87)</td>
<td>(2.74)</td>
<td>(4.06)</td>
<td>(2.44)</td>
<td>(12.48 / 17.48³)</td>
</tr>
<tr>
<td></td>
<td>1 ½ in Type B</td>
<td>590 (23.23)</td>
<td>50.4 (1.98)</td>
<td>34.8 (1.37)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>50 (2 in)</td>
<td>1 ½ in Type B</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>99 (3.86)</td>
<td>125</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>2 in Type B</td>
<td>740 (29.13)</td>
<td>63.9 (2.52)</td>
<td>47.5 (1.87)</td>
<td>(4.92)</td>
<td>(3.15)</td>
<td>(13.94 / 18.94³)</td>
<td>(60 / 62³)</td>
</tr>
<tr>
<td></td>
<td>2 ½ in Type B</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>80 (3 in)</td>
<td>2 ½ in Type B</td>
<td>950 (37.40)</td>
<td>77.4 (3.05)</td>
<td>60.2 (2.37)</td>
<td>155</td>
<td>183</td>
<td>183</td>
<td>445 / 572³</td>
</tr>
<tr>
<td></td>
<td>3 in Type B</td>
<td>910 (35.83)</td>
<td>90.9 (3.58)</td>
<td>72.9 (2.87)</td>
<td>(6.10)</td>
<td>(7.20)</td>
<td>(7.20)</td>
<td>(17.52 / 22.52³)</td>
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<tr>
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<td>4 in Type B</td>
<td>910 (35.83)</td>
<td>118.9 (4.68)</td>
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Process connection in accordance with DIN ISO 228 and ASME B 1.20.1, meter tube nominal diameter DN 15 to 80 (½ to 3 in)

<table>
<thead>
<tr>
<th>Meter tube</th>
<th>Process connection</th>
<th>L</th>
<th>GL⁴</th>
<th>WS⁵</th>
<th>SWL⁵</th>
<th>Ø A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>Approximate weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN</td>
<td>DN / G</td>
<td>PN</td>
<td>Aluminum¹</td>
<td>Stainless steel²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 (½ in)</td>
<td>8 (¼ in) / G ¼ in</td>
<td>100</td>
<td>450 (17.72)</td>
<td>10 (0.39)</td>
<td>19</td>
<td>10 (0.39)</td>
<td>44.5</td>
<td>77 (3.03)</td>
<td>46 (1.81)</td>
<td>278 / 405³</td>
</tr>
<tr>
<td></td>
<td>15 (¼ in) / G ½ in</td>
<td>–</td>
<td>13.5 (0.53)</td>
<td>27</td>
<td>15 (0.59)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>25 (1 in)</td>
<td>25 (1 in) / G 1 in</td>
<td>490 (19.29)</td>
<td>17 (0.67)</td>
<td>50</td>
<td>20 (0.79)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>15 (¼ in) / ½ in NPT</td>
<td>450 (17.72)</td>
<td>15.6 (0.61)</td>
<td>27</td>
<td>15 (0.59)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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</tr>
</tbody>
</table>

¹ Devices with terminal boxes made from aluminum.
² Devices with terminal boxes made from stainless steel.
³ Devices with 'Extended tower length' option or 'Pressure rating of sensor secondary housing' option.
⁴ Dimension GL: Provide thread length of female thread.
⁵ Dimension SW: Provide width across flats in mm, Dimension SWL: Provide length of wrench flats in mm.

Tolerance for dimension L: ±0 / −3 mm (+0 / −0.018 in)
**Sensor with wetted parts made from C4 or C22 nickel alloy**

For devices with wetted parts made from C4 or C22 nickel alloy, the installation length (L) is different from previous tables. All other dimensions and the weight are unchanged.

Dimensions in mm (in).

