Commissioning Instruction CI/FCB300/FCH300-EN Rev. F

CoriolisMaster FCB330, FCB350, FCH330, FCH350
Coriolis Mass Flowmeter

Measurement made easy

Power and productivity
for a better world™

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Coriolis Mass Flowmeter

Commissioning Instruction - EN
CI/FCB300/FCH300-EN

Rev. F
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Translation of the original instruction

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Contents

1 Safety

1.1 General information and notes for the reader

You must read these instructions carefully prior to installing and commissioning the device.
These instructions are an important part of the product and must be kept for future reference.
These instructions are intended as an overview and do not contain detailed information on all designs for this product or every possible aspect of installation, operation and maintenance.
For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.
The content of these instructions is neither part of any previous or existing agreement, promise or legal relationship nor is it intended to change the same.
This product is built based on state-of-the-art technology and is operationally safe. It has been tested and left the factory in perfect working order from a safety perspective. The information in the manual must be observed and followed in order to maintain this state throughout the period of operation.
Modifications and repairs to the product may only be performed if expressly permitted by these instructions.
Only by observing all of the safety instructions and all safety / warning symbols in these instructions can optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device, be ensured.
Information and symbols directly on the product must be observed. They may not be removed and must be fully legible at all times.

1.2 Intended use

This device is intended for the following uses:
- To convey liquids and gases (including unstable liquids and gases)
- To meter mass flow directly
- To meter volumetric flow (indirectly via mass flow and density)
- To measure the density of the liquid or gas
- To measure the temperature of the liquid or gas

Using these products as intended involves observing the following points:
- Read and follow the instructions in this manual
- Observe the technical ratings (refer to the “Technical limit values” section)
- Use only approved media for measurement (refer to the “Permissible media for measurement” section)

1.3 Improper use

The following are considered to be instances of improper use of the device:
- Operation as a flexible adapter in piping, e.g., to compensate for pipe offsets, pipe vibrations, pipe expansions, etc.
- Use as a climbing aid, e.g., for mounting purposes
- Use as a support for external loads, e.g., as a support for piping, etc.
- Addition of material, e.g., by painting over the name plate or welding/soldering on parts
- Removal of material, e.g., by spot drilling the housing

1.4 Target groups and qualifications

Installation, commissioning and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator to do so. The specialist personnel must have read and understood the manual and comply with its instructions.
The operators must strictly observe the applicable national regulations with regards to installation, function tests, repairs, and maintenance of electrical products.

1.5 Plates and symbols

1.5.1 Safety / warning symbols, note symbols

DANGER – Serious damage to health / risk to life

This symbol in conjunction with the signal word "DANGER" indicates an imminent danger. Failure to observe this safety information will result in death or severe injury.

DANGER – Serious damage to health / risk to life

This symbol in conjunction with the signal word "DANGER" indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.

WARNING – Bodily injury

This symbol in conjunction with the signal word "WARNING" indicates a potentially dangerous situation. Failure to observe this safety information may result in death or severe injury.

WARNING – Bodily injury

This symbol in conjunction with the signal word "WARNING" indicates a potential electrical hazard. Failure to observe this safety information may result in death or severe injury.

CAUTION – Minor injuries

This symbol in conjunction with the signal word "CAUTION" indicates a potentially dangerous situation. Failure to observe this safety information may result in minor or moderate injury. The symbol may also be used for property damage warnings.

NOTICE – Property damage

This symbol indicates a potentially damaging situation.

Failure to observe this safety information may result in damage to or destruction of the product and / or other system components.

IMPORTANT (NOTE)

This symbol indicates operator tips, particularly useful information, or important information about the product or its further uses. The signal word "IMPORTANT (NOTE)" does not indicate a dangerous or harmful situation.

1.5.2 Name plate

IMPORTANT (NOTE)

The name plates shown here are only examples. The name plates attached to the device may be different to what you see here.

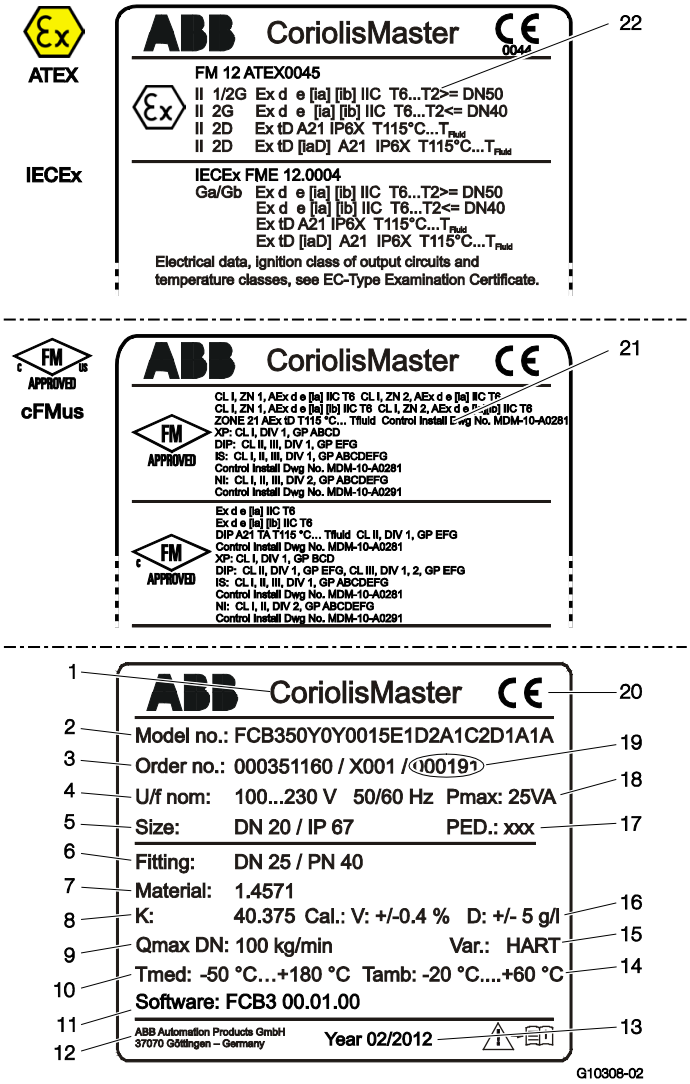


Fig. 1: Flowmeter sensor, integral mount design (example)
1 Full designation | 2 Order code | 3 Order number |
4 Power supply | 5 Nominal diameter / Degree of protection |
6 Process connection / Pressure rating | 7 Meter tube material |
8 Calibration factor | 9 Maximum flow rate |
10 Medium temperature range | 11 Software version |
12 Manufacturer | 13 Year of construction (month / year) |
14 Ambient temperature range | 15 Communication |
16 Calibration accuracy | 17 PED mark |
18 Maximum power consumption | 19 Serial number of sensor |
20 CE mark | 21 Ex approval cFMus | 22 Ex approval ATEX / IECEx

1.6 Transport safety instructions

Observe the following instructions:

- Do not expose the device to moisture during transport. Pack the device accordingly.
- Pack the device so that it is protected against vibrations during transport, e.g., by using air-cushioned packaging.
- Depending on the device, the center of gravity may not be in the center of the equipment.

1.7 Installation safety instructions

Prior to installation, check the devices for possible damage that may have occurred as a result of improper transport. Details of any damage that has occurred in transit must be recorded on the transport documents. All claims for damages must be submitted to the shipper without delay and before installation.

- The flow direction must correspond to the direction indicated on the meter (if labeled).
- The maximum torque must not be exceeded for all flange connections.
- The meters must be installed without mechanical tension (torsion, bending).
- Install flange devices with coplanar counter flanges.
- Equipment must only be installed for the intended operating conditions and with suitable gaskets.
- Flange bolts and nuts must be secured to provide protection against pipeline vibrations.

1.8 Safety instructions for electrical installation

The electrical connection may only be established by authorized specialist personnel and in accordance with the connection diagrams.
The electrical connection information in the manual must be observed; otherwise, the type of electrical protection may be adversely affected.
Ground the measurement system according to requirements.

1.9 Safety instructions for operation

Before switching on the device, make sure that your installation complies with the environmental conditions listed in the chapter “Technical Data” or on the data sheet.
If there is a chance that safe operation is no longer possible, take the device out of operation and secure it against unintended startup.

During operation with hot media, contact with the surface may result in burns.
Aggressive media may result in corrosion and abrasion of the parts that come into contact with the medium. As a result, pressurized media may escape prematurely.
Wear to the flange gasket or process connection gaskets (e.g., aseptic threaded pipe connections, Tri-Clamp, etc.) may enable a pressurized medium to escape.
When using internal flat gaskets, these can become embrittled through CIP/SIP processes.

WARNING – Risk of poisoning!
Bacteria and chemical substances can contaminate or pollute pipeline systems and the materials they are made of.
Observe the following instructions in installations conforming to EHEDG requirements.

- EHEDG certification requires a self draining installation, only possible with a vertical installation.
- In order to achieve compliance with EHEDG requirements, the combination of process connection and gaskets selected by the operator must consist solely of EHEDG-compliant parts. Note the information in the latest version of the following document: EHEDG Position Paper: "Hygienic process connections to use with hygienic components and equipment".

1.10 Technical limit values

The meter has been designed for use exclusively within the values stated on the name plate and within the technical limit values specified on the data sheets.
The following technical limit values must be observed:

- The permissible pressure (PS) and the permissible fluid temperature (TS) must not exceed the pressure/temperature ratings (refer to the "Specifications" section).
- The maximum and minimum operating temperature limits must not be exceeded or undershot.
- The permissible ambient temperature must not be exceeded.
- The housing's degree of protection must be observed during operation.
- The flowmeter sensor must not be operated in the vicinity of powerful electromagnetic fields, e.g., motors, pumps, transformers, etc. A minimum spacing of approx. 1 m (3.28 ft) must be maintained. For installation on steel parts (e.g., steel brackets), a minimum spacing of 100 mm (4") must be maintained. (These values have been calculated on the basis of IEC 801-2 and IEC TC77B.)

1.11 Permissible media for measurement

When using media for measurement, please note:

- Media may only be used if, based on the state of the art or the operating experience of the user, it can be assured that chemical and physical properties of the transmitter wetted parts will not be adversely affected during the operating period.
- Media containing chloride in particular can cause corrosion damage to stainless steels which, although not visible externally, can damage wetted parts beyond repair and lead to the medium for measurement escaping. It is the operator's responsibility to check the suitability of these materials for the application at hand.
- Media with unknown properties or abrasive media may only be used if the operator can perform regular and suitable tests to ensure the safe condition of the meter.
- Follow the instructions on the name plate.

1.12 Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.
Include the return form once it has been properly filled out (see appendix in operating instructions) with the device.
According to the EU Directive governing hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes: All devices delivered to ABB must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Please contact Customer Center Service acc. to page 1 for nearest service location.

1.13 Integrated management system

ABB Automation Products GmbH operates an integrated management system, consisting of:

- Quality management system to ISO 9001:2008
- Environmental management system to ISO 14001:2004
- Occupational health and safety management system to BS OHSAS 18001:2007 and
- Data and information protection management system

Environmental awareness is an important part of our company policy.
Our products and solutions are intended to have minimum impact on the environment and on people during manufacturing, storage, transport, use, and disposal.
This includes the environmentally-friendly use of natural resources. We conduct an open dialog with the public through our publications.

1.14 Disposal

This product is manufactured from materials that can be recycled by specialist recycling companies.

1.14.1 Information on WEEE Directive 2002/96/EC (Waste Electrical and Electronic Equipment)

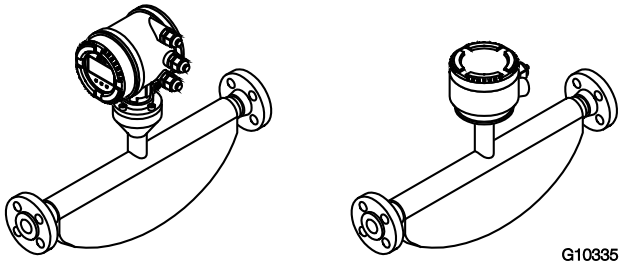
This product is not subject to WEEE Directive 2002/96/EC or relevant national laws (e.g., ElektroG in Germany).
The product must be disposed of at a specialist recycling facility. Do not use municipal garbage collection points.
According to the WEEE Directive 2002/96/EC, only products used in private applications may be disposed of at municipal garbage collection points. Proper disposal prevents negative effects on people and the environment, and supports the reuse of valuable raw materials.
If it is not possible to dispose of old equipment properly, ABB Service can accept and dispose of returns for a fee.

1.14.2 RoHS Directive 2002/95/EC

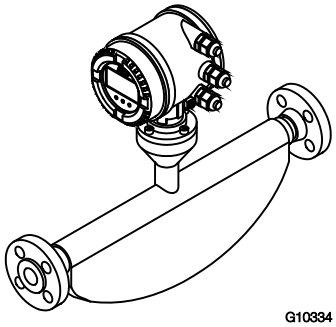
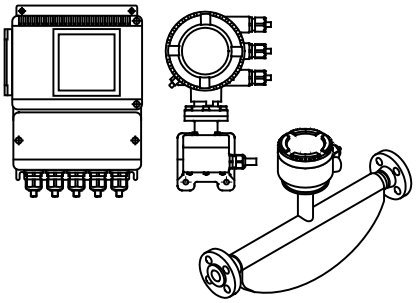
With the Electrical and Electronic Equipment Act (ElektroG) in Germany, the European Directives 2002/96/EC (WEEE) and 2002/95/EC (RoHS) are translated into national law. ElektroG defines the products that are subject to regulated collection and disposal or reuse in the event of disposal or at the end of their service life. ElektroG also prohibits the marketing of electrical and electronic equipment that contains certain amounts of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) (also known as hazardous substances with restricted uses).
The products provided by ABB Automation Products GmbH do not fall within the current scope of regulations on hazardous substances with restricted uses or the directive on waste electrical and electronic equipment according to ElektroG. If the necessary components are available on the market at the right time, in the future these substances will no longer be used in new product development.

2 Overview of flowmeter sensor and transmitter designs

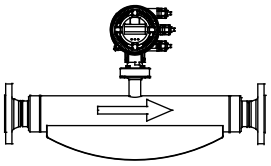
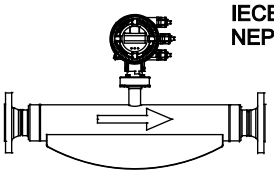
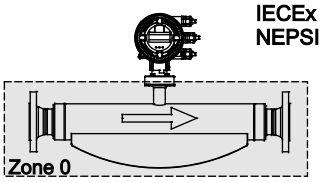
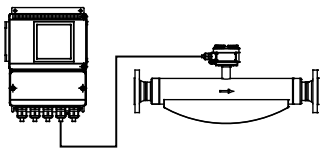
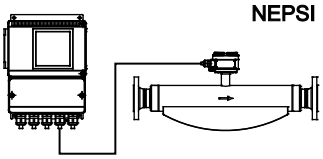
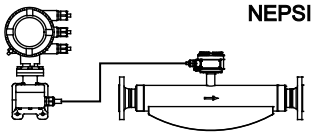
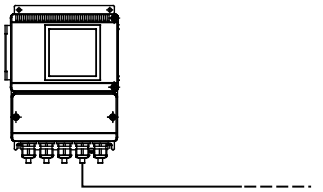
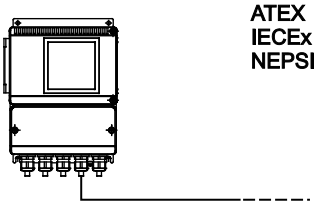
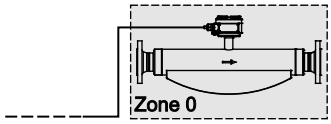
2.1 General remarks

	FCB3xx and FCH3xx flowmeter sensor (integral mount design)			
	 G10335			
Model number	FCB300 for standard applications		FCH300 for hygienic applications	
Process connections				
— Flange DIN 2501 / EN 1092-1	DN 10 … 200, PN 40 … 100		-	
— Flange ASME B16.5	DN 1/4“ … 8“ PN CL150 … CL600		-	
— Threaded pipe connection DIN 11851	DN 10 … 100 (1/4“ … 4“)		DN 25 … 80 (1“ … 3“)	
— Tri-Clamp	DIN 32676 (ISO 2852) BPE Tri-Clamp DN 10 … 100 (1/4“ … 4“)		DIN 32676 (ISO 2852) BPE Tri-Clamp DN 20 … 100 (3/4“ … 4“)	
— Other connections	On request		On request	
Wetted materials	Stainless steel Nickel-Alloy C4 / C22		Stainless steel, polished 1.4404 (AISI 316L) or 1.4435 (AISI 316L)	
Degree of protection acc. to EN 60529	IP 65 / 67, NEMA 4X		IP 65 / 67, NEMA 4X	
Approvals and certificates				
— Explosion protection ATEX / IECEx	Zone 0, 1, 2, 21, 22		Zone 0, 1, 2, 21, 22	
— Explosion protection cFMus	Class I Div. 1, Class I Div. 2, Zone 0, 1, 2, 20, 21		Class I Div. 1, Class I Div. 2, Zone 0, 1, 2, 20, 21	
— Explosion protection NEPSI	Zone 0, 1, 2, 21, 22		Zone 0, 1, 2, 21, 22	
— Hygienic and sterile requirements	-		EHEDG, FDA	
— Other approvals	On request			
Enclosure	Integral mount design, remote mount design			
Measuring accuracy for liquids	FCB330	FCB350	FCH330	FCH350
— Mass flow [1]	0,4 % and 0,25 %	0,1 % and 0,15 %	0,4 % and 0,25 %	0,1 % and 0,15 %
— Volume flow [1]	0,4 % and 0,25 %	0,15 %	0,4 % and 0,25 %	0,15 %
— Density	0,01 kg/l	— 0,002 kg/l — 0,001 kg/l (option) — 0,0005 kg/l [2]	0,01 kg/l	— 0,002 kg/l — 0,001 kg/l (option) — 0,0005 kg/l [2]
— Temperature	1 K	0,5 K	1 K	0,5 K
Measuring accuracy for gases [1]	1 %	0,5 %	1 %	0,5 %
Permissible temperature of the medium being measured	-50 … 160 °C (-58 … 320 °F)	-50 … 200 °C (-58 … 392 °F)	-50 … 160 °C (-58 … 320 °F)	-50 … 200 °C (-58 … 392 °F)

1) Stated measuring accuracy in % of rate (% o. r.)
2) Measuring accuracy following on-site calibration under operating conditions

	FCTxxx transmitter	
	 G10334	 G10846
Enclosure	Integral mount design	Remote mount design
Cable length	Maximum 10 m (33 ft), remote mount design only	
Power supply	100 … 230 V AC, 24 V AC/DC	
Current output	Current output 1: 0/4 … 20 mA active or 4 … 20 mA passive Current output 2: 4 ... 20 mA passive	
Pulse output	Active (not Zone 1 / Div. 1) or passive	
External output zero return	Yes	
External totalizer reset	Yes	
Forward / reverse flow metering	Yes	
Communication	HART protocol	
Empty pipe detection	Yes, based on preconfigured density alarm < 0.5 kg/l	
Self-monitoring and diagnostics	Yes	
Local display / totalization	Yes	
Field optimization for flow and density	Yes	
Degree of protection acc. to EN 60529	Integral mount design: IP 65/IP 67, NEMA 4X Remote mount design: IP 67, NEMA 4X	