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

<table>
<thead>
<tr>
<th>Meter tube nominal diameter</th>
<th>Process connection</th>
<th>L (EN 1092-1 B1)</th>
<th>L (EN 1092-1 B2)</th>
<th>L (EN 1092-1 B2)</th>
<th>L (ASME)</th>
<th>L (ASME)</th>
<th>L (ASME)</th>
<th>L (JIS 10 K)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>PN 16</td>
<td>PN 40</td>
<td>PN 63</td>
<td>PN 100</td>
<td>CL150</td>
<td>CL300</td>
<td>CL600</td>
<td></td>
</tr>
<tr>
<td>DN 15 (½ in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DN 10 (¼ in)</td>
<td>449 (17.7)</td>
<td>449 (17.7)</td>
<td>449 (17.7)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>449 (17.7)</td>
</tr>
<tr>
<td></td>
<td>DN 15 (⅛ in)</td>
<td>442 (17.4)</td>
<td>442 (17.4)</td>
<td>442 (17.4)</td>
<td>442 (17.4)</td>
<td>442 (17.4)</td>
<td>442 (17.4)</td>
<td>442 (17.4)</td>
</tr>
<tr>
<td></td>
<td>DN 20 (⅛ in)</td>
<td>428 (16.9)</td>
<td>428 (16.9)</td>
<td>428 (16.9)</td>
<td>428 (16.9)</td>
<td>428 (16.9)</td>
<td>428 (16.9)</td>
<td>428 (16.9)</td>
</tr>
<tr>
<td></td>
<td>DN 25 (1 in)</td>
<td>646 (25.4)</td>
<td>646 (25.4)</td>
<td>646 (25.4)</td>
<td>646 (25.4)</td>
<td>646 (25.4)</td>
<td>646 (25.4)</td>
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<tr>
<td></td>
<td>DN 25 (1 in)</td>
<td>614 (24.2)</td>
<td>614 (24.2)</td>
<td>614 (24.2)</td>
<td>614 (24.2)</td>
<td>614 (24.2)</td>
<td>614 (24.2)</td>
<td>614 (24.2)</td>
</tr>
<tr>
<td></td>
<td>DN 40 (1/4 in)</td>
<td>576 (22.7)</td>
<td>576 (22.7)</td>
<td>576 (22.7)</td>
<td>576 (22.7)</td>
<td>576 (22.7)</td>
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<td>576 (22.7)</td>
</tr>
<tr>
<td>DN 50 (2 in)</td>
<td>DN 40 (1/4 in)</td>
<td>814 (32.0)</td>
<td>814 (32.0)</td>
<td>814 (32.0)</td>
<td>814 (32.0)</td>
<td>814 (32.0)</td>
<td>814 (32.0)</td>
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</tr>
<tr>
<td></td>
<td>DN 50 (2 in)</td>
<td>764 (30.1)</td>
<td>764 (30.1)</td>
<td>764 (30.1)</td>
<td>764 (30.1)</td>
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<tr>
<td></td>
<td>DN 65 (2¼ in)</td>
<td>819 (32.2)</td>
<td>819 (32.2)</td>
<td>819 (32.2)</td>
<td>792 (31.2)</td>
<td>792 (31.2)</td>
<td>792 (31.2)</td>
<td>819 (32.2)</td>
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<tr>
<td></td>
<td>DN 80 (3 in)</td>
<td>1021 (40.2)</td>
<td>1021 (40.2)</td>
<td>1021 (40.2)</td>
<td>1021 (40.2)</td>
<td>1021 (40.2)</td>
<td>1021 (40.2)</td>
<td>1021 (40.2)</td>
</tr>
<tr>
<td></td>
<td>DN 80 (3 in)</td>
<td>971 (38.2)</td>
<td>971 (38.2)</td>
<td>971 (38.2)</td>
<td>971 (38.2)</td>
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<td></td>
<td>DN 100 (4 in)</td>
<td>1357 (53.4)</td>
<td>1357 (53.4)</td>
<td>1357 (53.4)</td>
<td>1357 (53.4)</td>
<td>1357 (53.4)</td>
<td>1357 (53.4)</td>
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</tr>
<tr>
<td></td>
<td>DN 100 (4 in)</td>
<td>1280 (50.4)</td>
<td>1280 (50.4)</td>
<td>1280 (50.4)</td>
<td>1280 (50.4)</td>
<td>1280 (50.4)</td>
<td>1280 (50.4)</td>
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<tr>
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<td>DN 150 (6 in)</td>
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<td>1261 (49.6)</td>
<td>1261 (49.6)</td>
<td>1261 (49.6)</td>
<td>1261 (49.6)</td>
<td>1261 (49.6)</td>
<td>1261 (49.6)</td>
</tr>
<tr>
<td></td>
<td>DN 150 (6 in)</td>
<td>1552 (62.7)</td>
<td>1552 (62.7)</td>
<td>1632 (64.3)</td>
<td>1592 (62.7)</td>
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<td>DN 150 (6 in)</td>
<td>1502 (59.1)</td>
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<td>1502 (59.1)</td>
<td>1542 (60.7)</td>
<td>1542 (60.7)</td>
<td>1502 (59.1)</td>
</tr>
</tbody>
</table>

**L dimension tolerance:**

- Meter tube nominal diameter DN 15 to 50 (½ to 2 in): +0 / −3 mm (+0 / −0.018 in)
- Meter tube nominal diameter DN 80 (3 in): +0 / −5 mm (+0 / −0.2 in)
- Meter tube nominal diameter DN 100 to 150 (4 to 6 in): +0 / −8 mm (+0 / −0.31 in)
## Ordering Information

**Note**
For additional information on dependencies and restrictions, and for help on product selection, please refer to the Online Product Selection Assistant (PSA) at www.abb.us/flow-selector.

### CoriolisMaster FCB130, FCB150

| 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 (½ in) / DN 10 (⅜ in) | 01SE1 |
| DN 15 (½ in) / DN 15 (⅜ in) | 01SR0 |
| DN 15 (⅜ in) / DN 20 (¼ in) | 01SR1 |
| DN 25 (1 in) / DN 20 (¼ in) | 02SE1 |
| DN 25 (1 in) / DN 25 (1 in) | 02SR0 |
| DN 25 (1 in) / DN 40 (1½ in) | 02SR2 |
| DN 50 (2 in) / DN 40 (1½ in) | 05OE1 |
| DN 50 (2 in) / DN 50 (2 in) | 05OR0 |
| DN 50 (2 in) / DN 65 (2½ in) | 05OR1 |
| DN 80 (3 in) / DN 65 (2½ in) | 08OE1 |
| DN 80 (3 in) / DN 80 (3 in) | 08OR0 |
| DN 80 (3 in) / DN 100 (4 in) | 08OR1 |
| 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 |

Continuation see next page
### Base model

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### Process Connection Type

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<td>Flanges DIN PN 100</td>
<td>D6</td>
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<td>Flanges EN 1092-1 PN 40, NAMUR length (DN 15, DN 25, DN 50, DN 80)</td>
<td>S5</td>
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<td></td>
<td>Flanges EN 1092-1 PN 16, NAMUR length (DN 100, DN 150)</td>
<td>S7</td>
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<td></td>
<td>Flanges ANSI / ASME B16.5 Class 150</td>
<td>A1</td>
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<td>Flanges ANSI / ASME B16.5 Class 300</td>
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<td>Threaded hygienic connection SMS1145, for pipe according to DIN11866 series A</td>
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<td>Tri-Clamp acc. DIN 32676</td>
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<td>Tri-Clamp acc. BPE</td>
<td>T3</td>
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<td></td>
<td>Food industry fittings acc. DIN 11851</td>
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<td>Female NPT thread</td>
<td>N5</td>
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<td>Female G thread</td>
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### Material of Wetted Parts

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<tr>
<th>Type</th>
<th>Stainless steel</th>
<th>A1</th>
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<tr>
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<td>Ni-Alloy</td>
<td>C1*</td>
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### Flow Calibration

<table>
<thead>
<tr>
<th>Type</th>
<th>Flow forward ±0.40 % of flow rate, Gas 1 % of flow rate</th>
<th>A**</th>
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<tbody>
<tr>
<td></td>
<td>Flow forward ±0.25 % of flow rate, Gas 1 % of flow rate</td>
<td>B**</td>
</tr>
<tr>
<td></td>
<td>Flow forward ±0.15 % of flow rate, Gas 0.5 % of flow rate</td>
<td>C***</td>
</tr>
<tr>
<td></td>
<td>Flow forward ±0.10 % of flow rate, Gas 0.5 % of flow rate</td>
<td>D***</td>
</tr>
<tr>
<td></td>
<td>Flow forward ±0.20 % of flow rate, Gas 1 % of flow rate</td>
<td>E**</td>
</tr>
<tr>
<td></td>
<td>Flow forward / reverse ±0.40 % of flow rate, Gas 1 % of flow rate</td>
<td>J**</td>
</tr>
<tr>
<td></td>
<td>Flow forward / reverse ±0.25 % of flow rate, Gas 1 % of flow rate</td>
<td>K**</td>
</tr>
<tr>
<td></td>
<td>Flow forward / reverse ±0.15 % of flow rate, Gas 0.5 % of flow rate</td>
<td>L***</td>
</tr>
<tr>
<td></td>
<td>Flow forward / reverse ±0.10 % of flow rate, Gas 0.5 % of flow rate</td>
<td>M***</td>
</tr>
<tr>
<td></td>
<td>Flow forward / reverse ±0.20 % of flow rate, Gas 1 % of flow rate</td>
<td>N***</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>Z</td>
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### Density Calibration

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<th>Density 10 g/l</th>
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<td></td>
<td>Density 2 g/l</td>
<td>3***</td>
</tr>
<tr>
<td></td>
<td>Density 1 g/l</td>
<td>4***</td>
</tr>
<tr>
<td></td>
<td>Density 0.5 g/l</td>
<td>5***</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>9</td>
</tr>
</tbody>
</table>

* If the sensor wetted parts are Ni-Alloy based, parts of the sensor housing are Ni-Alloy  
** Only with CoriolisMaster FCB130  
*** Only with CoriolisMaster FCB150

Continuation see next page
… Flowmeter sensor

### Base model

<table>
<thead>
<tr>
<th>Model</th>
<th>Flowmeter sensor Base model</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CoriolisMaster FCB130 Coriolis Mass Flowmeter</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
</tr>
<tr>
<td>CoriolisMaster FCB150 Coriolis Mass Flowmeter</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
</tr>
</tbody>
</table>

### Connection Design / Transmitter Housing Type / Transmitter Housing Material / Cable Glands

<table>
<thead>
<tr>
<th>Design Type</th>
<th>Integral / Single compartment / Aluminum / 2 × M20 × 1,5</th>
<th>Integral / Single compartment / Aluminum / 2 × NPT ½ in</th>
<th>Integral / Single compartment / Stainless Steel / 2 × M20 × 1,5</th>
<th>Integral / Single compartment / Stainless Steel / 2 × NPT ½ in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>B1</td>
<td>B2</td>
<td>T1</td>
<td>T2</td>
</tr>
</tbody>
</table>

### Outputs

- MODBUS, 2 digital outputs (passive) M2

### Power Supply

- 11 to 30 V DC C

### Additional ordering information

<table>
<thead>
<tr>
<th>Model</th>
<th>Flowmeter sensor Base model</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CoriolisMaster FCB130 Coriolis Mass Flowmeter</td>
<td>XX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>CoriolisMaster FCB150 Coriolis Mass Flowmeter</td>
<td>XX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
</tbody>
</table>

### 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 (inclusive heat analysis) CR
- Others C2

### Ships Register Certifications

- DNVG CL1

### Custody Transfer Certification

- Custody transfer acc. MID (OIML) CM1*

### Special Operation Mode

- Standard + FillMass filling function N5*
- Standard + DensiMass concentration measurement N6*
- VeriMass - Meter verification N7

* Only with CoriolisMaster FCB150

Continuation see next page
### Additional ordering information

<table>
<thead>
<tr>
<th>Model</th>
<th>XX</th>
<th>XXX</th>
<th>XX</th>
<th>XXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoriolisMaster FCB130</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoriolisMaster FCB150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Documentation Language

<table>
<thead>
<tr>
<th>Language</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>German</td>
<td>M1</td>
</tr>
<tr>
<td>English</td>
<td>M5</td>
</tr>
<tr>
<td>Language package Western Europe / Scandinavia (Languages: DA, ES, FR, IT, NL, PT, FI, SV)</td>
<td>MW</td>
</tr>
<tr>
<td>Language package Eastern Europe (Languages: EL, CS, ET, LV, LT, HU, HR, PL, SK, SL, RO, BG)</td>
<td>ME</td>
</tr>
<tr>
<td>Others</td>
<td>MZ</td>
</tr>
</tbody>
</table>