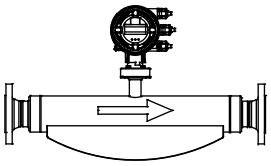
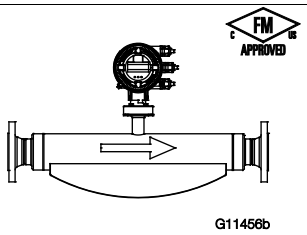
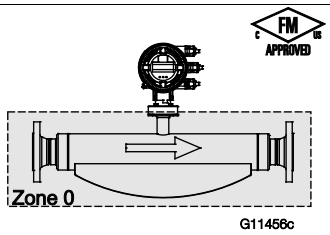
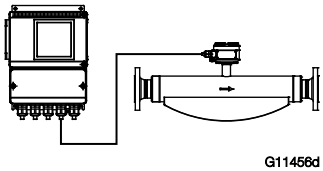
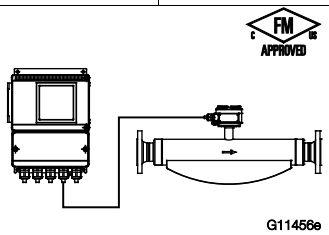
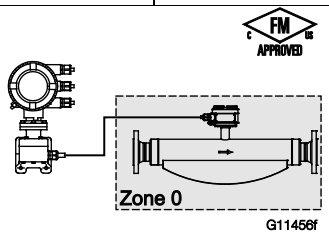
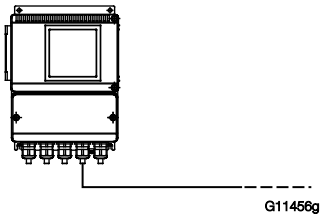
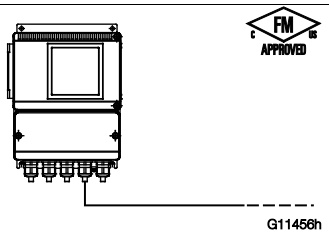
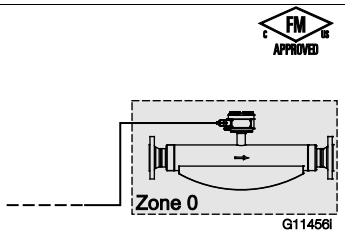
2.2 ATEX / IECEx / NEPSI device overview

	Standard / No explosion protection		Zone 2, 21, 22		Zone 1, 21 (Zone 0)	
Model number	**FCx3xx Y0**		**FCx3xx A2, S2**		**FCx3xx A1, S1**	
Integral mount design — Standard — Zone 2, 21, 22 — Zone 1, 21 — Zone 0	 G11455-01a		ATEX IECEx NEPSI  G11455-01b		ATEX IECEx NEPSI  G11455-01c	
Model number	**FCT3xx Y0**	**FCx3xx Y0**	**FCT3xx A2**	**FCT3xx Y0**	**FCx3xx Y0**	**FCT3xx A2**
Remote mount design Transmitter and flowmeter sensor — Standard — Zone 2, 21, 22 — Zone 1, 21 — Zone 0	 G11455-01d		ATEX IECEx NEPSI  G11455-01e		 G11455-01f	
Model number	**FCT3xx Y0**		**FCT3xx A2**		**FCx3xx A1, S1**	
Remote mount design Transmitter — Standard — Zone 2, 21, 22 Flowmeter sensor — Zone 1, 21 — Zone 0	 G11455-01g		ATEX IECEx NEPSI  G11455-01h		ATEX IECEx NEPSI  G11455-01i	

IMPORTANT (NOTE)

Detials can be found in chapter „Ex relevant specifications acc. to ATEX / IECEx / NEPSI“ or in the respective certificate.

2.3 cFMus device overview

	Standard / No explosion protection		Class I Div. 2 Zone 2, 21		Class I Div. 1 Zone 0, 1, 20 ,21	
Model number	**FCx3xx Y0**		**FCx3xx F2**		**FCx3xx F1**	
Integral mount design — Standard — Class I Div. 2 — Class I Div. 1 — Zone 2, 21 — Zone 1, 21 — Zone 0, 20						
Model number	**FCT3xx Y0**	**FCx3xx Y0**	**FCT3xx F2**	**FCT3xx Y0**	**FCx3xx Y0**	**FCT3xx F2**
Remote mount design Transmitter and flowmeter sensor — Standard — Class I Div. 2 — Class I Div. 1 — Zone 2, 21 — Zone 1, 21 — Zone 0, 20						
Model number	**FCT3xx Y0**		**FCT3xx F2**		**FCx3xx F1**	
Remote mount design Transmitter — Standard — Class I Div. 2 — Zone 2, 21 Flowmeter sensor — Class I Div. 1 — Zone 1, 21 — Zone 0, 20						

IMPORTANT (NOTE)

Details can be found in chapter „Ex relevant specifications acc. to cFMus“ or in the respective certificate.

3 Transport

3.1 Inspection

Check the devices immediately after unpacking for possible damage that may have occurred from improper transport. Details of any damage that has occurred in transit must be recorded on the transport documents.
All claims for damages must be submitted to the shipper without delay and before installation.

3.2 General remarks

Observe the following when transporting the device to the measurement site:

— The center of gravity is off center.
— Flange devices may not be lifted by the transmitter housing or terminal box.

4 Mounting

4.1 General remarks

The following points must be observed during installation:

— The flow direction must correspond to the marking, if there is one.
— The maximum torque for all flange connections must be complied with.
— The meters must be installed without mechanical tension (torsion, bending).
— Install flange and wafer type devices with coplanar counter flanges and use only appropriate gaskets.
— Use only gaskets made from a compatible material for the medium and medium temperature or use only gasket material compatible with hygienic designs.
— Gaskets must not extend into the flow area since possible turbulence could influence the device accuracy.
— The pipeline may not exert any unallowable forces or torques on the device.
— Do not remove the plugs in the cable connectors until you are ready to install the electrical cable.
— Make sure the gaskets for the housing cover are seated properly. Carefully gasket the cover. Tighten the cover fittings.
— A separate transmitter must be installed at a largely vibration-free location.
— Do not expose the transmitter and sensor to direct sunlight. Provide appropriate sun protection as necessary.
— When installing the transmitter in a control cabinet, make sure adequate cooling is provided.

4.2 Flowmeter sensor

The device can be installed at any location in a pipeline under consideration of the installation conditions.

1. Remove protective plates, if present, to the right and left of the flowmeter sensor.
2. Position the flowmeter sensor coplanar and centered between the pipes.
3. Install gaskets between the sealing surfaces.

4.3 Transmitter

The installation site for the transmitter must be essentially vibration free, see "Technical data". The specified temperature limits and the maximum signal cable length between the transmitter and the flowmeter sensor must not be exceeded.

IMPORTANT (NOTE)

When selecting a location for the transmitter, make sure that it will not be exposed to direct sunlight.
If exposure to direct sunlight cannot be avoided, a sun shade should be installed.
The limit values for the ambient temperature must be observed.

Field-mount housing

The housing is designed for protection class IP 65 / 67, NEMA 4X (EN 60529) and must be mounted using 4 screws. For dimensions, see Fig. 2 and Fig. 3.

4.3.1 Transmitter in remote mount design (option F1 or F2)

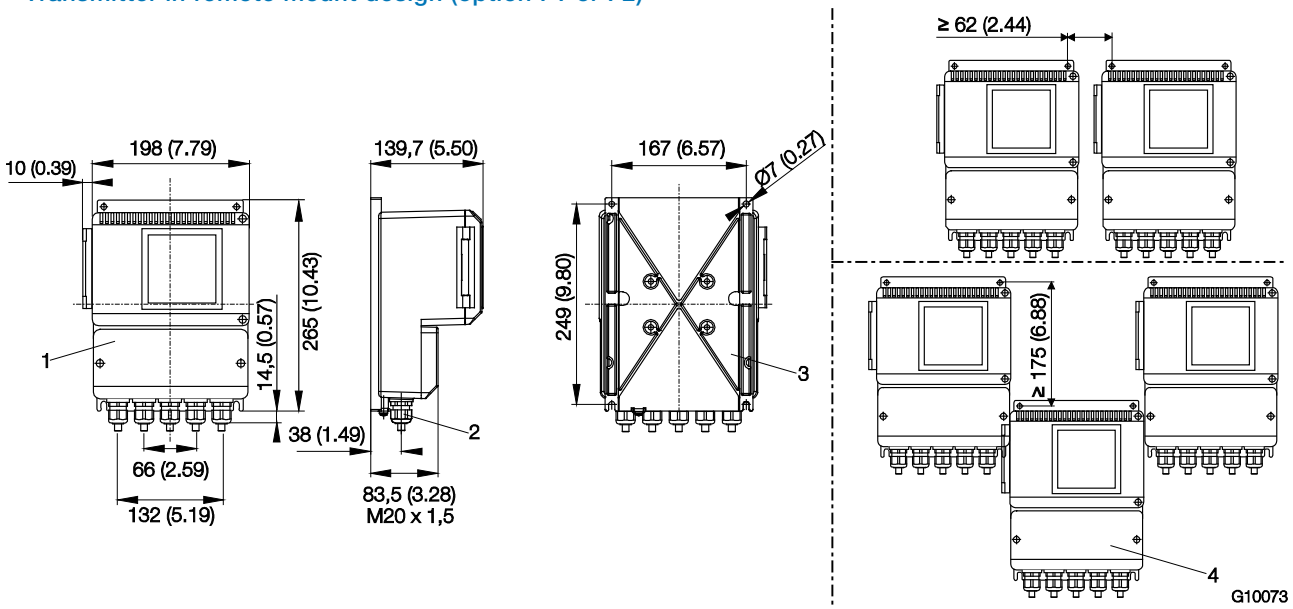


Fig. 2: Dimensions in mm (inch)
1 Field-mount enclosure with window | 2 Cable gland M20 x 1.5 or 1/2" NPT |
3 Installation holes for pipe mounting set, for 2" pipe installation; mounting set available on request (order no. 612B091U07) |
4 IP 67 degree of protection

4.3.2 Transmitter in remote mount design (option R1 or R2)

IP 65 / 67, NEMA 4X

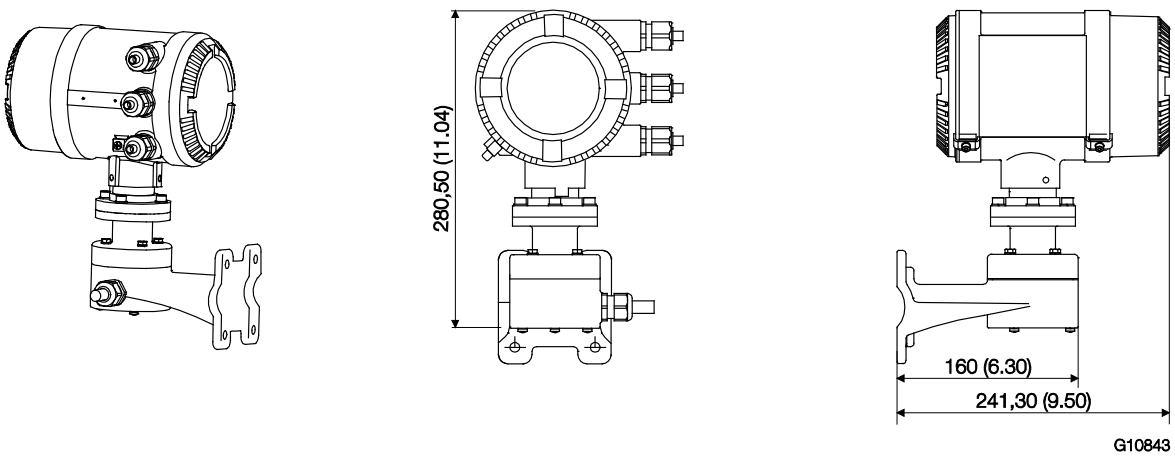


Fig. 3: Dimensions in mm (inch)

4.4 Rotating the transmitter and LCD display

Depending on the installation position, the integral transmitter housing or LCD display can be rotated to enable horizontal readings.

4.4.1 Transmitter enclosure

To rotate the transmitter housing, proceed as described below. A stop in the transmitter housing will prevent rotation through more than 330°.

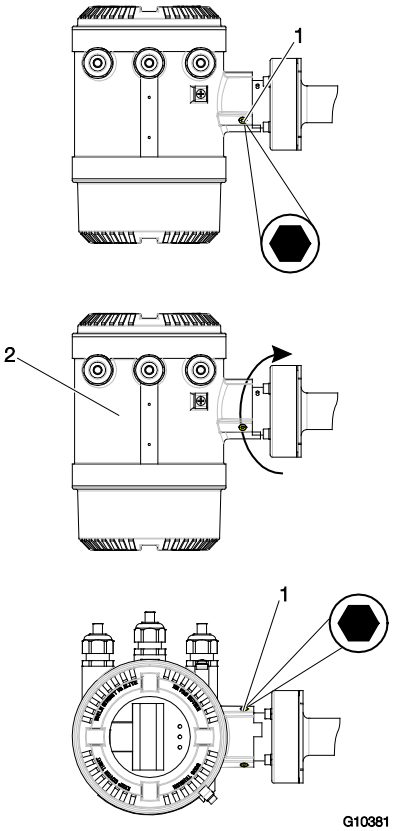


Fig. 4: Rotating the transmitter housing
1 Fixing screw | 2 Transmitter housing

1. Loosen the fixing screws approx. 2 turns.
2. Turn the transmitter housing to the required position.
3. Tighten the fixing screw.

DANGER – Risk of explosion!
Violation of hazardous area protection.
Do not disconnect the transmitter from the sensor.

4.4.2 LCD indicators

WARNING – Electrical dangers!
When the housing is open, EMC protection is impaired and there is no longer any protection against accidental contact.
Switch off the power supply before opening the housing.

To rotate the LCD Display, proceed as described below.

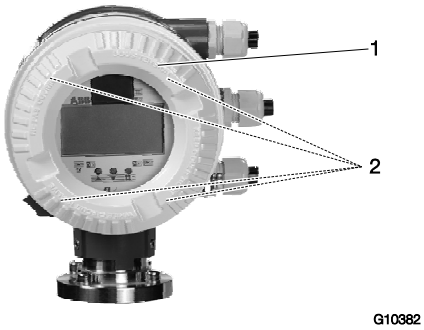


Fig. 5: Rotating the LCD display

1. Switch off the power supply.
2. Unscrew the housing cover (1).
3. Loosen the four fixing screws (2) on the LCD display. The LCD display is now hanging from the cable harness that connects it to the electronic plug-in unit.
4. Screw the LCD display into the required position. Take care not to damage the cable harness when tightening the screws.
5. Screw on housing cover (1) again.

NOTICE – Potentially adverse effect on housing ingress protection
If the gasket (o-ring) is seated incorrectly or damaged, this may have an adverse effect on the housing ingress protection.
Before closing the housing cover, check the gasket (o-ring) for any damage and replace if necessary. Check that the gasket is properly seated when closing the housing cover.

4.5 Installation instructions

4.5.1 Installation requirements/System sizing information

The CoriolisMaster FCB330, FCB350, FCH330, FCH350 is suitable for both indoor and outdoor installations. The standard device has an IP 67 enclosure. The flowmeter sensor is bidirectional and can be installed in any mounting position. It is important to ensure that the meter pipes are always completely filled with fluid. The material resistance of all wetted parts must be clarified.

The following points are to be considered during installation:

- The preferred flow direction is indicated by the arrow on the flowmeter sensor. Flow in this direction will be indicated as positive (a forward/reverse flow calibration is available as an option).
- The presence of gas bubbles in the meter tube increases the likelihood of erroneous measurements, particularly when measuring density. Therefore, the sensor should not be installed at the highest point in the system. Advantageous are installations in low pipeline sections, e.g., at the bottom of a U-section in the pipeline (invert).
- Make sure that any gases dissolved in the medium do not outgas and that the meter tubes are always completely full. To safeguard this, a minimum back pressure of 0.2 bar (2.9 psi) is recommended.
- In case of gas measurements ensure that the gases are dry and do not contain liquids.
- Make sure that operation below the vapor pressure cannot occur when a vacuum exists in the meter tube or when liquids with a low boiling point are being processed.
- Ensure that during operation no Phase transitions take place in the medium. For gaseous Media any liquid phase must be avoided, for liquid media, any gas phase must be avoided.
- Long drop lines downstream of the flowmeter sensor should be avoided to prevent the meter tube from draining.
- The devices can be installed directly to or from elbows, valves or other equipment unless no cavitation is caused.
- This Flowmeter is designed for industrial installations. As long as electromagnetic fields in the environment of the meter are according to "best practice" as defined in the standards covered in our "EC-declaration of conformity", no additonal efforts have to be taken. If electromagnetic fields exceed usual levels, sufficient distance is to be kept.
- Check that the flowmeter sensor does not come into contact with other objects. Do not attach the flowmeter sensor to the enclosure.
- In principle, no special supports or dampers are required on the device. In industrial and maritime facilities designed as "Best Paractice " typical forces are absorbed sufficiently by the device. This is valid for serial or parallel installation of Coriolis meters as well, as long as the use and installation follows the manual.
- To avoid damages to the process connections and pipes by axial forces, supports are recommended for devices of higher weights.

4.5.2 Inlet sections

The flowmeter sensor does not require any inlet sections. Make sure that any valves, gates, sight glasses, etc., in the vicinity of the flowmeter sensor do not cavitate and are not set in vibration by the flowmeter sensor.

4.5.3 Model in remote mount design

Make sure that the flowmeter sensor and transmitter are assigned correctly. Compatible devices have the same end numbers, e. g., X001 and Y001 or X002 and Y002, on the name plate.

4.5.4 Pressure loss

Pressure loss is determined by the properties of the medium and the flow.
Documents to help you to calculate pressure loss can be downloaded from www.abb.com/flow.

4.6 Mounting positions

The flowmeter operates in any mounting position. The ideal installation position is vertical with flow from bottom to top.

IMPORTANT (NOTE)
EHEDG certification requires a self draining installation, only possible with a vertical installation.

4.6.1 Vertical installation in riser

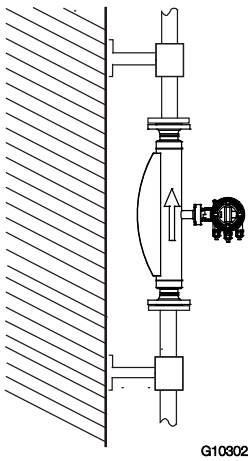


Fig. 6: Vertical installation, self-draining

4.6.2 Vertical installation in a drop line

Make sure that the flowmeter sensor is always completely full while measurements are being taken.

A pipeline reduction or an orifice must also be installed underneath the flowmeter sensor. The cross-section of the pipeline reduction or orifice must be smaller than the cross-section of the pipeline in order to prevent the flowmeter sensor from running dry while measurements are being taken.

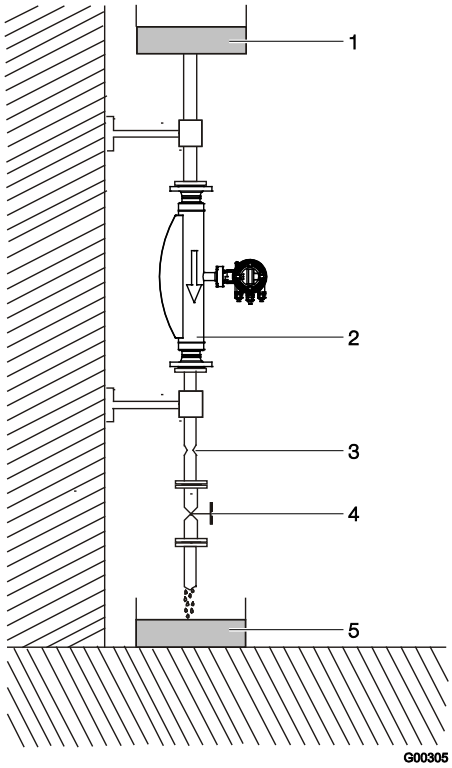


Fig. 7: Vertical installation in a drop line
1 Supply reservoir | 2 Flowmeter sensor | 3 Orifice or pipe constriction | 4 Valve | 5 Product reservoir

4.6.3 Horizontal installation in case of measurement of liquids

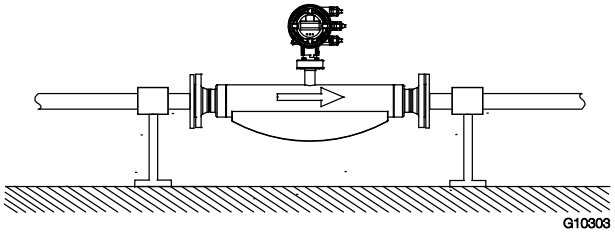


Fig. 8: Horizontal installation (liquids)

4.6.4 Horizontal installation in case of measurement of gases

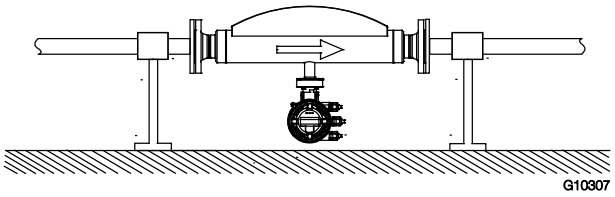


Fig. 9: Horizontal installation (gases)

In case of measurement of gases ensure that the transmitter housing or the terminal box pointing downwards.

4.6.5 Difficult installation locations for liquid measurement

The accumulation of air or gas bubbles in the meter tube will lead to increased inaccuracies.
Avoid the following installation locations in case of liquid measurement:

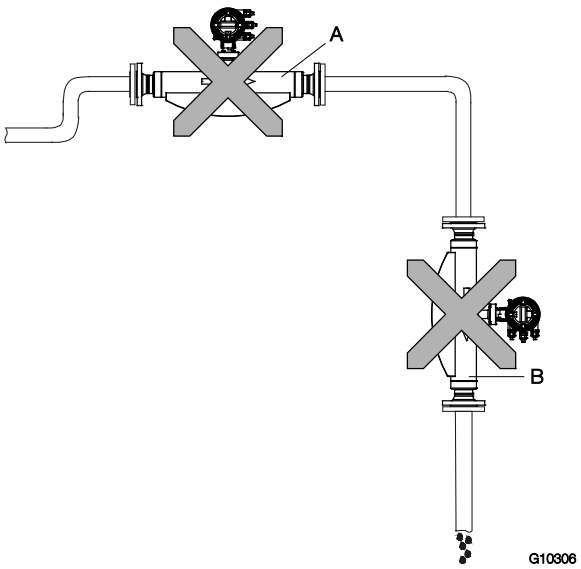


Fig. 10: Difficult installation locations

- **"A":** Installing the flowmeter sensor at the highest point of a pipeline leads to increased inaccuracies due to the accumulation of air or gas bubbles in the meter tube.
- **"B":** Installing the flowmeter sensor in a drop line means that there is no guarantee that the meter tube will be completely full while measurements are being taken and leads to increased inaccuracies.

4.6.6 Difficult installation locations and gas metering

When metering gas, the accumulation of fluid or the formation of condensate in the meter tube will lead to increased inaccuracies.
Avoid the following installation locations when metering gas:

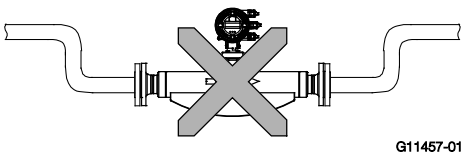


Fig. 11: Difficult installation locations

Installing the flowmeter sensor at the lowest point of a pipeline leads to increased inaccuracies due to the accumulation of fluid or the formation of condensate in the meter tube.

4.6.7 Zero balance

CoriolisMaster flowmeters do not require in any case a zero point calibration. Only under these circumstances a calibration is recommended:

- when measuring below 10% of QmaxDN,
- when very high accuracies are required (0.1% or better),
- the operating conditions (pressure and temperature) differ widely from the reference conditions.

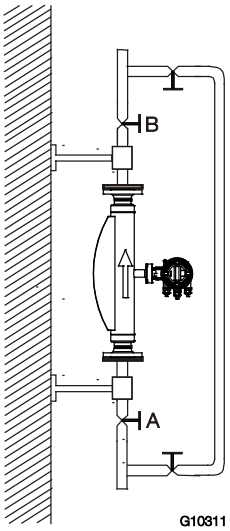


Fig. 12: Bypass line

Closing valves are to be installed in front (A) and after (B) the flowmeter.
We recommend installing a bypass line. Installing a bypass line means that adjustment can take place while the process is ongoing.

Before adjusting the zero under operating conditions, make sure that:

- The meter tube is completely full
- There are no gas bubbles or air in the meter tube (in case of liquid measurements)
- There are no condensates in the meter tube (in case of gas measurements)
- The pressure and temperature in the meter tube are appropriate for normal operating conditions

In case of a high zero point (> 0.1%) please check the installation for best praxis and ensure that there are no gas contents in a liquid or solids or liquids in gases. Please ensure that the meter is completely filled.

4.6.8 Installation dependent on the temperature of the medium being measured

The mounting position of the sensor is dependent on the temperature of the medium being measured T_{medium}. Be aware of the following mounting options!

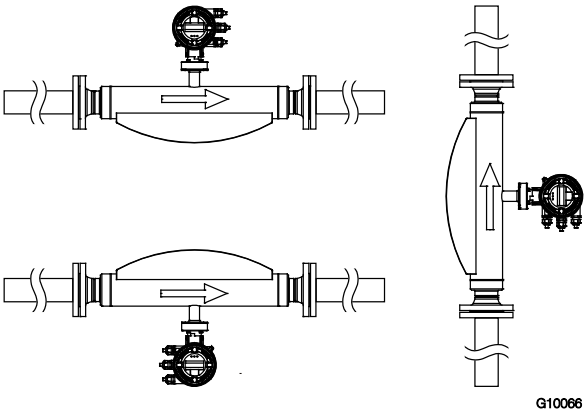


Fig. 13: Installation at T_{medium} -50°... 120 °C (-58 ... 248 °F)

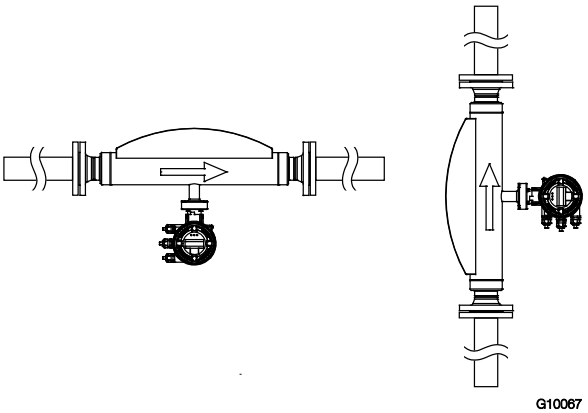


Fig. 14: Installation at T_{medium} -50°... 200 °C (-58 ... 392 °F)

4.6.9 Installation with option TE1 "extended tower length"

IMPORTANT (NOTE)

The sensor must only be insulated in conjunction with the TE1 "Extended tower length" option, as shown in Fig. 15.

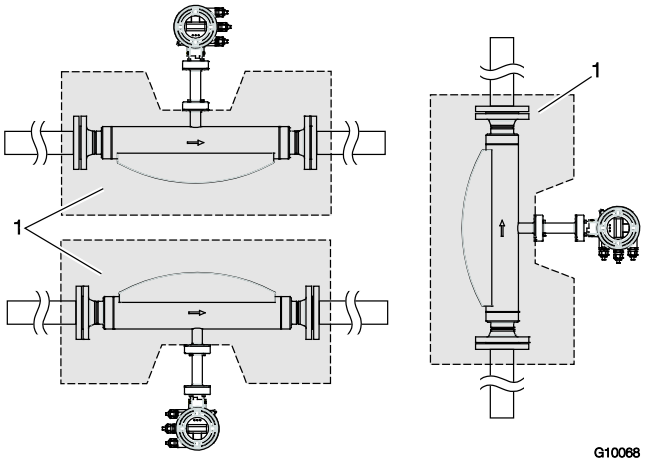


Fig. 15: Installation at T_{medium} -50°... 200 °C (-58 ... 392 °F)
1 Insulation

4.6.10 Notes about EHEDG conformity

WARNING – Risk of poisoning!
Bacteria and chemical substances can contaminate or pollute pipeline systems and the materials they are made of.
Observe the following instructions in installations conforming to EHEDG requirements.

- EHEDG certification requires a self draining installation, only possible with a vertical installation.
- In order to achieve compliance with EHEDG requirements, the combination of process connection and gaskets selected by the operator must consist solely of EHEDG-compliant parts. Note the information in the latest version of the following document: EHEDG Position Paper: "Hygienic process connections to use with hygienic components and equipment".

5 Electrical connections

5.1 Information for connecting the power supply

IMPORTANT (NOTE)

- Observe the limit values for the power supply listed in the "Technical data" section.
- Please remember that there is a voltage drop associated with long lead lengths and small lead cross-sections. The voltage at the terminals of the device may not fall below the minimum value required.
- Complete the electrical connection according to the connection diagram.

The line voltage and power consumption are indicated on the name plate for the transmitter.
A circuit breaker with a maximum rated current of 16 A must be installed in the supply power line of the transmitter.
The wire cross-sectional area of the supply power cable and the circuit breaker used must comply with VDE 0100 and must be dimensioned in accordance with the current consumption of the flowmeter measuring system. The leads must comply with IEC 227 and/or IEC 245.
The circuit breaker should be located near the transmitter and marked as being associated with the device.
The power supply is connected to terminal L (phase), N (neutral), or 1+, 2-, and PE, as stated on the name plate.
Connect the transmitter and flowmeter sensor to functional ground.

5.2 Information for cable installation

Make provision for a drip loop (water trap) when installing the connecting cables for the flowmeter sensor.
If you are installing the flowmeter transmitter vertically, point the cable entry points downwards. (You might need to rotate the transmitter housing accordingly.)

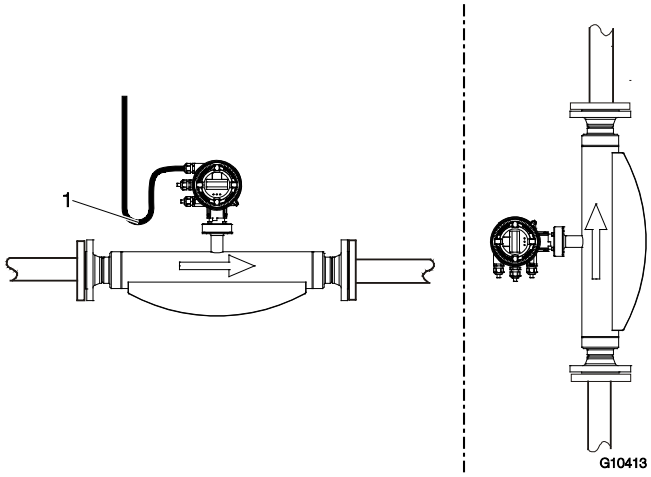


Fig. 16: Installing the connection cables
1 Drip loop

5.3 Integral mount design

On integral mount design devices, the terminals are located behind the cover on the rear of the transmitter housing. A schematic electrical connection diagram can be found on the inside of the cover. The configuration of the device is marked here.

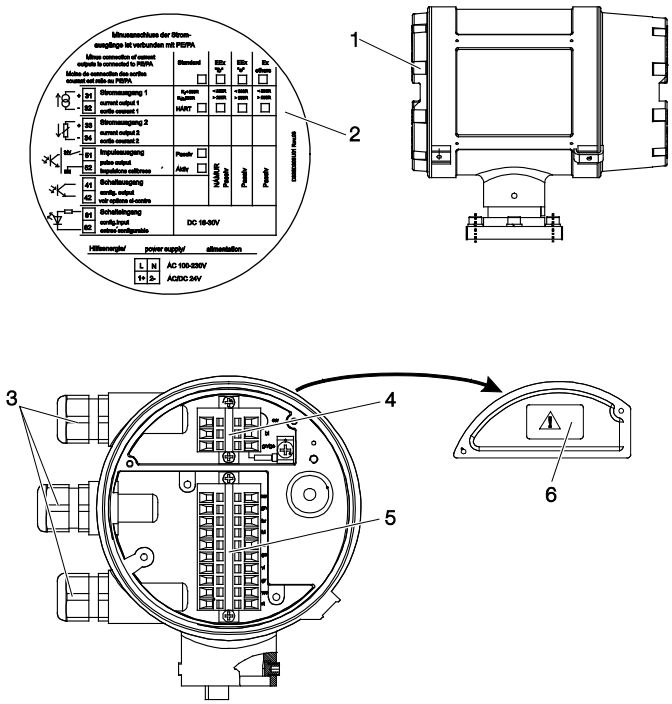


Fig. 17: Terminals
1 Cover for connection area | 2 Pin assignment | 3 Cable entry points | 4 Terminals for power supply | 5 Terminals for signal inputs and signal outputs | 6 Terminal cover

IMPORTANT (NOTE)
Use suitable wire end sleeves when connecting the cables.

Connect the device:

1. Unscrew the cover for the connection area.
2. Prepare the cable ends and feed them into the connection area through the cable entry points.
3. Remove the terminal cover and connect the power supply cables as shown in the connection diagrams.
4. Replace the terminal cover.
5. Connect the signal input and output cables as shown in the connection diagrams. Connect the cable shielding (if used) to the designated grounding clamp.
6. Unscrew the cover for the connection area again.

NOTICE – Potentially adverse effect on housing ingress protection
If the gasket (o-ring) is seated incorrectly or damaged, this may have an adverse effect on the housing ingress protection.
Before closing the housing cover, check the gasket (o-ring) for any damage and replace if necessary. Check that the gasket is properly seated when closing the housing cover.

5.4 Remote mount design

With remote mount design devices, the transmitter is installed separately and connected to the flowmeter sensor via a signal cable.

5.4.1 Cable specification

Signal cable	
Designation	LI2YCY PiMF 5 x 2 x 0.5 mm^2
Shield	Pair shielding with continuity wire and copper braided screen
Temperature range	-30 ... 70 °C (-22 ... 158 °F)
Loop resistance	maximum 78.4 Ω/km
Inductance	0,4 mH/km approx.
Max. cable length	10 m (33 ft)

5.4.2 Routing the signal cable

Observe the following points when routing cables:

- The signal cable carries a voltage signal of only a few millivolts and must, therefore, be routed over the shortest possible distance. The maximum permissible signal cable length is 10 m (33 ft).
- Avoid routing the cable in the vicinity of electrical equipment or switching elements that can create stray fields, switching pulses, and induction. If this is not possible, route the signal cable inside a metal cable conduit and connect the cable conduit to operational ground.
- To shield against magnetic interspersion, the cable contains outer shielding that is attached to operational ground.
- Do not run the signal cable over junction boxes or terminal strips.

5.4.3 Connecting the signal cable

IMPORTANT (NOTE)

Use suitable wire end sleeves when connecting the cables.

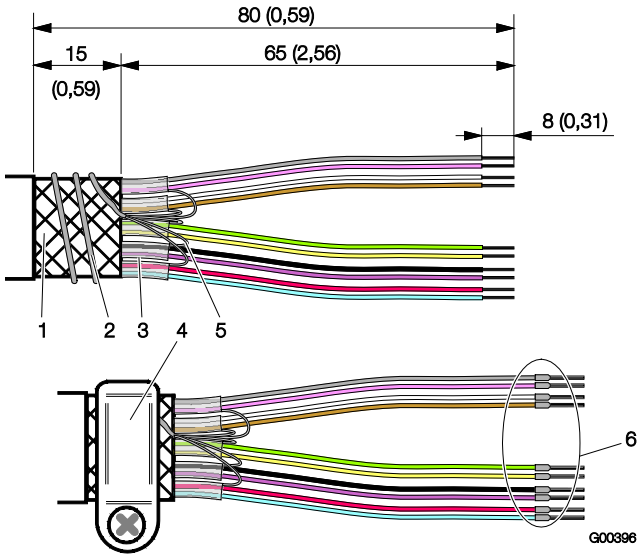


Fig. 18: Signal cable assembly, dimensions in mm (inch)
1 Wire mesh shield | 2 Foil shield continuity wires (twisted) | 3 Foil shield | 4 Grounding clamp | 5 Continuity wire | 6 Wire end sleeves

1. Strip the signal cable as shown.
2. Cut the wire mesh shield to a length of approx. 15 mm (0.59 inch).
3. Remove the cable core and foil shield from the wire pairs.
4. Strip the wires and attach wire end sleeves.
5. Twist the foil shield continuity wires and wrap them around the wire mesh shield. When connecting to the devices, clamp the wire mesh shield and the twisted continuity wires underneath the grounding clamp.
6. Connect the signal cables to the transmitter and flowmeter sensor as shown in the connection diagrams.
7. Connect the signal cables for signal inputs and outputs to the transmitter as shown in the connection diagrams. Connect the cable shields to the designated grounding clamp.
8. Connect the power supply cables to the transmitter as shown in the connection diagrams.
9. Screw all open covers for the transmitter and flowmeter sensor connection areas back into place.

NOTICE – Potentially adverse effect on housing ingress protection

If the gasket (o-ring) is seated incorrectly or damaged, this may have an adverse effect on the housing ingress protection. Before closing the housing cover, check the gasket (o-ring) for any damage and replace if necessary. Check that the gasket is properly seated when closing the housing cover.