### Pressure Rating of Sensor Secondary Containment

<table>
<thead>
<tr>
<th>Description</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum burst pressure 6 MPa / 60 bar / 870 psi inclusive tower length extension</td>
<td>PR5</td>
</tr>
<tr>
<td>Maximum burst pressure 10 MPa / 100 bar / 1450 psi inclusive tower length extension</td>
<td>PR6</td>
</tr>
<tr>
<td>Maximum burst pressure 15 MPa / 150 bar / 2175 psi inclusive tower length extension</td>
<td>PR7</td>
</tr>
</tbody>
</table>

### Device Identification Plate

<table>
<thead>
<tr>
<th>Description</th>
<th>T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless steel plate with TAG no.</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>TZ</td>
</tr>
</tbody>
</table>

### Extended Tower Length

| Description                                                      | TE  |
|                                                                |     |
| Tower length extension - meter insulation capability              | TE1 |
| Tower length extension - meter insulation capability with double sealing | TE2 |
| Tower length extension - short - insulation capability            | TE3 |

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCx1xx Local Operation Interface (LOI) adapter and cable</td>
<td>3KXS310000L0001</td>
</tr>
</tbody>
</table>
### Flowmeter sensor

**Note**

For additional information on dependencies and restrictions, and for help on product selection, please refer to the Online Product Selection Assistant (PSA) at www.abb.us/flow-selector.

**CoriolisMaster FCH130, FCH150**

<table>
<thead>
<tr>
<th>Base model</th>
<th>FCH130</th>
<th>XX</th>
<th>XXXX</th>
<th>XX</th>
<th>XX</th>
<th>X</th>
<th>X</th>
<th>XX</th>
<th>XX</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoriolisMaster FCH130 Coriolis Mass Flowmeter</td>
<td>FCH130</td>
<td>XX</td>
<td>XXXX</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
</tr>
<tr>
<td>CoriolisMaster FCH150 Coriolis Mass Flowmeter</td>
<td>FCH150</td>
<td>XX</td>
<td>XXXX</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
</tr>
</tbody>
</table>

**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 25 (1 in) / DN 20 (¾ in): 025E1
- DN 25 (1 in) / DN 25 (1 in): 025R0
- DN 25 (1 in) / DN 40 (1½ in): 025R2
- DN 50 (2 in) / DN 40 (1½ in): 050E1
- DN 50 (2 in) / DN 50 (2 in): 050R0
- DN 50 (2 in) / DN 65 (2½ in): 050R1
- DN 80 (3 in) / DN 65 (2½ 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. BPE: T3
- Food industry fittings acc. DIN 11851: F1
- Others: Z9

**Material of Wetted Parts**

- Stainless steel AISI 316L (L4404), polished: H2

Continuation see next page
# Base model

<table>
<thead>
<tr>
<th>Model</th>
<th>X</th>
<th>X</th>
<th>XX</th>
<th>XX</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoriolisMaster FCH130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoriolisMaster FCH150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Flow Calibration

<table>
<thead>
<tr>
<th>Calibration Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow forward ±0.40 % of flow rate, Gas 1 % of flow rate</td>
<td>A*</td>
</tr>
<tr>
<td>Flow forward ±0.25 % of flow rate, Gas 1 % of flow rate</td>
<td>B*</td>
</tr>
<tr>
<td>Flow forward ±0.15 % of flow rate, Gas 0.5 % of flow rate</td>
<td>C**</td>
</tr>
<tr>
<td>Flow forward ±0.10 % of flow rate, Gas 0.5 % of flow rate</td>
<td>D**</td>
</tr>
<tr>
<td>Flow forward ±0.20 % of flow rate, Gas 1 % of flow rate</td>
<td>E*</td>
</tr>
<tr>
<td>Flow forward / reverse ±0.40 % of flow rate, Gas 1 % of flow rate</td>
<td>J*</td>
</tr>
<tr>
<td>Flow forward / reverse ±0.25 % of flow rate, Gas 1 % of flow rate</td>
<td>K*</td>
</tr>
<tr>
<td>Flow forward / reverse ±0.15 % of flow rate, Gas 0.5 % of flow rate</td>
<td>L**</td>
</tr>
<tr>
<td>Flow forward / reverse ±0.10 % of flow rate, Gas 0.5 % of flow rate</td>
<td>M**</td>
</tr>
<tr>
<td>Flow forward / reverse ±0.20 % of flow rate, Gas 1 % of flow rate</td>
<td>N*</td>
</tr>
<tr>
<td>Others</td>
<td>Z</td>
</tr>
</tbody>
</table>

## Density Calibration

<table>
<thead>
<tr>
<th>Density</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 g/l</td>
<td>1*</td>
</tr>
<tr>
<td>2 g/l</td>
<td>3**</td>
</tr>
<tr>
<td>1 g/l</td>
<td>4**</td>
</tr>
<tr>
<td>0.5 g/l</td>
<td>5**</td>
</tr>
<tr>
<td>Others</td>
<td>9</td>
</tr>
</tbody>
</table>

## Connection Design / Transmitter Housing Type / Transmitter Housing Material / Cable Glands

<table>
<thead>
<tr>
<th>Design / Material / Glands</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integral / Single compartment / Aluminum / 2 х M20 x 1.5</td>
<td>B1</td>
</tr>
<tr>
<td>Integral / Single compartment / Aluminum / 2 х NPT ½ in.</td>
<td>B2</td>
</tr>
<tr>
<td>Integral / Single compartment / Stainless Steel / 2 х M20 x 1.5</td>
<td>T1</td>
</tr>
<tr>
<td>Integral / Single compartment / Stainless Steel / 2 х NPT ¼ in.</td>
<td>T2</td>
</tr>
</tbody>
</table>

## Outputs

- MODBUS, 2 digital outputs (passive)  

## Power Supply

- 11 to 30 V DC  

* Only with CoriolisMaster FCH130  
** Only with CoriolisMaster FCH150  

Continuation see next page
### Additional ordering information

<table>
<thead>
<tr>
<th>Description</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoriolisMaster FCH130 Coriolis Mass Flowmeter</td>
<td>XX</td>
</tr>
<tr>
<td>CoriolisMaster FCH150 Coriolis Mass Flowmeter</td>
<td>XX</td>
</tr>
</tbody>
</table>

#### 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 (inclusive heat analysis): CR
- Others: CZ

#### Hygienic Approval
- EHEDG: CWL*

#### Custody Transfer Certification
- Custody transfer acc. MID (OIML): CM1**

#### Special Operation Mode
- Standard + FillMass filling function: N5**
- Standard + DensiMass concentration measurement: N6**
- VeriMass - Meter verification: N7

#### Documentation Language
- German: M1
- English: M5
- Language package Western Europe / Scandinavia (Languages: DA, ES, FR, IT, NL, PT, FI, SV): MW
- Language package Eastern Europe (Languages: EL, CS, ET, LV, LT, HU, HR, PL, SK, SL, RO, BG): ME
- Others: MZ

#### Device Identification Plate
- Stainless steel plate with TAG no.: T1
- Others: T2

#### Extended Tower Length
- Tower length extension - meter insulation capability: TE1
- Tower length extension - meter insulation capability with double sealing: TE2

* EHEDG (optional), FDA-konform
** Only with CoriolisMaster FCH150

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCx1xx Local Operation Interface (LOI) adapter and cable</td>
<td>3KXS310000L0001</td>
</tr>
</tbody>
</table>
Use in potentially explosive atmospheres in accordance with 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

<table>
<thead>
<tr>
<th>Model number</th>
<th>Standard / No explosion protection</th>
<th>Zone 2, 21, 22</th>
<th>Zone 1, 21 (Zone 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCx1xx Y0</td>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Standard</td>
<td><img src="image4.png" alt="Diagram" /></td>
<td><img src="image5.png" alt="Diagram" /></td>
<td><img src="image6.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Zone 2, 21, 22</td>
<td><img src="image7.png" alt="Diagram" /></td>
<td><img src="image8.png" alt="Diagram" /></td>
<td><img src="image9.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Zone 1, 21</td>
<td><img src="image10.png" alt="Diagram" /></td>
<td><img src="image11.png" alt="Diagram" /></td>
<td><img src="image12.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Zone 0</td>
<td><img src="image13.png" alt="Diagram" /></td>
<td><img src="image14.png" alt="Diagram" /></td>
<td><img src="image15.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

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.

Model FCx1xx-A2... in Zone 2, 21, 22

ATEX
- FM 14 ATEX0017X
- II 3 G Ex ec mc IIC T6 ... T2 Gc
- FM 14 ATEX0016X
- II 2 D Ex tb IIIC T85°C ... Tmedium Db

IECEx
- IECEx FME 14.0003X
- Ex ec mc IIC T6 ... T2 Gc
- Ex tb IIIC T85°C ... Tmedium Db

Model FCx1xx-A1 in Zone 1, 21 (Zone 0)

ATEX
- FM 14 ATEX0016X
- II 1/2 G Ex eb ia mb IIC T6 ... T2 Ga/Gb
- II 2 D Ex ia tb IIIC T85°C ... Tmedium Db

IECEx
- IECEx FME 14.0003X
- Ex eb ia mb IIC T6 ... T2 Ga/Gb T_{medium, max}= 70°C
- Ex ia tb IIIC T85°C ... Tmedium Db

Temperature data

Temperature resistance for the connecting cable
The temperature at the cable entries of the device is dependent on the measuring medium temperature \( T_{medium} \) and the ambient temperature \( T_{amb} \).

For the electrical connection of the device, use only cables with sufficient temperature resistance in accordance with the table.

<table>
<thead>
<tr>
<th>Temperature resistance for the connecting cable</th>
<th>( T_{amb} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \leq 50 ^\circ C ) (( \leq 122 ^\circ F ))</td>
<td>( \geq 105 ^\circ C ) (( \geq 221 ^\circ F ))</td>
</tr>
<tr>
<td>( \leq 60 ^\circ C ) (( \leq 140 ^\circ F ))</td>
<td>( \geq 110 ^\circ C ) (( \geq 230 ^\circ F ))</td>
</tr>
<tr>
<td>( \leq 70 ^\circ C ) (( \leq 158 ^\circ F ))</td>
<td>( \geq 120 ^\circ C ) (( \geq 248 ^\circ F ))</td>
</tr>
</tbody>
</table>

From an ambient temperature of \( T_{amb} \geq 60 ^\circ C \) (\( \geq 140 ^\circ F \)) the wires in the terminal boxes must be additionally insulated using the enclosed silicone hoses.

Environmental and process conditions for model FCx1xx...