5.5 Digital communication

5.5.1 HART protocol

The device is registered with the HART Communication Foundation.

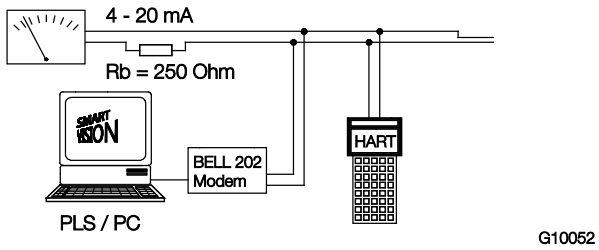


Fig. 19: Communication via HART protocol

HART protocol	
Configuration	— Directly on the device — Via software DSV401 + HART-DTM
Transmission	FSK modulation on voltage output 4 … 20 mA according to Bell 202 standard
Baud rate	1200 baud
Display	Logic 1: 1200 Hz Logic 0: 2200 Hz
Maximum signal amplitude	1.2 mAss
Load at current output	250 … 560 Ω (in hazardous area: maximum 300 Ω)

Cable	
Design	Two-wire cable AWG 24, twisted
Maximum length	1500 m (4921 ft)

See the interface description for detailed information.

System integration:
Communication (configuration, parameterization) can be performed with the DTM (Device Type Manager) available for the device and the corresponding framework applications as per FDT 0.98 or 1.2 (DSV401 R2).
Other tool/system integrations (e.g., Emerson AMS/Siemens PCS7) are available on request.
The necessary DTMs can also be downloaded from www.abb.com/flow.

5.6 Terminal connection diagrams

5.6.1 Connection of transmitter models to peripherals

Models FCB330, FCB350, FCH330, FCH350, FCT330, FCT350

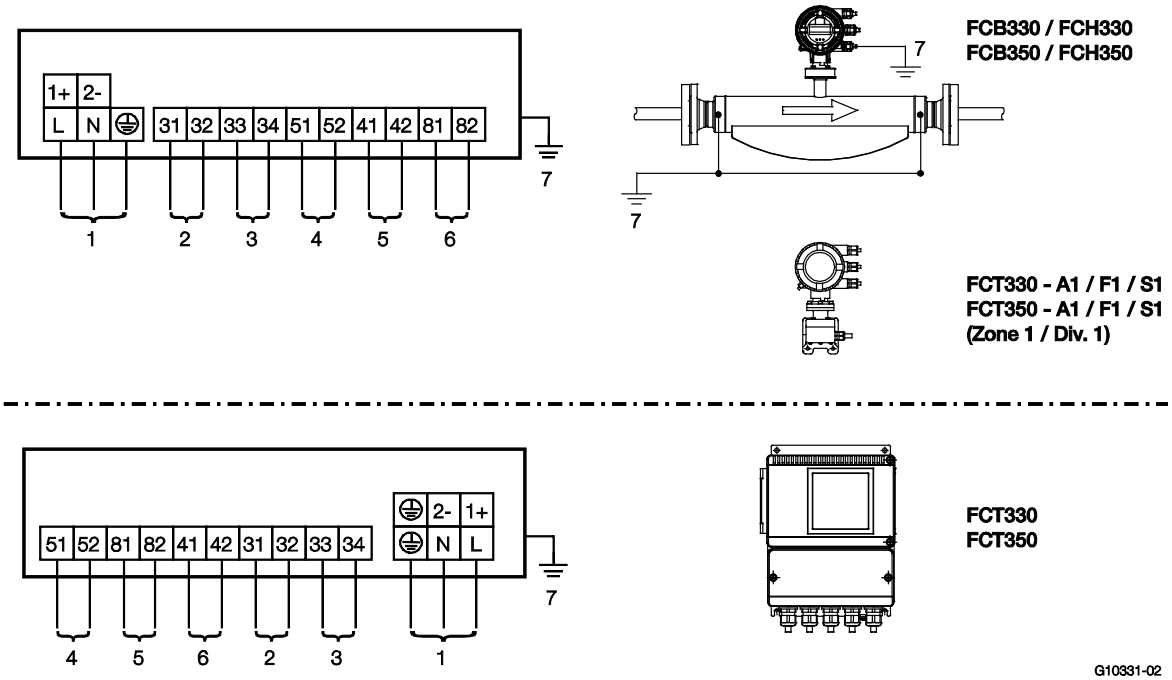


Fig. 20
1 Power supply | 2 Current output 1 | 3 Current output 2 | 4 Pulse output | 5 Digital switching output | 6 Digital switching input | 7 Equipotential bonding (PA)

IMPORTANT (NOTE)

When using the device in hazardous areas, note the additional connection data in the chapter titled "Ex relevant specifications"!

Terminal	Function
L / N / PE	Power supply, 100 … 230 V AC, 50/60 Hz
1+ / 2- / PE	Power supply — 24 V AC, 50/60 Hz — 24 V DC
31 / 32	Current output 1, active 0/4 … 20 mA , (0 Ω ≤R_B ≤560 Ω, FCT300-A1/F1:1 0 Ω ≤R_B ≤300 Ω)
	Current output 1, passive 4 … 20 mA (0 Ω ≤R_B ≤600 Ω), source voltage 12 ≤U_q ≤ 30 V
33 / 34	Current output 2, passive 4 … 20 mA (0 Ω ≤R_B ≤600 Ω), source voltage 12 ≤U_q ≤ 30 V
51 / 52	Pulse output, passive fmax = 5 kHz, pulse width = 0.1 … 2000 ms, 0.001 ... 1000 pulses/unit — "Closed": 0 V ≤ U_{CEL} ≤ 2 V, 2 mA ≤ I_{CEL} ≤ 220 mA — "Open": 16 V ≤ U_{CEH} ≤ 30 V DC, 0 mA ≤ I_{CEH} ≤ 0.2 mA
	Pulse output active, U = 16 … 30 V, load ≥ 150 Ω, fmax = 5 kHz
41 / 42	Digital switching output, passive — "Closed": 0 V ≤ U_{CEL} ≤ 2 V, 2 mA ≤ I_{CEL} ≤ 220 mA — "Open": 16 V ≤ U_{CEH} ≤ 30 V DC, 0 mA ≤ I_{CEH} ≤ 0.2 mA
81 / 82	Digital switching input, passive — Input "On": 16 V ≤ UKL ≤ 30 V — Input "Off": 0 V ≤ UKL ≤ 2 V
-	Equipotential bonding "PA" When the FCT300 transmitter is connected to the FCB3xx / FCH3xx flowmeter sensor, the transmitter must also be connected to "PA".

5.6.2 Connection examples for the peripherals

Current outputs (including HART communication)

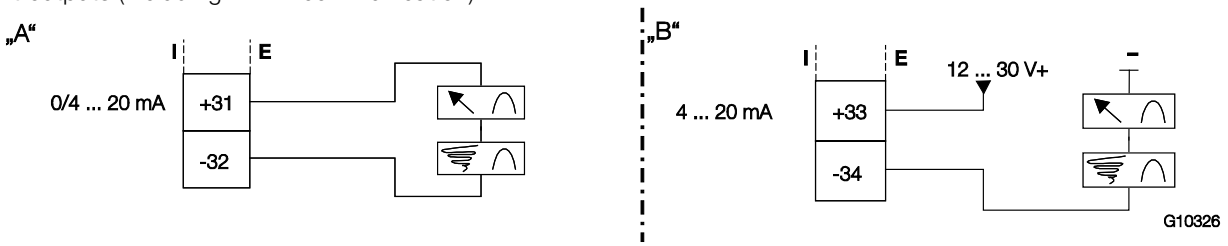


Fig. 21: Active / passive current outputs
"A" Active | "B" Passive | I Internal | E External

Digital switching output and digital switching input

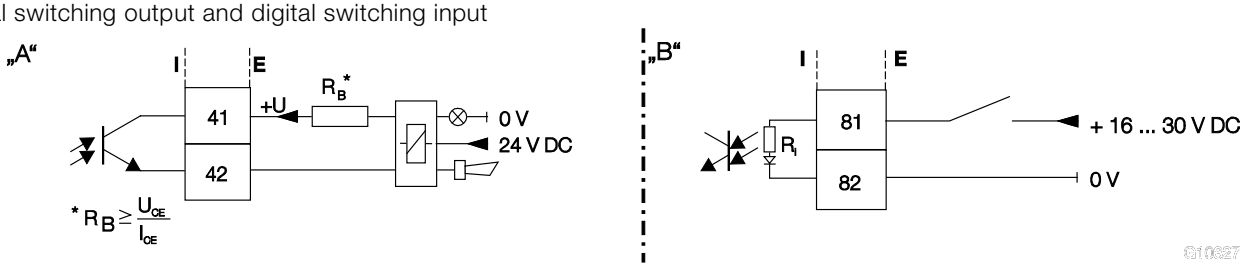


Fig. 22
"A" Output for system monitoring, min. / max. alarm for empty meter tube or forward / reverse signal |
"B" Input for external totalizer reset or external output zero return | I Internal | E External

Pulse output

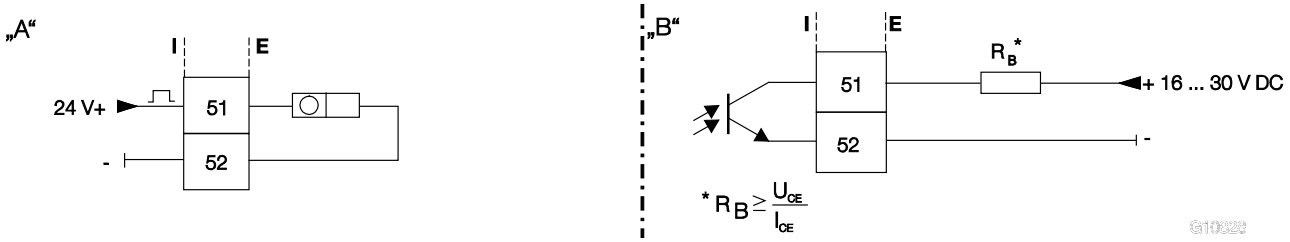


Fig. 23: Active / passive pulse output
"A" Active | "B" Passive (optocoupler) | I Internal | E External

5.6.3 Connection of transmitter to flowmeter sensor

FCT330, FCT350 transmitter to FCB330, FCB350, FCH330, FCH350 flowmeter sensor

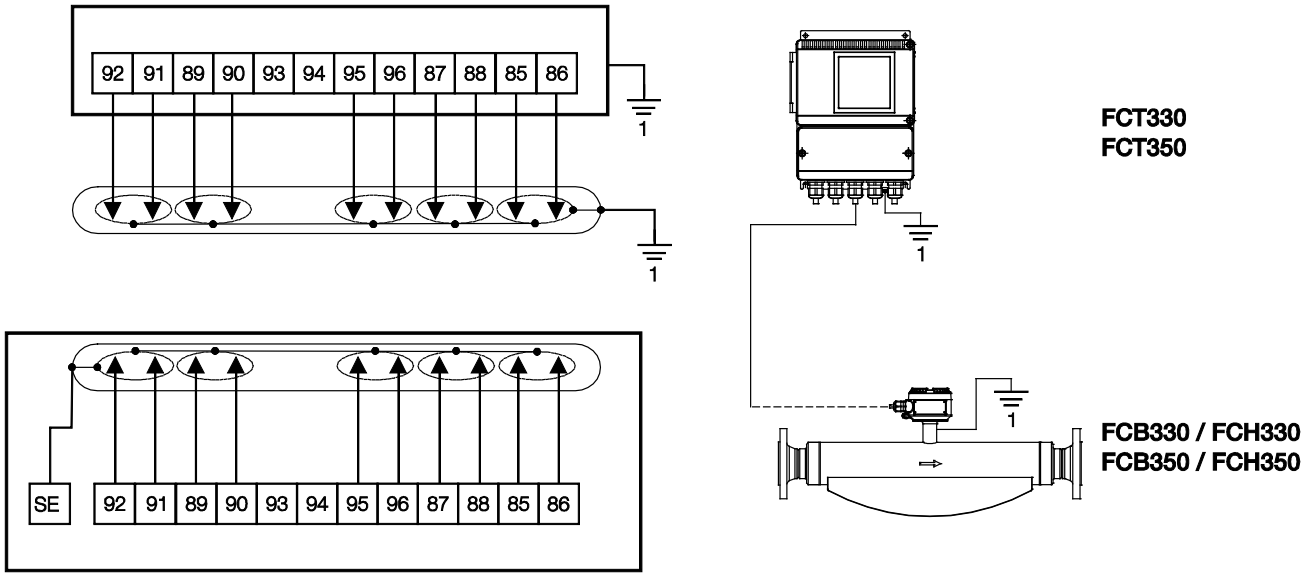


Fig. 24
1 Equipotential bonding (PA)

Terminal	Corresponding wire color	Function
85	White	Sensor 1
86	Brown	Sensor 1
87	Green	Sensor 2
88	Yellow	Sensor 2
89	Black	Temperature
90	Violet	Temperature

Terminal	Corresponding wire color	Function
91	Gray	Driver
92	Pink	Driver
93	-	Not used
94	-	Not used
95	Blue	Temperature
96	Red	Temperature

IMPORTANT (NOTE)

The precise position of the PA terminals may vary according to the device type. Each terminal is marked accordingly. When the FCT330, FCT350 transmitter is connected to the FCB330, FCB350, FCH330, FCH350 flowmeter sensor, the transmitter must also be connected to "PA".

The following flowmeter sensor / transmitter combinations are permitted:

— FCB330, FCH330 flowmeter sensor with FCT330 transmitter
— FCB350, FCH350 flowmeter sensor with FCT350 transmitter

5.6.4 Connection of transmitter to flowmeter sensor in Zone 1 / Div. 1

FCT330, FCT350 transmitter to FCB330, FCB350, FCH330, FCH350 flowmeter sensor

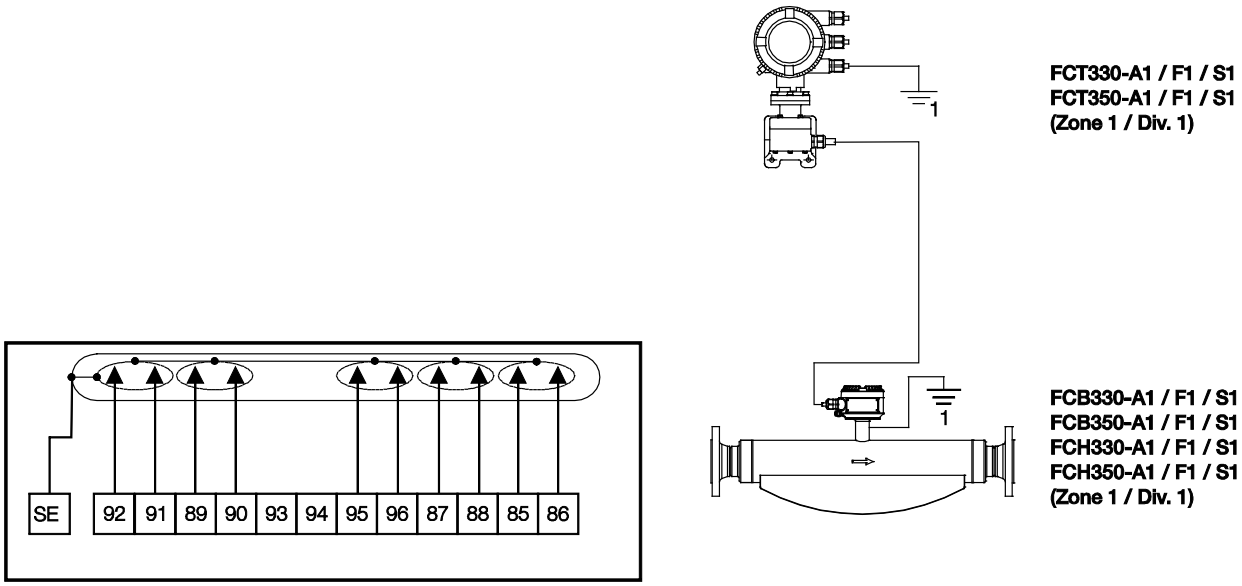


Fig. 25
1 Equipotential bonding (PA)

Terminal	Corresponding wire color	Function
85	White	Sensor 1
86	Brown	Sensor 1
87	Green	Sensor 2
88	Yellow	Sensor 2
89	Black	Temperature
90	Violet	Temperature

Terminal	Corresponding wire color	Function
91	Gray	Driver
92	Pink	Driver
93	-	Not used
94	-	Not used
95	Blue	Temperature
96	Red	Temperature

IMPORTANT (NOTE)

The wires must be connected in pairs in order to ensure EMC protection.

The following flowmeter sensor / transmitter combinations are permitted:

— FCB330, FCH330 flowmeter sensor with FCT330 transmitter

— FCB350, FCH350 flowmeter sensor with FCT350 transmitter

6 Commissioning

6.1 Checks prior to commissioning

The following points must be checked before commissioning the device:

- The assignment of the flowmeter sensor to the transmitter must be correct
- The wiring must have been completed as described in the "Electrical connections" section
- The flowmeter sensor must be correctly grounded
- The external data memory module (FRAM) must have the same serial number as the flowmeter sensor
- The external data memory module (FRAM) must be inserted in the correct position (see the "Maintenance / Repairs" section)
- The ambient conditions must meet the requirements set out in the technical data
- The power supply must meet the requirements set out on the name plate

6.2 Switching on the power supply

Switch on the power supply.
After switching on the power supply, the flowmeter data in the external FRAM is compared with the data saved internally.
If the data is not identical, the transmitter data is replaced automatically. Once completed, the message "Ext. Data loaded" is displayed. The flowmeter is now ready for operation.
The LCD display indicates the current flow.

6.2.1 Inspection after switching on the power supply

The following points must be checked after commissioning the device:

- The parameter configuration must correspond to the operating conditions.
- The system zero adjustment must have been made.

General information:

- If the flow direction indicated on the display is incorrect, it could mean that the signal lead connections between the sensor and the transmitter have been accidentally reversed.
- The position of the fuses and the fuse values are listed in the spare parts list in the operating instructions for the device.

6.3 Basic Setup

IMPORTANT (NOTE)
For additional information regarding operation of the LCD display, refer to the "Configuration, parameterization / operation" section.
For detailed descriptions of all menus and parameters, refer to the operating instructions for the device.

The device can be factory calibrated to customer specifications upon request. If no customer information is available, the device is delivered with factory settings.
On-site configuration requires only a few parameter settings.
The following parameters must be checked and/or set when commissioning the device:

Flow range end value
("QmMax" parameter and "Unit" submenu)
The device is factory calibrated to the largest flow range end value, unless customer information to the contrary is available.

Current outputs
("Current output 1" and "Current output 2" submenus)
Select the desired current range (0 … 20 mA or 4 … 20 mA).

Pulse output
("Pulse" parameter and "Unit" submenu)
To set the number of pulses per volume flow unit, a unit for the totalizer (e.g., kg or t) must first be selected in the "Unit" submenu. After this, the number of pulses has to be entered in the "Pulse" parameter.