<table>
<thead>
<tr>
<th>Ambient temperature ( T_{amb} )</th>
<th>-20 to 70°C (-4 to 158^\circ F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( -40 to 70 ^\circ C ) ( -40 to 158 ^\circ F )</td>
<td>( -40 to 205 ^\circ C ) ( -40 to 400 ^\circ F )</td>
</tr>
<tr>
<td>Measuring medium temperature</td>
<td>( \leq 40 ) to 205°C</td>
</tr>
<tr>
<td>IP rating / NEMA rating</td>
<td>Type 4X</td>
</tr>
</tbody>
</table>

* Optional, with order code ‘Ambient temperature range – TA9’
… Use in potentially explosive atmospheres in accordance with ATEX and IECEx

Measuring medium temperature (Ex data) for model FCx1xx-A1... in Zone 1
The table shows the maximum permissible measuring medium temperature as a function of ambient temperature and temperature class.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature $T_{amb}$</th>
<th>$T_1$</th>
<th>$T_2$</th>
<th>$T_3$</th>
<th>$T_4$</th>
<th>$T_5$</th>
<th>$T_6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 °C (≤ 86 °F)</td>
<td>205 °C (400 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
</tr>
<tr>
<td>≤ 40 °C (≤ 104 °F)</td>
<td>205 °C (400 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
</tr>
<tr>
<td>≤ 50 °C (≤ 122 °F)</td>
<td>205 °C (400 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
</tr>
<tr>
<td>≤ 60 °C (≤ 140 °F)</td>
<td>205 °C (400 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
</tr>
<tr>
<td>≤ 70 °C (≤ 158 °F)</td>
<td>205 °C (400 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
</tr>
</tbody>
</table>

Measuring medium temperature (Ex data) for model FCx1xx-A2... in Zone 2
The table shows the maximum permissible measuring medium temperature as a function of ambient temperature and temperature class.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature $T_{amb}$</th>
<th>$T_1$</th>
<th>$T_2$</th>
<th>$T_3$</th>
<th>$T_4$</th>
<th>$T_5$</th>
<th>$T_6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 °C (≤ 86 °F)</td>
<td>195 °C (383 °F)*</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 °C (≤ 104 °F)</td>
<td>205 °C (400 °F)*</td>
<td>195 °C (383 °F)*</td>
<td>130 °C (266 °F)*</td>
<td>95 °C (203 °F)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 50 °C (≤ 122 °F)</td>
<td>205 °C (400 °F)*</td>
<td>195 °C (383 °F)*</td>
<td>130 °C (266 °F)*</td>
<td>95 °C (203 °F)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 60 °C (≤ 140 °F)</td>
<td>140 °C (284 °F)</td>
<td>130 °C (266 °F)*</td>
<td>95 °C (203 °F)*</td>
<td>80 °C (176 °F)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 70 °C (≤ 158 °F)</td>
<td>120 °C (248 °F)</td>
<td>130 °C (266 °F)*</td>
<td>95 °C (203 °F)*</td>
<td>80 °C (176 °F)*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Only with the ‘Extended tower length – TE1, TE2 or TE3’ order option

Measuring medium temperature (Ex data) for model FCx1xx-A1... in Zone 21 and FCx1xx-A2... in Zone 22
The table shows the maximum permissible measuring medium temperature as a function of ambient temperature and temperature class.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature $T_{amb}$</th>
<th>$T_{210}$ °C</th>
<th>$T_{200}$ °C</th>
<th>$T_{135}$ °C</th>
<th>$T_{100}$ °C</th>
<th>$T_{85}$ °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 °C (≤ 86 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 50 °C (≤ 122 °F)</td>
<td>140 °C (284 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>60 °C (140 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 60 °C (≤ 140 °F)</td>
<td>120 °C (248 °F)</td>
<td>120 °C (248 °F)</td>
<td>95 °C (203 °F)</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 70 °C (≤ 158 °F)</td>
<td>80 °C (176 °F)</td>
<td>80 °C (176 °F)</td>
<td>80 °C (176 °F)</td>
<td>—</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electrical data

Modbus outputs and digital outputs

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Operating values (general)</th>
<th>Operating values 'ec' (Zone 2)</th>
<th>Operating values 'eb' (Zone 1)</th>
<th>Type of protection “ia” (zone 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus, active</td>
<td>U_I [V] I_I [mA]</td>
<td>U_II [V] I_II [mA]</td>
<td>U_III [V] I_III [mA]</td>
<td>U_0 [V] I_0 [mA] P_0 [mW] C_0 [nF] C_0 pa [nF] L_0 [µH]</td>
</tr>
<tr>
<td>Terminals A / B</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Digital output DO1, passive</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Terminals 41 / 42</td>
<td></td>
<td></td>
<td></td>
<td>4,2</td>
</tr>
<tr>
<td>Digital output DO2, passive</td>
<td>30</td>
<td>25</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Terminals 51 / 52</td>
<td></td>
<td></td>
<td></td>
<td>4,2</td>
</tr>
</tbody>
</table>

All outputs are electrically isolated from each 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

Note

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

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

- Combining intrinsically safe and non-intrinsically safe circuits is not permitted.
- On intrinsically safe circuits, potential equalization should be established along the entire length of the cable used for the signal outputs.
- The rated voltage of the non-intrinsically safe circuits is U_M = 30 V.
- Intrinsic safety is preserved if the rated voltage U_M = 30 V is not up-scaled when connections are established to non-intrinsically safe external circuits.
- When changing the type of protection, the information in the corresponding chapter Changing the type of protection in operating instruction must be observed.
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

<table>
<thead>
<tr>
<th>Model number</th>
<th>Standard / No explosion protection</th>
<th>Class I Div. 2 Zone 2, 21</th>
<th>Class I Div. 1 Zone 0, 1, 20, 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCx1xx Y0</td>
<td></td>
<td>FCx1xx F2</td>
<td>FCx1xx F1</td>
</tr>
</tbody>
</table>

- Standard
- Class I Div. 2
- Class I Div. 1
- Zone 2, 21
- Zone 1, 21
- Zone 0, 20
**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.

### Model FCx1xx-F2... in Zone 2, Div. 2

**FM (marking US)**

FM16U50201X

Ni: CL I, DIV2, GPS ABCD, T6 ... T2
Ni: CL II, III, DIV2, GPS EFG, T6 ... T3B
DIP: CL II, Div 1, GPS EFG, T6 ... T3B
DIP: CL III, Div 1, 2, T6 ... T3B
CL I, ZN 2, AEx ec IIC T6 ... T2 Gc
ZN 21 AEx tb IIC T85°C ... T165°C Db

See Instructions for temperature class information

**FM (marking Canada)**

FM16CA0104X

Ni: CL I, DIV2, GPS ABCD, T6 ... T2
Ni: CL II, III, DIV2, GPS EFG, T6 ... T3B
DIP: CL II, Div 1, GPS EFG, T6 ... T3B
DIP: CL III, Div 1, 2, T6 ... T3B
Ex ec IIC T6 ... T2 Gc

See Instructions for temperature class information

### Model FCx1xx-F1... in Zone 1, Div. 1

**FM (marking US)**

FM16U50201X

XP-IS: CL I, Div 1, GPS BCD, T6 ... T2
DIP: CL II, Div 1, GPS EFG, T6 ... T3B
DIP: CL III, Div 1, 2, T6 ... T3B
CL I, ZN 1, AEx db ia IIB+H2 T6 ... T2 Ga/Gb
ZN 21 AEx ia tb IIC T85°C to T165°C Db

See Instructions for temperature class information and Installation Drawing No. 3KXF000014G0009

**FM (marking Canada)**

FM16CA0104X

XP-IS: CL I, Div 1, GPS BCD, T6 ... T2
DIP: CL II, Div 1, GPS EFG, T6 ... T2
DIP: CL III, Div 1, 2, T6 ... T3B
Ex db ia IIB+H2 T6 ... T2 Gb
Ex ia INTRINSICALLY SAFE SECURITE INTRINSEQUE

See Instructions for temperature class information and Installation Drawing No. 3KXF000014G0009
... Use in potentially explosive atmospheres in accordance with cFMus

Temperature data

Temperature resistance for the connecting cable
The temperature at the cable entries of the device is dependent on the measuring medium temperature $T_{\text{medium}}$ and the ambient temperature $T_{\text{amb}}$.

For the electrical connection of the device, use only cables with sufficient temperature resistance in accordance with the table.

<table>
<thead>
<tr>
<th>$T_{\text{amb}}$</th>
<th>Temperature resistance for the connecting cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq 50 , ^\circ \text{C}$ ($\leq 122 , ^\circ \text{F}$)</td>
<td>$\geq 105 , ^\circ \text{C}$ ($\geq 221 , ^\circ \text{F}$)</td>
</tr>
<tr>
<td>$\leq 60 , ^\circ \text{C}$ ($\leq 140 , ^\circ \text{F}$)</td>
<td>$\geq 110 , ^\circ \text{C}$ ($\geq 230 , ^\circ \text{F}$)</td>
</tr>
<tr>
<td>$\leq 70 , ^\circ \text{C}$ ($\leq 158 , ^\circ \text{F}$)</td>
<td>$\geq 120 , ^\circ \text{C}$ ($\geq 248 , ^\circ \text{F}$)</td>
</tr>
</tbody>
</table>

From an ambient temperature of $T_{\text{amb}} \geq 60 \, ^\circ \text{C}$ ($\geq 140 \, ^\circ \text{F}$) the wires in the terminal boxes must be additionally insulated using the enclosed silicone hoses.

Environmental and process conditions for model FCx1xx...

<table>
<thead>
<tr>
<th>Ambient temperature $T_{\text{amb}}$.</th>
<th>-20 to 70 °C ($-4$ to 158 °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring medium temperature $T_{\text{medium}}$.</td>
<td>-40 to 205 °C ($-40$ to 400 °F)</td>
</tr>
<tr>
<td>IP rating / NEMA rating</td>
<td>IP 65, IP 67 / NEMA 4X, Type 4X</td>
</tr>
</tbody>
</table>

* Optional, with order code ‘Ambient temperature range – TA9’
Measuring medium temperature (Ex data) for model FCx1xx-F1… in Class I Div. 1, Class I Zone 1
The table shows the maximum permissible measuring medium temperature as a function of ambient temperature and temperature class.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Tamb.</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 °C (≤ 86 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 °C (≤ 104 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 50 °C (≤ 122 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 60 °C (≤ 140 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 70 °C (≤ 158 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Only with the 'Extended tower length – TE1, TE2 or TE3' order option