Pulse width
("Pulse width" parameter)
For external processing of the present counting pulses, the pulse width can be set to between 0.1 ms and 2,000 ms.

System zero point
("System Zero adj." submenu)
The fluid in the flowmeter sensor must be brought to a complete standstill. The flowmeter sensor must be full. Select the "System Zero adj." menu. Next press ENTER. Use the STEP key to call up "System Zero adj. Function automatic?" and select ENTER to start the adjustment. You can choose between slow or fast adjustment. Slow adjustment generally provides a more accurate zero point.

6.4 Configuring the pulse output

The configuration (active, passive) for the pulse output is set in the transmitter using a jumper.
To change the configuration, you must remove the transmitter plug-in module from the housing.

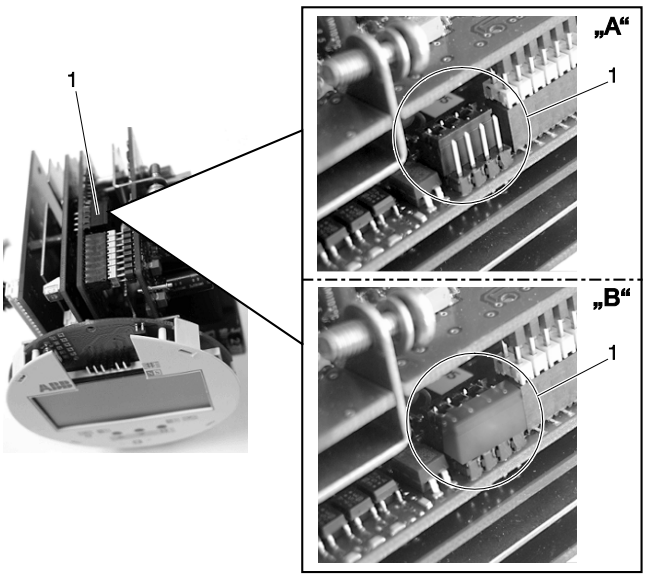


Fig. 26: Plug-in Jumper Location
1 Jumper for configuring the pulse output

Number	Function
"A"	Pulse output 51 / 52 passive
"B"	Pulse output 51 / 52 active (not for hazardous area design)

IMPORTANT (NOTE)
Please note that in case of Zone 1 or Div. 1 approved meters, this jumper will be in position "B" (active) although the pulse output is passive!

6.5 Operating protection switch

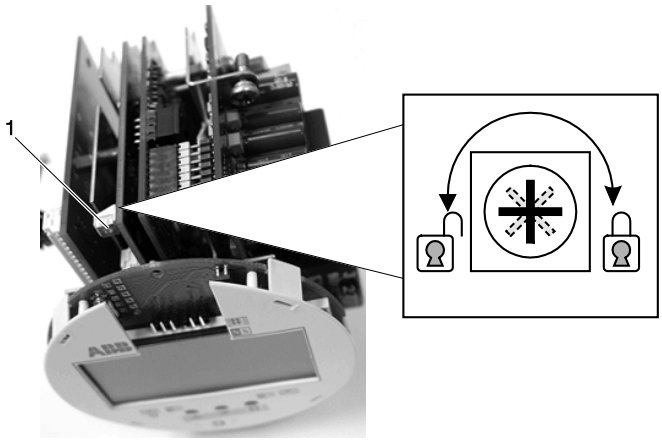


Fig. 27: Operating protection switch

In addition to password protection, it is possible to activate hardware write protection.
Turning the switch (1) clockwise activates the programming protection while turning the switch anti-clockwise deactivates it.
If you attempt to change parameters while the protection is active, the "Operating protection" warning is displayed and the entry is rejected.
It is also possible to use a cover locking screw with a hole to seal the compact unit so that changes to calibration-related parameters cannot remain undetected.

6.6 Information for safe operation in potentially explosive atmospheres – ATEX

6.6.1 Inspection

DANGER – Risk of explosion!
Risk of explosion when opening the housing.
Before opening the housing:
- Check that a valid fire permit is available
- Check that there is no risk of explosion
- Switch off the power supply

CAUTION – Risk of burns!
Risk of burns on the flowmeter sensor posed by hot media for measurement. The surface temperature may exceed 70 °C (158 °F), depending on the temperature of the medium. Before starting work on the flowmeter sensor, make sure that the device has cooled sufficiently.

Flowmeter sensors must be commissioned and operated according to ElexV (German ordinance on electrical installations in potentially explosive atmospheres), EN 60079-14 (setting up electrical installations in potentially explosive atmospheres), and relevant national standards.
In potentially explosive atmospheres, installation, commissioning, maintenance, and servicing must only be performed by properly trained personnel.
The commissioning activities described here are performed after the flowmeter has been installed and the electrical connection has been made.
The supply power must be switched off.
When operating the flowmeter in areas containing combustible dusts, comply with EN 61241-0:2006.
Please observe the drawing „3KXF002126G0009“ in the appendix.

6.6.2 Output circuits

Installation of intrinsically safe "i" or increased safety "e"
The output circuits are designed so that they can be connected to both intrinsically safe and non-intrinsically safe circuits.
It is not permitted to combine intrinsically safe and non-intrinsically safe circuits.
On intrinsically safe circuits, equipotential bonding must be in place along the entire length of the cable used for the current outputs.
The rated voltage of the non-intrinsically safe circuits is Um = 60 V.

IMPORTANT (NOTE)
The cable glands are supplied in black by default. If the signal outputs are wired to intrinsically safe circuits, we recommend that you use the light blue cap supplied, which you will find in the connection area, for the corresponding cable entry.

IMPORTANT (NOTE)
The safety specifications for intrinsically safe circuits can be found on the EC type-examination certificate.

- Make sure that the cover over the voltage supply connection is tightly closed. With intrinsically safe output circuits, the terminal box can be opened.
- It is recommended that you use the cable glands supplied (not for the -40 °C (-40 °F) version) for the output circuits as appropriate for the relevant type of protection: intrinsically safe: blue, non-intrinsically safe: black
- The sensor and the transmitter housing must be connected via the equipotential bonding. For intrinsically safe current outputs, equipotential bonding needs to be in place all the way along the circuits.
- After switching off the power supply, wait t > 2 minutes before opening the transmitter housing.
- When commissioning the flowmeter, refer to EN 61241-1:2004 regarding use in areas containing combustible dust.
- The operator must ensure that, when connecting the protective conductor (PE), no potential differences exist between the protective conductor and the equipotential bonding (PA), even in the event of a fault.
- In case of Dust-Ex application, the maximum surface temperature is 85 °C (185 °F).
- The process temperature of connected piping can exceed 85 °C (185 °F).

6.6.3 NAMUR contact

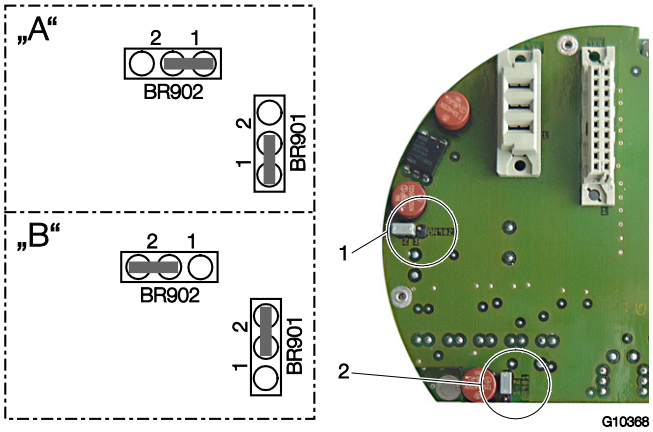


Fig. 28: Positions of jumpers
"A" Standard wiring | "B" NAMUR wiring
1 Jumper BR902 | 2 Jumper BR901

Jumper	Number	Function
BR902	1	Standard configuration, preferred for Ex "e" (factory default)
BR901	1	
BR902	2	NAMUR configuration, preferred for Ex "i"
BR901	2	

The switching output and the pulse output (terminals 41 / 42 and 51 / 52) can be wired internally as a NAMUR contact for the purpose of connecting to a NAMUR amplifier; this is achieved by setting the jumpers accordingly.

6.6.4 Cable entries

Special instructions for devices with North American certification

Devices certified in accordance for North America are only ever supplied with 1/2" NPT threads without glands.

6.6.5 Flowmeter sensor insulation

If the flowmeter is to be insulated, follow the instructions in the "Mounting / Installation positions / Installation with option TE1 "extended tower length"" section.

6.6.6 Operation in Zone 2 with protection class "restricted breathing" (nR)

The transmitter housing (rectangular or round, compact or separate) can be operated in Zone 2 with protection class "restricted breathing" (nR).

WARNING – Potentially adverse effect on protection class

The operator must check the device in accordance with IEC 60079-15 following installation or maintenance, or each time the housing has been opened (see chapter “Important notes to test the device”).

Important notes to test the device

According to IEC 60079-15 chapter 23.2.3.2.1.2 “Equipment without test port” observe the following points:

— Under constant temperature conditions, the time interval required for an internal pressure of at least 0.3 kPa (30 mmWS) below atmospheric to change to half the initial value shall be not less than 180 seconds.

Alternatively following test procedures may be used to shorten the time needed for the routine tests:

— Under constant temperature conditions, the time interval required for an internal pressure of 0.3 kPa (30 mmWS) below atmospheric to change to 0.27 kPa (27 mmWS) below atmospheric shall be not less than 27 seconds.

— Under constant temperature conditions, the time interval required for an internal pressure of 3.0 kPa (300 mmWS) below atmospheric to change to 2.7 kPa (270 mmWS) below atmospheric shall be not less than 27 seconds.

IMPORTANT (NOTE)

If using the low value of pressure (0.3 kPa (30 mmWS)) creates difficulties, the alternative 10 times higher figures (3.0 kPa (300 mmWS)) may be used.

Carrying out the check

1. Switch off the power supply and wait for at least two minutes before opening the housing.
2. Remove a cable gland which is not being used. Cable glands certified to ATEX or IECEx are usually used, e.g., M20 x 1.5 or 1/2" NPT thread.
3. Connect the device being used to test the pressure in place of the cable gland you removed. Check that the test device has been installed and sealed correctly.
4. ☐ Carry out the test with the test device (see chapter “Important notes to test the device”).
5. Remove the test device and put the cable gland back in place correctly.

Before the power supply is switched on again, the housing, seals, thread, and cable entries must be subjected to a visual inspection. There must be no evidence of damage.

IMPORTANT (NOTE)
For sealing original spare parts should be used only.
Spare parts can be ordered from ABB Service: Please contact Customer Center Service acc. to page 2 for nearest service location.

IMPORTANT (NOTE)
When selecting a location for the transmitter, make sure that it will not be exposed to direct sunlight.
If exposure to direct sunlight cannot be avoided, a sun shade should be installed.
The limit values for the ambient temperature must be observed.

6.6.7 Changing the type of protection

When installed in DIV 1 / Zone 1 the FCB330/350, FCH330/350 and FCT330/350 models can be operated at Signal Data INPUT / OUTPUT
with different types of protection:

— Signal Data INPUT / OUTPUT as intrinsically safe ia (ib) / IS or
— Signal Data INPUT / OUTPUT as non-intrinsically safe

Initial installation	Should be installed as	Required step to check
DIV 1 / Zone 1: Signal Data INPUT / OUTPUT as non-intrinsically safe	**DIV 1 / Zone 1:** Signal Data INPUT / OUTPUT as intrinsically safe ia (ib) / IS	— 500 V AC/1 min or 500 x 1,414 = 710 V DC/1 min test between terminals 31 / 32, 33 / 34, 41 / 42, 51 / 52, 81 / 82 and / or 97 / 98 and terminals 31, 32, 33, 34, 41, 42, 51, 52, 81, 82, 97, 98 and the housing. — Visual inspection, particularly of the electronic circuit boards — Visual inspection: No damage or explosion can be detected.
DIV 1 / Zone 1: Signal Data INPUT / OUTPUT as intrinsically safe ia (ib) / IS	**DIV 1 / Zone 1:** Signal Data INPUT / OUTPUT as non-intrinsically safe	Visual inspection: No damage to the threads (cover, 1/2" NPT cable glands)

Important (NOTE)
For more details on hazardous areas, protection type and instrument Model No see installation diagram FCB 3KXF002126G0009 (see chapter „Appendix“).

6.7 Information for safe operation in potentially explosive atmospheres – cFMus

6.7.1 Inspection

DANGER – Risk of explosion!
Risk of explosion when opening the housing.
Before opening the housing:
- Check that a valid fire permit is available
- Check that there is no risk of explosion
- Switch off the power supply and wait for t > 2 minutes.

CAUTION – Risk of burns!
Risk of burns on the flowmeter sensor posed by hot media for measurement. The surface temperature may exceed 70 °C (158 °F), depending on the temperature of the medium. Before starting work on the flowmeter sensor, make sure that the device has cooled sufficiently.

Additionally observe the following points:
- In potentially explosive atmospheres, installation, commissioning, maintenance, and servicing must only be performed by properly trained personnel.
- When the housing is open, there is no longer any EMC protection or protection against accidental contact.
- The sensor and transmitter must be grounded in accordance with the applicable international standards.
- The flowmeter sensor must be connected to the transmitter by means of the signal cable supplied by ABB Automation Products; no other cable may be used for this purpose.
- In the case of the remote mount design, the signal cable between the flowmeter sensor and the transmitter must measure at least 5 m (16.4 ft) in length.
- It is essential that the temperature classes as per the approvals contained in the section titled „Ex relevant specifications acc. to cFMus“ are observed.
- Please observe the drawing “3KXF002126G0009” in the appendix.

6.7.2 Cable entries

Special instructions for devices with North American certification

Devices certified in accordance for North America are only ever supplied with 1/2" NPT threads without glands.

6.7.3 Electrical connection

IMPORTANT (NOTE)
The housing for the transmitter and flowmeter sensor must be connected to the potential equalization PA. The operator must ensure that when connecting the protective conductor (PE) no potential differences can occur between protective conductor and potential equalization (PA).

A temperature of 70 °C (158 °F) at the cable entry is assumed for the Ex calculations. Therefore, the cables used for the supply power and the signal inputs and outputs must have a minimum specification of 70 °C (158 °F).

Grounding

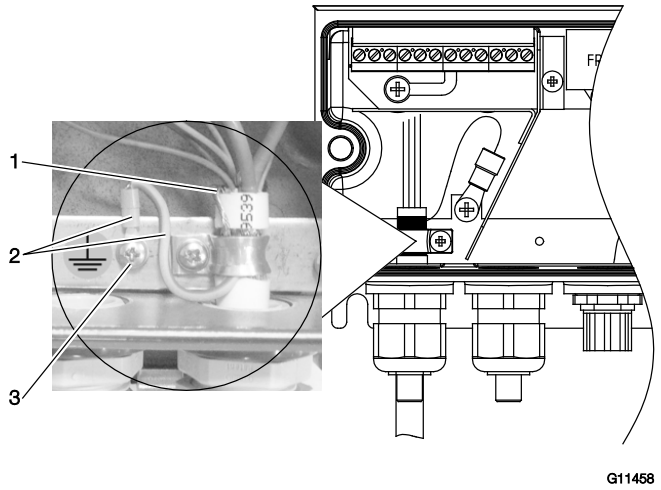


Fig. 29

According to NEC standards, the separate ground connection between flowmeter sensor and transmitter can be established as follows:
1. Strip the signal cable on a length of 100 ... 120 mm (3.94 ... 4,72 inch).
2. Fan out the braided shield (1) that runs through the signal cable to a length of 10 ... 15 mm (0.39 ... 0.59 inch). Twist the disentangled wires of the braided shield so that they form one strand.
3. Slide the green/yellow protective tubing over the strand, leaving 10 mm (0.39 inch) protruding from the end (if necessary, shorten the protective tubing).
4. Press on the ring-type terminal (2) supplied.
5. Connect to the grounding connection (3).

6.7.4 Process sealing

According to „North American Requirements for Process Sealing between Electrical Systems and Flammable or Combustible Process Fluids“

IMPORTANT (NOTE)
Equipment for use in Canada, Class II, Groups E, F and G shall be limited to a maximum surface temperature of 165°C (329 °F).
Seal all conduits within 18 inches (457.20 mm).

The flow meters from ABB are designed for the world wide industrial market and are suitable to measure among others flammable and combustible process fluids and are installed within a process pipe.
Among others the instruments are connected to an electrical system via a conduit system which is able to allow the migration of process fluids directly into the electrical system.

To avoid the migration of process fluids the instruments has a process seal which meet the requirements of ANSI/ISA 12.27.01.
The Coriolis Flowmeters are designed as a “single seal device”.
In accordance to the requirements of ANSI/ISA 12.27.01 the existing operating rates of temperature, pressure and liner types have to reduce to the following limits:

Limits	
Flange or tube Material	All materials of the existing model number
Sizes	DN 20 ... 150 (1/2” ... 6”)
Usable Operating Temperature	-50 °C ... 200 °C (-58 °F ... 392 °F)
Pressure result	PN100 / Class 600

6.7.5 Changing the type of protection

The FCB330/350, FCH330/350 and FCT330/350 models can be operated in different types of protection:
- When connected to an intrinsically safe circuit in Div. 1, operated as an intrinsically safe device (IS)
- When connected to a non-intrinsically safe circuit in Div. 1, operated as a device with a explosionproof enclosure (XP)
- When connected to a non-intrinsically safe circuit in Div. 2, operated as a non-incendive device (NI)

If a device which is already installed is required to provide a different type of protection, the following measures must be implemented/inspections must be performed in accordance with applicable standards.

1. Type of protection	2. Type of protection	Required step/check
Housing: XP, U_{max} = 60 V Outputs non IS	Housing: XP Outputs: IS	— 500 V AC/1 min or 500 x 1,414 = 710 V DC/1 min test between terminals 31 / 32, 33 / 34, 41 / 42, 51 / 52, 81 / 82 and / or 97 / 98 and terminals 31, 32, 33, 34, 41, 42, 51, 52, 81, 82, 97, 98 and the housing. When this test is performed, no voltage flashover is permitted in or on the device. — Visual inspection, particularly of the electronic circuit boards — Visual inspection: No damage or explosion can be detected.
	Housings: Div 2 Outputs: NI	— 500 V AC/1 min or 500 x 1,414 = 710 V DC/1 min test between terminals 31 / 32, 33 / 34, 41 / 42, 51 / 52, 81 / 82 and / or 97 / 98 and terminals 31, 32, 33, 34, 41, 42, 51, 52, 81, 82, 97, 98 and the housing. When this test is performed, no voltage flashover is permitted in or on the device. — Visual inspection, particularly of the electronic circuit boards — Visual inspection: No damage or explosion can be detected.
Outputs: IS Housing: XP	Housing: XP Outputs: non IS	Visual inspection: No damage to the threads (cover, 1/2" NPT cable glands)
	Housing: XP Outputs: NI	No special measures
Housing: XP, U_{max} = 60 V Outputs: NI	Housing: XP Outputs: IS	— 500 V AC/1 min or 500 x 1,414 = 710 V DC/1 min test between terminals 31 / 32, 33 / 34, 41 / 42, 51 / 52, 81 / 82 and / or 97 / 98 and terminals 31, 32, 33, 34, 41, 42, 51, 52, 81, 82, 97, 98 and the housing.When this test is performed, no voltage flashover is permitted in or on the device. — Visual inspection, particularly of the electronic circuit boards — Visual inspection: No damage or explosion can be detected.
	Housing: XP Outputs: non IS	Visual inspection: No damage to the threads (cover, 1/2" NPT cable glands)

7 Ex relevant specifications acc. to ATEX / IECEx / NEPSI

7.1 Electrical data

7.1.1 Overview of the different output options

Versions	ATEX, IECEx, NEPSI Zone 2	ATEX, IECEx, NEPSI Zone 1
Version I Output option A1, A2, H1, H2 in the order number	— Current output 1: Active — Current output 2: Passive — Pulse output: Active / passive, switchable — Switching input and output: Passive	— Current output 1: Active — Current output 2: Passive — Pulse output: Passive — Switching input and output: Passive
Version II Output option A3, H3 in the order number		— Current output 1: Passive — Current output 2: Passive — Pulse output: Passive — Switching input and output: Passive

7.1.2 Version I: Active / passive current outputs

Model FCx3xx-A1, FCT3xx-A1 or FCx3xx-A2, FCT3xx-A2 or FCx3xx-S2, FCT3xx-S2

	Type of protection "nA" (Zone 2)		General operating values		Type of protection "e" (Zone 1)		Type of protection "ib" (Zone 1)					
Current output 1, active Terminals 31 / 32 Terminal 32 is connected to "PA"	U_i (V)	I_i (mA)	U_b (V)	I_b (mA)	U (V)	I (mA)	U_o (V) U_i (V)	I_o (mA) I_i (mA)	P_o (mW) P_i (mW)	C_o (nF) C_i (nF)	C_o pa (nF) C_i pa (nF)	L_o (mH) L_i (mH)
	30	30	30	30	60	35	20 60	100 100	500 500	217 2.4	0 2.4	3.8 0.17
Current output 2, passive Terminals 33 / 34 Terminal 34 is connected to "PA"	30	30	30	30	60	35	30	100	760	2.4	2.4	0.17
Pulse output, passive Terminals 51 / 52	30	65	30	65	60	35	15	30	115	2.4	2.4	0.17
Switching output, passive Terminals 41 / 42	30	65	30	65	60	35	15	30	115	2.4	2.4	0.17
Switching input, passive Terminals 81 / 82	30	10	30	10	60	35	30	60	500	2.4	2.4	0.17

All inputs and outputs are electrically isolated from one other and from the power supply. Only current outputs 1 and 2 in zone 1 design are not electrically isolated from one another.

7.1.3 Version II: Passive / passive current outputs

Model FCx3xx-A1, FCT3xx-A1 or FCx3xx-A2, FCT3xx-A2 or FCx3xx-S2, FCT3xx-S2												
	Type of protection "nA" (Zone 2)		General operating values		Type of protection "e" (Zone 1)		Type of protection "ia" (Zone 1)					
	U_i (V)	I_i (mA)	U_b (V)	I_b (mA)	U (V)	I (mA)	U_i (V)	I_i (mA)	P_i (mW)	C_i (nF)	C_i pa (nF)	L_i (mH)
Current output 1, passive Terminals 31 / 32	30	30	30	30	60	35	60	300	2000	0.47	0.47	0.17
Current output 2, passive Terminals 33 / 34	30	30	30	30	60	35	60	300	2000	0.47	0.47	0.17
Pulse output, passive Terminals 51 / 52	30	65	30	65	60	35	60	300	2000	0.47	0.47	0.17
Switching output, passive Terminals 41 / 42	30	65	30	65	60	35	60	300	2000	0.47	0.47	0.17
Switching input, passive Terminals 81 / 82	30	10	30	10	60	35	60	300	2000	0.47	0.47	0.17

All inputs and outputs are electrically isolated from one other and from the auxiliary power.

7.1.4 Special connection conditions

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

It is not permitted to combine intrinsically safe and non-intrinsically safe circuits. In case of a change of type of protection observe chapter 6.6.7.

On intrinsically-safe circuits, equipotential bonding must be in place along the entire length of the cable used for the current outputs.

The rated voltage of the non-intrinsically safe circuits is U_M = 60 V.

The switching output and the pulse output (terminals 41 / 42 and 51 / 52) can be wired internally as a NAMUR contact for the purpose of connecting a NAMUR amplifier.

The cable glands are supplied in black by default. If the signal outputs are wired to intrinsically-safe circuits, we recommend that you use the light blue caps supplied for the appropriate cable entries.

IMPORTANT (NOTE)

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

7.2 Flowmeter sensor model FCB3xx / FCH3xx

7.2.1 Temperature class

Model FCx3xx-A1Y... or FCx3xx-S1Y... Zone 1			
Ambient temperature	≤40 °C (≤104 °F)	≤50 °C (≤122 °F)	≤60 °C (≤140 °F)
Temperature class			
T1	200 °C (392 °F)	200 °C (392 °F)	200 °C (392 °F)
T2	200 °C (392 °F)	200 °C (392 °F)	200 °C (392 °F)
T3	185 °C (365 °F)	180 °C (356 °F)	180 °C (356 °F)
T4	125 °C (257 °F)	120 °C (248 °F)	120 °C (248 °F)
T5	85 °C (185 °F)	85 °C (185 °F)	75 °C (167 °F)
T6	65 °C (149 °F)	65 °C (149 °F)	60 °C (140 °F)

Model FCx3xx-A2Y... or FCx3xx-S2Y... Zone 2			
Ambient temperature	≤40 °C (≤104 °F)	≤50 °C (≤122 °F)	≤60 °C (≤140 °F)
Temperature class			
T1	200 °C (392 °F)	200 °C (392 °F)	180 °C (356 °F)
T2	200 °C (392 °F)	200 °C (392 °F)	180 °C (356 °F)
T3	180 °C (356 °F)	180 °C (356 °F)	180 °C (356 °F)
T4	115 °C (239 °F)	115 °C (239 °F)	115 °C (239 °F)
T5	80 °C(176 °F)	80 °C(176 °F)	75 °C (167 °F)
T6	60 °C (140 °F)	60 °C (140 °F)	60 °C (140 °F)

Ambient and process conditions:

T_{amb} -20 ... 60 °C (-4 ... 140 °F)

$T_{amb, optional}$ -40 ... 60 °C (-40 ... 140 °F) (only for integral mount design devices)

T_{medium} -50 ... 200 °C (-58 ... 392 °F)

Protection class IP 65, IP 67, and NEMA 4X

7.2.2 Hazardous area approval ATEX / IECEx / NEPSI

Specific marking according to ATEX, IECEx and NEPSI applies depending on the design of the flowmeter sensor (integral or remote mount design).

IMPORTANT (NOTE)

ABB reserves the right to make changes to the Ex-marking. The exact marking can be found at the name plate of the meter.

Modell FCx3xx-A2A... or FCx3xx-S2A... (remote mount design in Zone 2)		
Approval	**Marking**	**Comment**
ATEX	II 3 G Ex nA IIC T6 ... T2 II 2 D Ex tD IIIC T85°C .. Tmedium	-
IECEx or NEPSI	Ex nA IIC T6 .. T2 Gc Ex tb IIIC T85°C Tmedium	-

Model FCx3xx-A1A... or FCx3xx-S1A... (remote mount design in Zone 1)		
Approval	**Marking**	**Comment**
ATEX	II 1 G Ex ia IIC T6 ... T2 II 1 D Ex ia IIIC T85°C... Tmedium	-
IECEx or NEPSI	T2 Ga Ex ia IIIC T85°C .. Tmedium Da	-

Model FCx3xx-A2Y... or FCx3xx-S2Y... (integral mount design in Zone 2)		
Approval	**Marking**	**Comment**
ATEX	II 3 G Ex nA nR IIC T6 ... T2 II 2 D Ex tD IIIC T85°C .. Tmedium	-
IECEx or NEPSI	Ex nA nR IIC T6 .. T2 Gc Ex tb IIIC T85°C Tmedium Db	-

Modell FCx3xx-A1Y... or FCx3xx-S1Y... (integral mount design in Zone 1)		
Approval	**Marking**	**Comment**
ATEX		
Version II	II 1/2 G Ex d e ia IIC T6 .. T2 II 2 D Ex ia tb IIIC T85°C .. Tmedium	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	II 1/2 G Ex d e ia ib IIC T6 .. T2 or II 1/2 G Ex d e ia IIC T6 .. T2 II 2 D Ex ia ia tb IIIC T85°C .. Tmedium or II 2 D Ex ia tb IIIC T85°C .. Tmedium	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.
IECEx or NEPSI		
Version II	Ex d e ia IIC T6 .. T2 Ga/Gb Ex ia tb IIIC T85°C .. Tmedium	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	Ex d e ia ib IIC T6 .. T2 Ga/Gb or Ex d e ia IIC T6 .. T2 Ga/Gb Ex ia ib tb IIIC T85°C .. Tmedium or Ex ia tb IIIC T85°C .. Tmedium	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.

7.3 Transmitter model FCT300 in remote mount design

Ambient and process conditions:
T_{amb} -20 ... 60 °C (-4 ... 140 °F)
Protection class IP 65, IP 67, and NEMA 4X / Type 4X

7.3.1 Hazardous area approval ATEX / IECEx / NEPSI

Specific marking according to ATEX, IECEx and NEPSI applies depending on the design of the flowmeter sensor (integral or remote mount design).

IMPORTANT (NOTE)

ABB reserves the right to make changes to the Ex-marking. The exact marking can be found at the name plate of the meter.

Model FCT3xx-Y0... (Transmitter outside the hazardous area, Sensor in Zone 0, 1 or 2)		
Approval	**Marking**	**Comment**
ATEX	II (1) G [Ex ia] IIC	-
IECEx or NEPSI	[Ex ia Ga] IIC	-

Model FCT3xx-A2... or FCT3xx-S2... (Transmitter in Zone 2, Sensor in Zone 0, 1 or 2)		
Approval	**Marking**	**Comment**
ATEX	II 3(2) G Ex nA nR [ia] IIC T6 II 2 D Ex tb [ia] IIIC T85°C	-
IECEx or NEPSI	Ex nA nR [ia] IIC T6 Gc (Gb) Ex tb [ia] IIIC T85°C Db	-

Modell FCT3xx-A1... or FCT3xx-S1... (Transmitter in Zone 1, Sensor in Zone 0, 1 or 2)		
Approval	**Marking**	**Comment**
ATEX		
Version II	II 2 (1) G Ex d e ia IIC T6 II 2 (1) D Ex ia tb IIIC T85°C	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	II 2 (1) G Ex d e ib [ia] IIC T6 or II 2 (1) G Ex d e [ia] IIC T6 II 2 (1) D Ex ib tb [ia] IIIC T85°C or II 2 (1) D Ex tb [ia] IIIC T85°C	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.
IECEx or NEPSI		
Version II	Ex d e ia IIC T6 Gb (Ga) Ex ia tb IIIC T85°C Db (Da)	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	Ex d e ib [ia Ga] IIC T6 Gb or Ex d e [ia Ga] IIC T6 Gb Ex ib tb [ia Da] IIIC T85°C Db or Ex tb [ia Da] IIIC T85°C Db	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.

8 Ex relevant specifications acc. to cFMus

8.1 Overview of the different output options

Versions	Class I Div. 2	Class I Div. 1
Version I Output option A1, A2, H1, H2 in the order number	— Current output 1: Active — Current output 2: Passive — Pulse output: Active / passive, switchable — Switching input and output: Passive	— Current output 1: Active — Current output 2: Passive — Pulse output: Passive — Switching input and output: Passive
Version II Output option A3, H3 in the order number		— Current output 1: Passive — Current output 2: Passive — Pulse output: Passive — Switching input and output: Passive

8.2 Electrical data for Div. 2 / Zone 2

8.2.1 Version I: Active / passive current outputs and Version II: passive / passive current outputs

Model FCx3xx-F2, FCT3xx-F2		
	Type of protection NI	
	$Vmax_o$ (V)	$Imax_o$ (mA)
Current output 1 Terminals 31 / 32	30	30
Current output 2 Terminals 33 / 34	30	30
Pulse output Terminals 51 / 52	30	65
Switching output Terminals 41 / 42	30	65
Switching input Terminals 81 / 82	30	10

All inputs and outputs are electrically isolated from one other and from the power supply.

8.3 Electrical data for Div. 1 / Zone 1

8.3.1 Version I: Active / passive current outputs

Model FCx3xx-F1, FCT3xx-F1								
	Type of protection non IS		Type of protection IS					
	$Vmax_o$ (V)	$Imax_o$ (mA)	$Vmax_o$ (V)	$Imax_o$ (mA)	P_o (mW)	C_o (nF)	$C_{o\ PA}$ (nF)	L_0 (mH)
Current output 1, active	30	30	20	100	500	217	0	3.8
Terminals 31 / 32			VMax (V)	I_{Max} (mA)	P_i (mW)	C_i (nF)	$C_{i\ PA}$ (nF)	L_i (mH)
			60	100	500	2.4	2.4	0.17
Current output 2, passive Terminals 33 / 34	30	30	30	100	760	2.4	2.4	0.17
Pulse output, active or passive Terminals 51 / 52	30	65	15	30	115	2.4	2.4	0.17
Switching output, passive Terminals 41 / 42	30	65	15	30	115	2.4	2.4	0.17
Switching input, passive Terminals 81 / 82	30	10	30	60	500	2.4	2.4	0.17

All inputs and outputs are electrically isolated from one other and from the power supply. Only current outputs 1 and 2 are not electrically isolated from one another.

8.3.2 Version II: Passive / passive current outputs

Model FCx3xx-F1, FCT3xx-F1								
	Type of protection non IS		Type of protection IS					
	Vmax (V)	Imax (mA)	Vmax (V)	Imax (mA)	Pi (mW)	Ci (nF)	$C_{i\ PA}$ (nF)	L_i (mH)
Current output 1, passive Terminals 31 / 32	30	30	60	300	2000	0.47	0.47	0.17
Current output 2, passive Terminals 33 / 34	30	30	60	300	2000	0.47	0.47	0.17
Pulse output, active or passive Terminals 51 / 52	30	65	60	300	2000	0.47	0.47	0.17
Switching output, passive Terminals 41 / 42	30	65	60	300	2000	0.47	0.47	0.17
Switching input, passive Terminals 81 / 82	30	10	60	300	2000	0.47	0.47	0.17

All inputs and outputs are electrically isolated from one other and from the power supply.

8.3.3 Special connection conditions

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

It is not permitted to combine intrinsically-safe and non-intrinsically safe circuits. In case of a change of type of protection observe chapter 6.7.5.

On intrinsically-safe circuits, equipotential bonding must be in place along the entire length of the cable used for the current outputs.

The rated voltage of the non-intrinsically-safe circuits is U_M = 60 V.

Provided that rated voltage UM = 60 V is not exceeded if connections are established to non-intrinsically-safe external circuits, intrinsic safety is retained.

IMPORTANT (NOTE)

The transmitter and flowmeter sensor enclosures must be connected to equipotential bonding PA. The operator must ensure that when connecting the protective conductor PE no potential differences can occur between the protective conductor PE and the equipotential bonding PA.

8.4 Flowmeter sensor model FCB300 / FCH300

8.4.1 Temperature class

Model FCx3xx-F1..., in Class I Div. 1			
Ambient temperature	≤40 °C (≤104 °F)	≤50 °C (≤122 °F)	≤60 °C (≤140 °F)
Temperature class			
T1	200 °C (392 °F)	200 °C (392 °F)	200 °C (392 °F)
T2	200 °C (392 °F)	200 °C (392 °F)	200 °C (392 °F)
T3	185 °C (365 °F)	180 °C (356 °F)	180 °C (356 °F)
T4	125 °C (257 °F)	120 °C (248 °F)	120 °C (248 °F)
T5	85 °C (185 °F)	85 °C (185 °F)	75 °C (167 °F)
T6	65 °C (149 °F)	65 °C (149 °F)	60 °C (140 °F)

Model FCx3xx-F2..., in Class I Div. 2			
Ambient temperature	≤40 °C (≤104 °F)	≤50 °C (≤122 °F)	≤60 °C (≤140 °F)
Temperature class			
T1	200 °C (392 °F)	200 °C (392 °F)	180 °C (356 °F)
T2	200 °C (392 °F)	200 °C (392 °F)	180 °C (356 °F)
T3	180 °C (356 °F)	180 °C (356 °F)	180 °C (356 °F)
T4	115 °C (239 °F)	115 °C (239 °F)	115 °C (239 °F)
T5	80 °C (176 °F)	80 °C (176 °F)	75 °C (167 °F)
T6	60 °C (140 °F)	60 °C (140 °F)	60 °C (140 °F)

Ambient and process conditions:

T_{amb} -20 ... 60 °C (-4 ... 140 °F)

$T_{amb, optional}$ -40 ... 60 °C (-40 ... 140 °F) (only for integral mount design devices)

T_{medium} -50 ... 200 °C (-58 ... 392 °F)

Protection class IP 65, IP 67, and NEMA 4X / Type 4X

IMPORTANT (NOTE)

In the case of the remote mount design, the signal cable between the flowmeter sensor and the transmitter must measure at least 5 m (16.4 ft) in length. Install conduit seals within 18” (45 cm).

8.4.2 Hazardous area approval cFMus

Specific marking according to FM applies depending on the design of the flowmeter sensor (integral or remote mount design).

IMPORTANT (NOTE)

ABB reserves the right to make changes to the Ex-marking. The exact marking can be found at the name plate of the meter.