Measuring medium temperature (Ex data) for model FCx1xx-F2… in Class I Div. 2, Class I Zone 2
The table shows the maximum permissible measuring medium temperature as a function of ambient temperature and temperature class.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Tamb.</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 °C (≤ 86 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 40 °C (≤ 104 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 50 °C (≤ 122 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 60 °C (≤ 140 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 70 °C (≤ 158 °F)</td>
<td>205 °C (400 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Measuring medium temperature (Ex data) for model FCx1xx-F1… in Zone 21, Class II / III and FCx1xx-F2… in Zone 22, Class II / III
The table shows the maximum permissible measuring medium temperature as a function of ambient temperature and temperature class.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Tamb.</th>
<th>T210 °C</th>
<th>T200 °C</th>
<th>T135 °C</th>
<th>T100 °C</th>
<th>T85 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 °C (≤ 86 °F)</td>
<td>195 °C (383 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>80 °C (176 °F)</td>
<td>80 °C (176 °F)</td>
<td></td>
</tr>
<tr>
<td>≤ 40 °C (≤ 104 °F)</td>
<td>140 °C (284 °F)</td>
<td>130 °C (266 °F)</td>
<td>95 °C (203 °F)</td>
<td>60 °C (140 °F)</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>≤ 50 °C (≤ 122 °F)</td>
<td>120 °C (248 °F)</td>
<td>120 °C (248 °F)</td>
<td>95 °C (203 °F)</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>≤ 60 °C (≤ 140 °F)</td>
<td>80 °C (176 °F)</td>
<td>80 °C (176 °F)</td>
<td>80 °C (176 °F)</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>≤ 70 °C (≤ 158 °F)</td>
<td>80 °C (176 °F)</td>
<td>80 °C (176 °F)</td>
<td>80 °C (176 °F)</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>
... Use in potentially explosive atmospheres in accordance with cFMus

### Electrical data

**Modbus outputs and digital outputs**

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Model: FCx1xx-F1…, FCx1xx-F2…</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating values</strong></td>
<td><strong>Type of protection</strong></td>
</tr>
<tr>
<td>(general)</td>
<td>(Div. 2, Zone 2)</td>
</tr>
<tr>
<td>NI</td>
<td>(Div. 1, Zone 1)</td>
</tr>
<tr>
<td>XP</td>
<td>(Div. 1, Zone 1)</td>
</tr>
<tr>
<td>IS</td>
<td>(Div. 1, Zone 1)</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td><strong>U_O [V]</strong></td>
</tr>
<tr>
<td><strong>I_O [mA]</strong></td>
<td><strong>P_O [mW]</strong></td>
</tr>
<tr>
<td><strong>C_O [nF]</strong></td>
<td><strong>C_O pa [nF]</strong></td>
</tr>
<tr>
<td><strong>L_O [µH]</strong></td>
<td></td>
</tr>
<tr>
<td>Modbus, active</td>
<td>4,2</td>
</tr>
<tr>
<td>Terminals A / B</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>13900</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Digital output DO1, passive</td>
<td>4,2</td>
</tr>
<tr>
<td>Terminals 41 / 42</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>13900</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Digital output DO2, passive</td>
<td>4,2</td>
</tr>
<tr>
<td>Terminals 51 / 52</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>13900</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

All outputs are electrically isolated from each 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

#### Note

If the protective earth (PE) is connected in the flowmeter's terminal box, you must ensure that no dangerous potential difference can arise between the protective earth (PE) and the potential equalization (PA) in areas with explosion risk. The output circuits are designed so that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits.

- Combining intrinsically safe and non-intrinsically safe circuits is not permitted.
- On intrinsically safe circuits, potential equalization should be established along the entire length of the cable used for the signal outputs.
- The rated voltage of the non-intrinsically safe circuits is $U_M = 30$ V.
- Intrinsic safety is preserved if the rated voltage $U_M = 30$ V is not up-scaled when connections are established to non-intrinsically safe external circuits.
- When changing the type of protection, the information in the corresponding chapter Changing the type of protection in operating instruction must be observed.
# Questionnaire

<table>
<thead>
<tr>
<th>Customer:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms. / Mr.:</td>
<td>Department:</td>
</tr>
<tr>
<td>Telephone:</td>
<td>Fax:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring medium</th>
<th>Liquid content:</th>
<th>Gas content:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate:</td>
<td>kg/h</td>
<td></td>
</tr>
<tr>
<td>(min., max., operating point)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density:</td>
<td>kg/m³</td>
<td></td>
</tr>
<tr>
<td>(min., max., operating point)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic viscosity:</td>
<td>mPas/cP</td>
<td></td>
</tr>
<tr>
<td>(min., max., operating point)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring medium temperature:</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>(min., max., operating point)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

| Pressure: | bar |
| (min., max., operating point) |

| Rate of flow: | | |
|---------------|---------------|
| ☐ Steady | ☐ Pulsating |

<table>
<thead>
<tr>
<th>Batch operation:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
</tbody>
</table>

| Concentration calculation: | | |
|-----------------------------|-----------------------------|
| ☐ Yes | ☐ No |

| Transmitter design: | | |
|---------------------|---------------------|
| ☐ Integral mount design | ☐ Remote mount design |

| Explosion protection: | | |
|-----------------------|-----------------------|
| ☐ Yes | ☐ No |

| Power supply: | 11 to 30 V DC |

<table>
<thead>
<tr>
<th>Electrical outputs:</th>
<th>Communication:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Pulse output, passive</td>
<td>☐ Modbus-RTU, RS 485</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional specifications:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline diameter:</td>
<td>…………………mm</td>
</tr>
<tr>
<td>Process connection:</td>
<td>…………………</td>
</tr>
</tbody>
</table>

Trademarks
Modbus is a registered trademark of the Modbus Organization
Hastelloy C-4 is a trademark of Haynes International
Hastelloy C-22 is a trademark of Haynes International
Windows is a registered trademark of Microsoft Corporation.
Measurement made easy
Compact device for high-precision measurement of mass and volume flow, density, temperature and concentration with just one device

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
• Lower pressure loss, self-draining
• Global approvals for explosion protection
• MID / OIML approval for legal metrology

Integrated VeriMass device verification and diagnosis
• Predictive maintenance in the process
• Extended maintenance cycles • Reduced maintenance effort

CoriolisMaster Software Tools
• DensiMass for concentration measurements, net mass and volume flow calculations
• FillMass for filling applications

CoriolisMaster FCH100
• For hygienic applications