Model FCx3xx-F2A... (remote mount design in Zone 2, Div 2)		
Approval	**Marking**	**Comment**
FM (marking US)	NI: CL I,II,III, DIV 2, GPS ABCDEFG CL I, ZN2, AEx nA IIC T6 ... T2 ZN 21 AEx tb IIIC T85°C ... T165°C	-
FM (marking Canada)	NI: CL I, II, III, Div 2 GPS ABCDEFG Ex nA IIC T6 ... T2	-

Model FCx3xx-F2Y... (integral mount design in Zone 2, Div 2)		
Approval	**Marking**	**Comment**
FM (marking US)	NI: CL I, II, III, Div 2 GPS ABCDEFG DIP: CL II Div 1 GPS EFG DIP : CL III, Div 1,2 CL I, ZN 2, AEx nA nR IIC T6 ... T2 ZN 21 AEx tb IIIC T85°C ... T165°C	-
FM (marking Canada)	NI: CL I, II, III, Div 2 GPS ABCDEFG DIP: CL II Div 1 GPS EFG DIP : CL III, Div 1,2 Ex nA nR IIC T6 ... T2	-

Model FCx3xx-F1A... (remote mount design in Zone 1, Div 1)		
Approval	**Marking**	**Comment**
FM (marking US)	CL I, II, III, Div 1, GPS ABCDEFG CL I, ZN0, AEx ia IIC T6 ... T2 ZN 20 AEx ia IIIC T85°C ... T165°C	-
FM (marking Canada)	CL I, II, III, Div 1, GPS ABCDEFG Ex ia IIC T6 ... T2	-

Model FCx3xx-F1Y… (integral mount design in Zone 1, Div 1)		
Approval	**Marking**	**Comment**
FM (marking US)		
Version II	IS: CL I, Div 1, GPS ABCD NI: CL I,II,III, DIV2, GPS ABCDEFG XP: CL I, Div 1, GPS ABCD DIP: CL II, Div 1, GPS EFG DIP: CL III, Div 1, 2 CL I, ZN1, AEx d ia IIC T6 ZN 21 AEx ia tb IIIC T85°C to T165°C	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	IS: CL I, Div 1, GPS ABCD NI: CL I, II, III, DIV2, GPS ABCDEFG XP: CL I, Div 1, GPS ABCD DIP: CL II, Div 1, GPS EFG DIP: CL III, Div 1, 2 CL I, ZN 1, AEx d ia ib IIC T6 or CL I, ZN 1, AEx d ia IIC T6 ZN 21 AEx ib ia tb IIIC T85°C or ZN21 AEx tb ia IIC T6	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.
FM (marking Canada)		-
Version II	IS: CL I, Div 1, GPS ABCD NI: CL I,II,III, Div 2, GPS ABCDEFG XP: CL I, Div 1, GPS BCD DIP CL II, Div 1, GPS EFG DIP CL III, Div 1, 2 Ex d ia IIC T6	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	IS: CL I, Div 1, GPS ABCD NI: CL I, II, III, Div 2, GPS ABCDEFG XP: CL I, Div 1, GPS BCD DIP: CL II, Div 1, GPS EFG DIP: CL III, Div 1, 2 Ex d ia ib IIC T6 or Ex d ia IIC T6	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.

8.5 Transmitter model FCT300 in remote mount design

Ambient and process conditions:
T_{amb} -20 ... 60 °C (-4 ... 140 °F)
Protection class IP 65, IP 67, and NEMA 4X / Type 4X

8.5.1 Hazardous area approval cFMus

Specific coding according to FM applies depending on the design of the flowmeter sensor (integral or remote mount design).

IMPORTANT (NOTE)

ABB reserves the right to make changes to the Ex-marking. The exact marking can be found at the name plate of the meter.

Model FCT3xx-Y0... (Transmitter in General Purpose and Sensor in Zone 2, Div 2 or Zone 0, Div 1)		
Approval	**Marking**	**Comment**
FM (marking US)	NI: CL I, II, III, Div 2 GPS ABCDEFG DIP: CL II Div 1 GPS EFG DIP: CL III, Div 1,2	-
FM (marking Canada)	NI: CL I, II, III, Div 2 GPS ABCDEFG DIP: CL II Div 1 GPS EFG DIP: CL III, Div 1,2	-

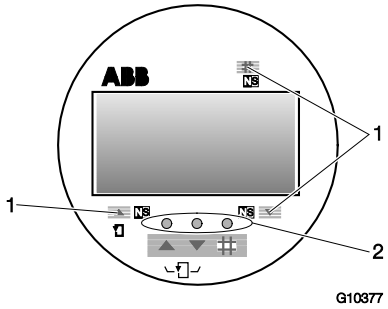
Model FCT3xx-F2... (Transmitter and Sensor in Zone 2, Div 2)		
Approval	**Marking**	**Comment**
FM (marking US)	NI: CL I, II, III, Div 2 GPS ABCDEFG DIP: CL II Div 1 GPS EFG DIP: CL III, Div 1,2 CL I, ZN 2, AEx nA nR [ia] IIC T6 ZN 21 AEx tb [ia] IIIC T85°C	-
FM (marking Canada)	NI: CL I, II, III, Div 2 GPS ABCDEFG DIP: CL II Div 1 GPS EFG DIP: CL III, Div 1,2 Ex nA nR [ia] IIC T6	-

Model FCT3xx-F1… (Transmitter in Zone 1, Div 1, Sensor in Zone 0, 1 or 2, Div 2 oder Div 1)		
Approval	**Marking**	**Comment**
FM (marking US)		
Version II	IS: CL I, Div 1, GPS ABCD NI: CL I, II, III, DIV2, GPS ABCDEFG XP: CL I, Div 1, GPS ABCD DIP: CL II, Div 1, GPS EFG DIP: CL III, Div 1, 2 CL I, ZN1, AEx d ia IIC T6 ZN 21 AEx ia tb IIIC T85°C	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	IS: CL I, Div 1, GPS ABCD NI: CL I, II, III, DIV2, GPS ABCDEFG XP: CL I, Div 1, GPS ABCD DIP: CL II, Div 1, GPS EFG DIP: CL III, Div 1, 2 CL I, ZN 1, AEx d ib [ia] IIC T6 or CL I, ZN1, AEx d [ia] IIC T6 ZN21 AEx ib tb [ia] IIIC T85°C or ZN21 AEx tb [ia] IIC T6	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.
FM (marking Canada)		
Version II	IS: CL I, Div 1, GPS ABCD NI: CL I, II, III, Div 2, GPS ABCDEFG XP: CL I, Div 1, GPS BCD DIP: CL II, Div 1, GPS EFG DIP: CL III, Div 1, 2 Ex d ia IIC T6	2 passive analog outputs, outputs "ia" / "e", depending on user wiring.
Version I	IS: CL I, Div 1, GPS ABCD NI: CL I, II, III, Div 2, GPS ABCDEFG XP: CL I, Div 1, GPS BCD DIP: CL II, Div 1, GPS EFG DIP CL III, Div 1, 2 Ex d ib [ia] IIC T6 or Ex d [ia] IIC T6	Active / passive analog outputs, outputs "ib" / "e", depending on user wiring.

9 Configuration, parameterization

9.1 Operation

9.1.1 Menu navigation



3 Line 1
4 Line 2

Fig. 30: LCD indicators

1 Points for inserting the magnet stick | 2 Buttons for menu navigation | 3 1st line of the LCD display | 4 2nd line of the LCD display

When setting parameters, the transmitter remains online, i.e., current and pulse outputs still show the current operating mode.

Control button functions

You can browse through the menu or select values from a list using the ▲ or ▼ buttons.
Depending on your position in the menu, the buttons may have other functions.

Symbol	Meaning
⊞	— Toggle between process display and menu — Exit submenu
▲	— Scroll forwards through the menu or a parameter list — For increasing numerical values (increment)
▼	— Scroll backwards through the menu or a parameter list — For reducing numerical values (decrement) — Select the next position for entering numerical and alphanumeric values
▲ + ▼	ENTER function Press the ▲ + ▼ buttons at the same time to execute the ENTER function. — Select a parameter to change — Confirm the entry of a value or parameter — Call up submenu

IMPORTANT (NOTE)
The values entered are checked for plausibility; if they are not plausible, a corresponding message appears on the LCD display.

Magnet stick operation

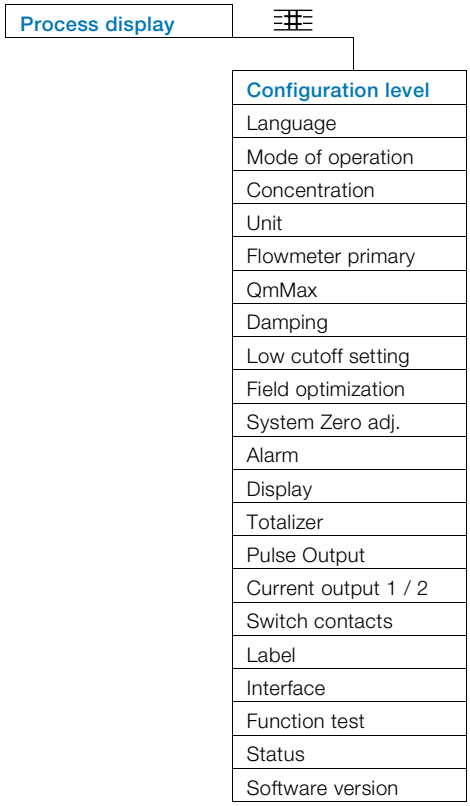
The magnet stick provides an alternative means of configuring the device even when the housing cover is closed.
To execute the functions, hold the active side of the magnet stick against the corresponding areas on the LCD display. These areas are identified by the NS symbol.

ENTER function with magnet stick operation

It is not possible to use the magnet stick to press two buttons at the same time. To execute the ENTER function when using the magnet stick to operate the device, hold the stick against the ▲ area for more than 3 seconds.
The LCD display flashes to indicate that the ENTER function has been executed successfully.

9.2 Menu levels

The configuration level is located under the process display.



Process display	The process display shows the current process values.
Configuration level	The configuration level contains all the parameters required for device commissioning and configuration. The device configuration can be changed on this level.

9.2.1 Process display

The process display appears on the LCD display when the device is switched on. It shows information about the device and current process values.

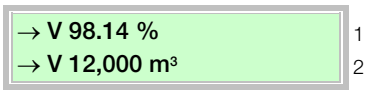


Fig. 31: Process display
1 1st line of the process display |
2 2nd line of the process display

The way in which the current process values are shown in lines 1 and 2 can be adjusted on the configuration level.

Symbol	Description
→	Display in forward direction
←	Display in reverse direction

Error messages on the LCD display

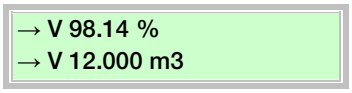
In the event of an error, a message appears on the process display. The text displayed provides information about the area in which the error has occurred.

IMPORTANT (NOTE)
For a detailed error description and information on troubleshooting, refer to the operating instructions for the device.

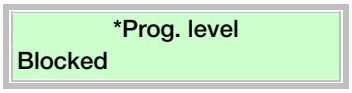
9.2.2 Switching to the configuration level (parameterization)

The device parameters can be displayed and changed on the configuration level.

IMPORTANT (NOTE)
If the message "Error – operating protection" appears on the LCD display, hardware write protection has been activated with the operating protection switch.

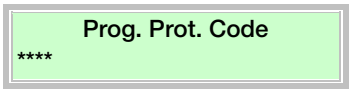


1. Use ⊞ to switch to the configuration level: A menu option now appears at random on the LCD display.
2. Use ▲ or ▼ to select the "Prog. level" submenu and ▲ + ▼ (ENTER function) to select edit mode.



3. Use ▲ or ▼ to select the "Specialist" access level.
4. Use ▲ + ▼ (ENTER function) to confirm your settings.

If a password has been set (Prog. Prot. Code) you must enter it now.



5. Use ▲ to set the required value (the decimal position is incremented every time the button is pressed).
6. Use ▼ to select the next decimal position.
7. Use ▲ + ▼ (ENTER function) to confirm your settings.

After the correct password has been entered, the corresponding access level is opened. If the "Service" programming level was selected, then the service password must be entered.
The LCD display now indicates the first menu item on the configuration level.

8. Use ▲ or ▼ to select a menu.
9. Use ▲ + ▼ (ENTER function) to confirm your selection.

Access levels

IMPORTANT (NOTE)
There are four access levels: A password can be specified for the "Standard" and "Specialist" access levels.
There is no factory default password.

Access levels	Description
Blocked	On the "Blocked" level all entries are disabled. Menus / parameters are read only and cannot be modified.
Standard	Display and modify all menus / parameters required for operating the device.
Specialist	Display and modify all menus / parameters that can be accessed by the customer.
Service	The service menu can be displayed by entering the correct service password (for ABB Service only).

9.2.3 Selecting and changing parameters

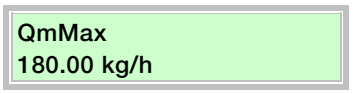
Entry from table

When an entry is made from a table, a value is selected from a list of parameter values.

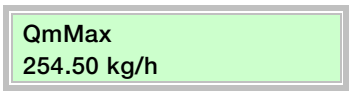
1. Select the parameters you want to set in the menu.
2. Use ▲ + ▼ (ENTER function) to call up the parameter for editing.
3. Use ▲ oder ▼ to select the required value.
4. Use ▲ + ▼ (ENTER function) to confirm your selection.

Numerical entry

When a numerical entry is made, a value is set by entering the individual decimal positions.



1. Select the parameters you want to set in the menu.
2. Use ▲ + ▼ (ENTER function) to call up the parameter for editing. The value set previously is deleted and a cursor (_) is displayed in the first position.

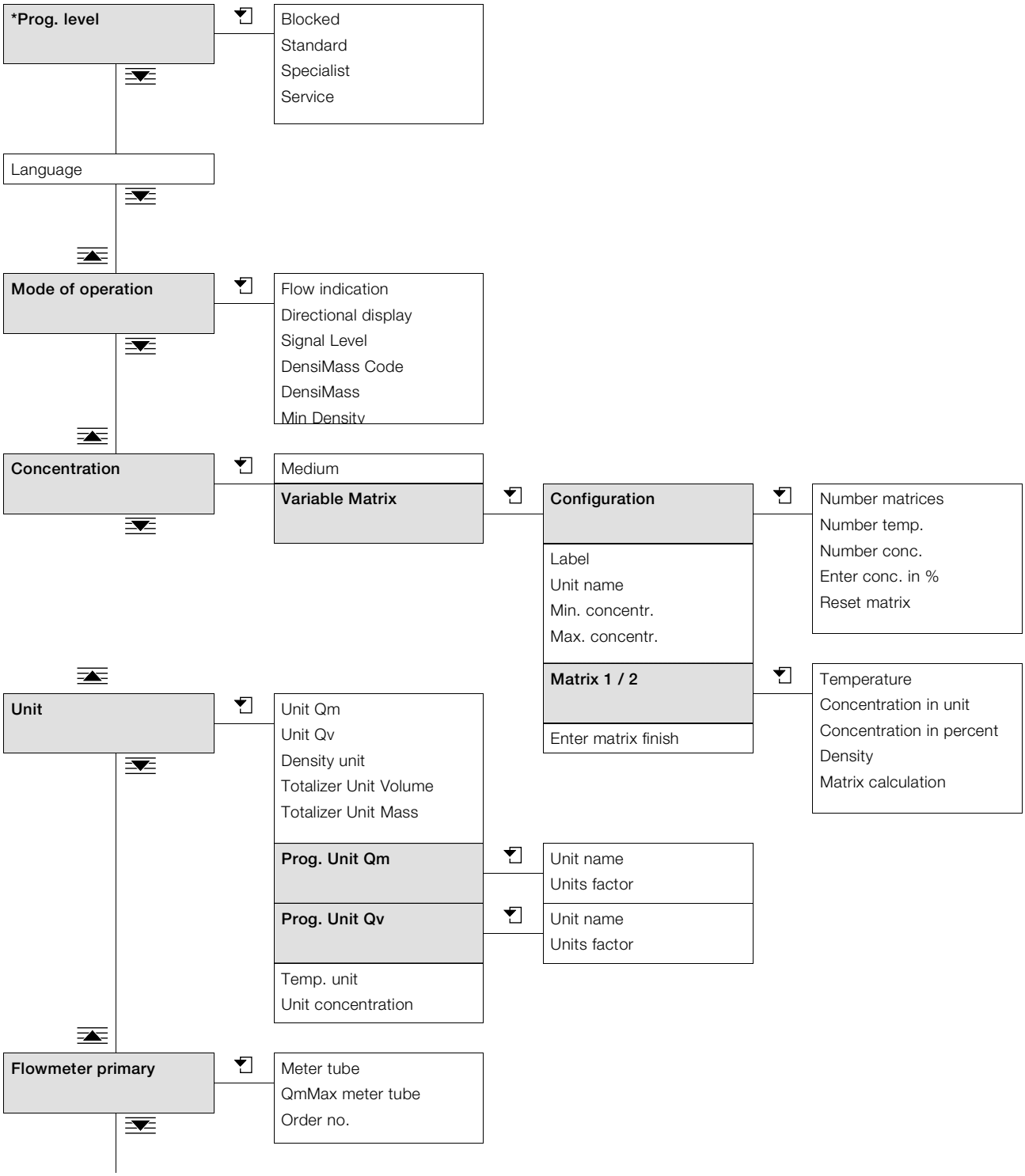


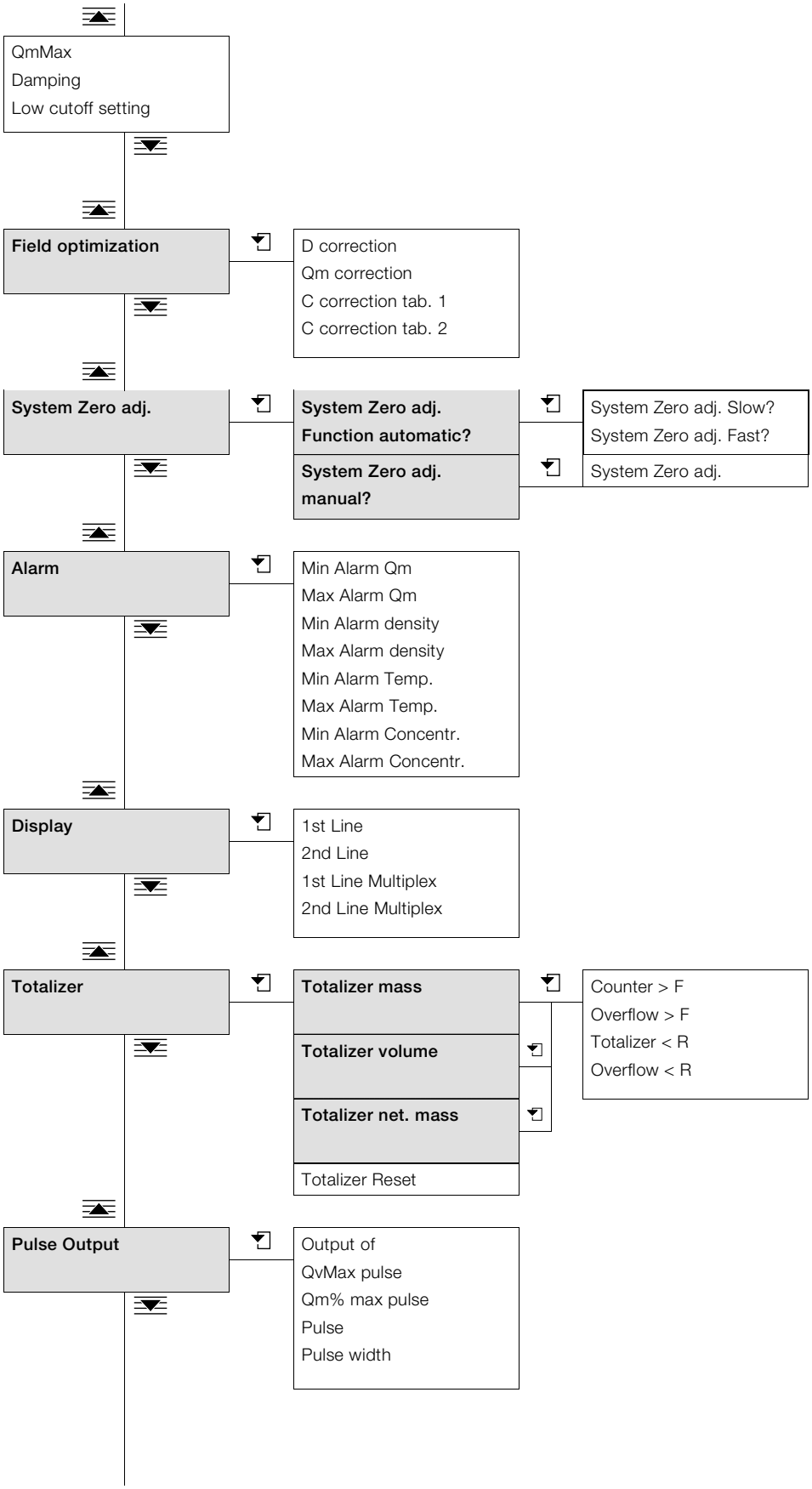
3. Use ▲ to set the required value (the decimal place is incremented every time the button is pressed).
4. Use ▼ to select the next decimal position.
5. If necessary, select and set other decimal positions using the same procedure as described in steps 3 and 4.
6. Use ▲ + ▼ (ENTER function) to confirm your settings.

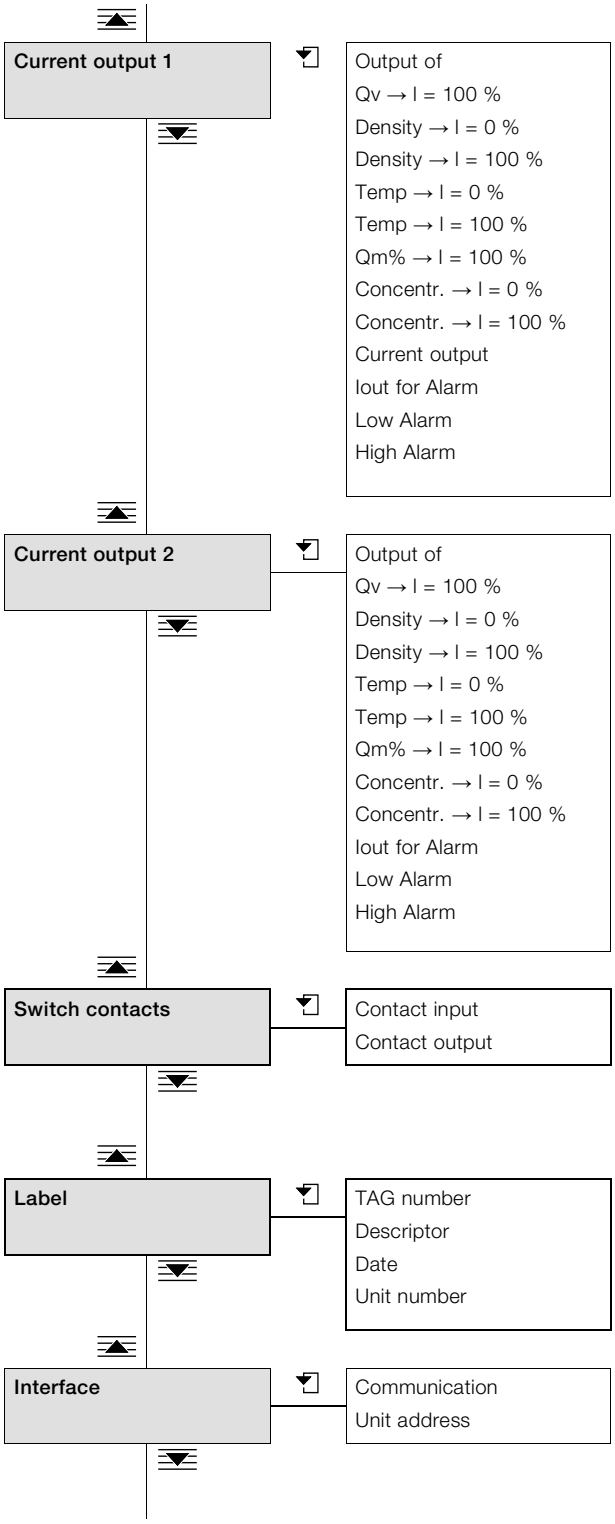
This concludes the procedure for changing a parameter value.

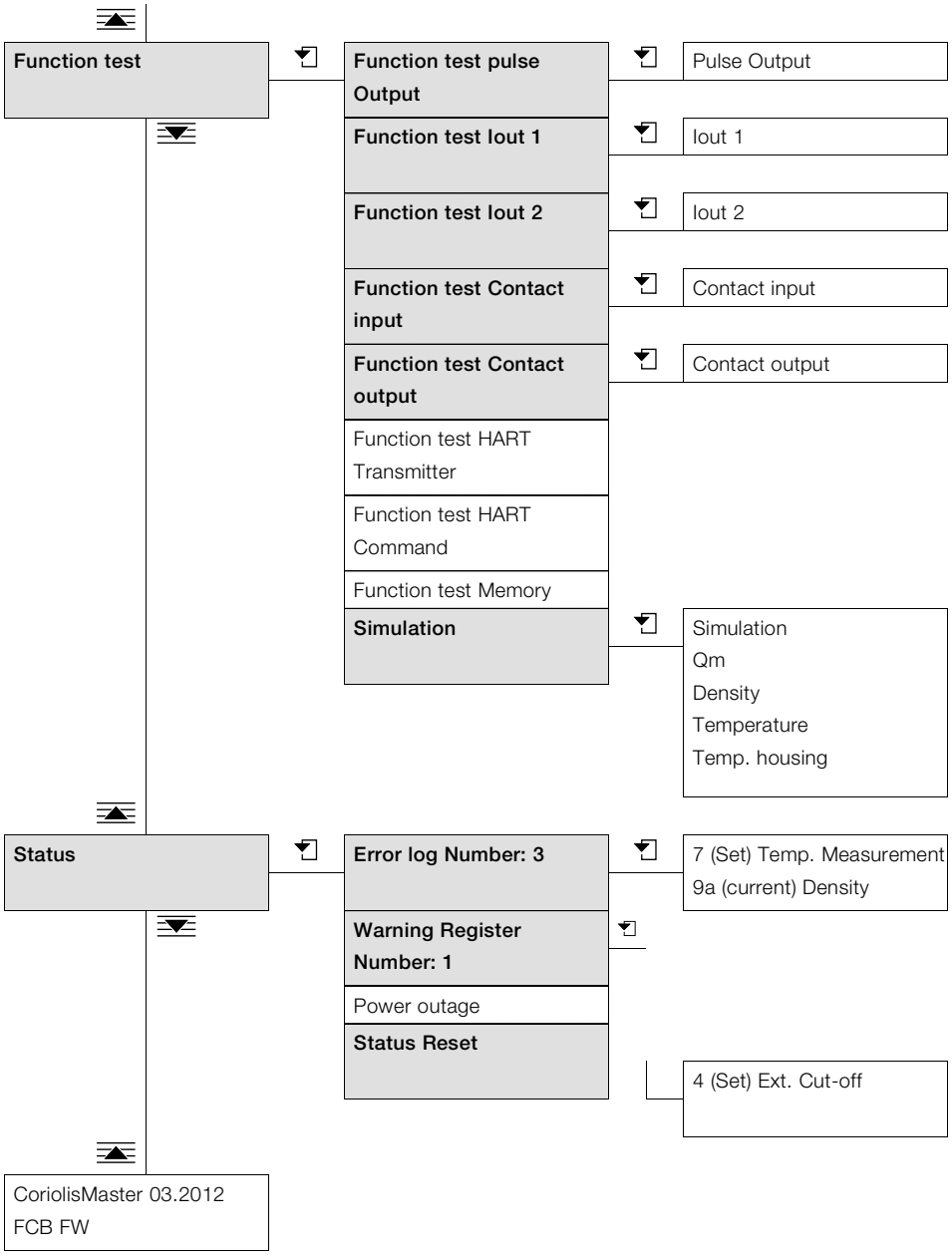
9.3 Overview of parameters on the configuration level

IMPORTANT (NOTE)
This overview of parameters shows all the menus and parameters available on the device. Depending on the version and configuration of the device, not all of the menus and parameters may be visible on it.
In this overview of parameters, the ENTER function ▲ + ▼ is represented by the ↵ symbol for reasons of space.




QmMax
Damping
Low cutoff setting
Field optimization
D correction
Qm correction
C correction tab. 1
C correction tab. 2
System Zero adj.
System Zero adj. Function automatic?
System Zero adj. Slow?
System Zero adj. Fast?
System Zero adj. manual?
System Zero adj.
Alarm
Min Alarm Qm
Max Alarm Qm
Min Alarm density
Max Alarm density
Min Alarm Temp.
Max Alarm Temp.
Min Alarm Concentr.
Max Alarm Concentr.
Display
1st Line
2nd Line
1st Line Multiplex
2nd Line Multiplex
Totalizer
Totalizer mass
Totalizer volume
Totalizer net. mass
Totalizer Reset
Counter > F
Overflow > F
Totalizer < R
Overflow < R
Pulse Output
Output of
QvMax pulse
Qm% max pulse
Pulse
Pulse width


Current output 1
Output of
Qv → I = 100 %
Density → I = 0 %
Density → I = 100 %
Temp → I = 0 %
Temp → I = 100 %
Qm% → I = 100 %
Concentr. → I = 0 %
Concentr. → I = 100 %
Current output
Iout for Alarm
Low Alarm
High Alarm
Current output 2
Output of
Qv → I = 100 %
Density → I = 0 %
Density → I = 100 %
Temp → I = 0 %
Temp → I = 100 %
Qm% → I = 100 %
Concentr. → I = 0 %
Concentr. → I = 100 %
Iout for Alarm
Low Alarm
High Alarm
Switch contacts
Contact input
Contact output
Label
TAG number
Descriptor
Date
Unit number
Interface
Communication
Unit address



Trademarks

® HART is a registered trademark of the HART Communication Foundation

™ Hastelloy C-4 is a Haynes International trademark

™ Hastelloy C-22 is a Haynes International trademark

™ Hastelloy C-276 is a Haynes International trademark

10 Appendix

10.1 Approvals and certifications

CE mark

The version of the device as provided by us meets the requirements of the following EU directives:

- EMC Directive 2004/108/EC
- Low Voltage Directive 2006/95/EC
- Pressure Equipment Directive (PED) 97/23/EC
- ATEX directive 94/9/EC

Explosion protection

Designation relating to intended use in potentially explosive atmospheres in compliance with:

- ATEX Directive (additional identification with CE mark)

IECEx

- IEC standards

- NEPSI (China)

- cFMus Approvals for Canada and United States

IMPORTANT (NOTE)

All documentation, declarations of conformity, and certificates are available in ABB's download area.
www.abb.com/flow

EG-Konformitätserklärung
EC Declaration of Conformity

Hiermit bestätigen wir die Übereinstimmung der aufgeführten Geräte mit den Richtlinien des Rates der Europäischen Gemeinschaft, welche mit dem CE-Zeichen gekennzeichnet sind. Die Sicherheits- und Installationshinweise der Produktdokumentation sind zu beachten.

We herewith confirm that the listed devices are in compliance with the council directives of the European Community and are marked with the CE marking. The safety and installation requirements of the product documentation must be observed.

Hersteller: *Manufacturer:*	ABB Automation Products GmbH, Dransfelder Straße 2, 37079 Göttingen - Germany
Gerät: *Device:*	CoriolisMaster
Modelle.: *Models:*	FCB3_ _; FCH3_ _. FCT3_ _ Flowmeter
Richtlinie: *Directive:*	2004/108/EG * (EMV) *2004/108/EC * (EMC)*
Europäische Norm: *European Standard:*	EN 61326-1, 10/2006 * EN 61326-2-3, 05/2007 *EN 61326-1, 10/2006 * EN 61326-2-3, 05/2007*
Richtlinie: *Directive:*	2006/95/EG * (Niederspannungsrichtlinie) *2006/95/EC * (Low voltage directive)*
Europäische Norm: *European Standard:*	EN 61010-1, 08/2002 * *EN 61010-1, 08/2002 **

* einschließlich Nachträge / *including alterations*

Göttingen, 03.04.2013

i.V. Dr. Günter Kuhlmann
(R&D Manager)

i.V. Klaus Schäfer
(QM Manager)

3KXF002000G0021
Rev.2. 24744

EG-Konformitätserklärung
EC-Declaration of Conformity

CE
0045

Hiermit bestätigen wir die Übereinstimmung des aufgeführten Gerätes mit den Richtlinien des Rates der Europäischen Gemeinschaft, welche mit dem CE-Zeichen gekennzeichnet sind. Die Sicherheits- und Installationshinweise der Produktdokumentation sind zu beachten.
Herewith we confirm that the listed instrument is in compliance with the council directives of the European Community and are marked with the CE markíng. The safety and installation requirements of the product documentation must be observed.

Hersteller: *Manufacturer:*	ABB Automation Products GmbH, 37070 Göttingen - Germany	
Modell: *Model:*	**CoriolisMaster FCB... und FCH...**	
Richtlinie: *Directive:*	Druckgeräterichtlinie 97/23/EG *Pressure equipment directive 97/23/EC*	
Einstufung: *Classification:*	Ausrüstungsteile von Rohrleitungen *Piping accessories*	
Normengrundlage: *Technical standard:*	AD 2000 Merkblätter und EN 12516 *AD 2000 Merkblätter and EN 12516*	
Konformitätsbewertungsverfahren: *Conformity assessment procedure:*	B (EG-Baumusterprüfung) + D (Qualitätssicherung Produktion) *B (EC-type-examination) + D (production quality assurance)*	
EG-Baumusterprüfbescheinigung: Entwurfsprüfbericht: EG-Baumusterprüfbescheinigung:	Nr. 1045 Z 0034 / 2 / D / 0004 Nr. STK1 P 0220 2 01 Nr. 1045 Z 109 / 12 / D / 0004 Nr. 1045 Z 0014 / 13 / D / 0004	 Nachtrag 1
Entwurfsprüfbericht: EG-Baumusterprüfbescheinigung: Entwurfsprüfbericht:	Nr. STK1 P 0879 2 01 Nr. 1045 P 0079 / 13 / D / 0004 Nr. STK3 P 0198 3 01	Nachtrag 1 Nachtrag 2
EC type-examination certificate: *Design-examination report:* *EC type-examination certificate:*	*No. 1045 Z 109 / 12 / D / 0004* *No. STK1 P 0220 2 01* *No. 1045 Z 109 / 12 / D / 0004* *No. 1045 Z 0014 / 13 / D / 0004*	 *Appendix 1*
Design-examination report: *EC type-examination certificate:* *Design-examination report:*	*No. STK1 P 0879 2 01* *No. 1045 P 0079 / 13 / D / 0004* *No. STK3 P 0198 3 01*	*Appendix 1* *Appendix 2*

Benannte Stelle:
Notified Body:

TÜV Nord Systems GmbH & Co. KG
Große Bahnstr. 31
22525 Hamburg

Kennnummer:
Identification no.

0045

Göttingen, den 27.05.2013

i.V. .....
(Günter Kuhlmann, R & D Manager)

i.A. .....
(Lothar Deppe, Mechanical Engineering)

EG-Konformitätserklärung
EC-Certificate of Compliance

0044

Hiermit bestätigen wir die Übereinstimmung ..
Herewith we confirm that our ..

CoriolisMaster
FCB3_ _, FCH3_ _ and FCT3_ _ Flowmeter

mit den grundlegenden Sicherheits- und Gesundheitsanforderungen gem. der Richtlinie 94/9/EG des Rates der Europäischen Gemeinschaft. Die sicherheits- und Installationshinweise der Produktdokumentation sind zu beachten.
are in compliance with the Essential Health and Safety Requirements with refer to the council directives 94/9/EC of the European Community. The safety and installation requirements of the product documentation must be observed.

CoriolisMaster Durchflussmesser basieren auf dem Coriolis-Prinzip und kommen zur Messung von Flüssigkeiten und Gasen zum Einsatz.
CoriolisMaster flowmeters are based on the Coriolis-Principle and are suitable to measure liquids and gas.

Zulassung und Kennzeichnung *Approval and Coding*	**Normen** *Standards*
FM12ATEX0045 X ***CoriolisMaster - Integral transmitter/sensor*** II 1/2 G Ex d e ia IIC T6...T2 - IP65, IP67 II 2 D Ex ia tb IIIC T85°C...Tmedium - IP65, IP67 II 1/2 G Ex d e ia ib IIC T6...T2 - IP65, IP67 II 2 D Ex ia ib tb IIIC T85°C...Tmedium - IP65, IP67 II 2 (1) G Ex d e ia IIC T6 .. T2 - IP65, IP67 II 2 (1) D Ex ia tb IIIC T65°C .. Tmedium - IP65, IP67 II 2 D Ex tb IIIC T85°C .. Tmedium Ta = -40°C to +60°C - IP65, IP67 ***CoriolisMaster – sensor only*** II 1 G Ex ia IIC T6...T2 - IP65, IP67 II 1 D Ex ia IIIC T85°C .. Tmedium - IP65, IP67 II 2 D Ex tb IIIC T85°C...Tmedium - IP65, IP67 ***CoriolisMaster – Transmitter only*** II 2 (1) G Ex d e ia IIC T6 - IP65, IP67 II 2 (1) G Ex d e ib [ia] IIC T6 - IP65, IP67 II 2 (1) G Ex d e [ia] IIC T6 - IP65, IP67 II 2 (1) D Ex ia tb IIIC T85°C - IP65, IP67 II 2 (1) D Ex ib tb [ia] IIIC T85°C - IP65, IP67 II 2 (1) D Ex tb [ia] IIIC T85°C - IP65, IP67 ***FCT3cY0klm.n.o.p CoriolisMaster – Transmitter only*** II (1) G [Ex ia] IIC - IP65, IP67 II 3 (2) G Ex nA nR [ia] IIC T6 Ta = -40°C to +60°C - IP65, IP67	EN 60079-0:2009 EN 60079-1:2007 EN 60079-7:2007 EN 60079-11:2011 EN 60079-15: 2010 EN 60079-26:2007 EN 60079-31:2008 EN 60529:1991 + A1:2000
FM12ATEX0044 X ***CoriolisMaster - Integral transmitter/sensor*** II 3 G Ex nA nR IIC T6...T2 Ta = -40°C to +60°C - IP65, IP67 ***CoriolisMaster - sensor only*** II 3 G Ex nA IIC T6 .. T2 Ta = -40°C to +60°C - IP65, IP67	EN 60079-0:2009 EN 60079-15: 2010 EN 60529:1991 + A1:2000

Göttingen, 04.01.2013

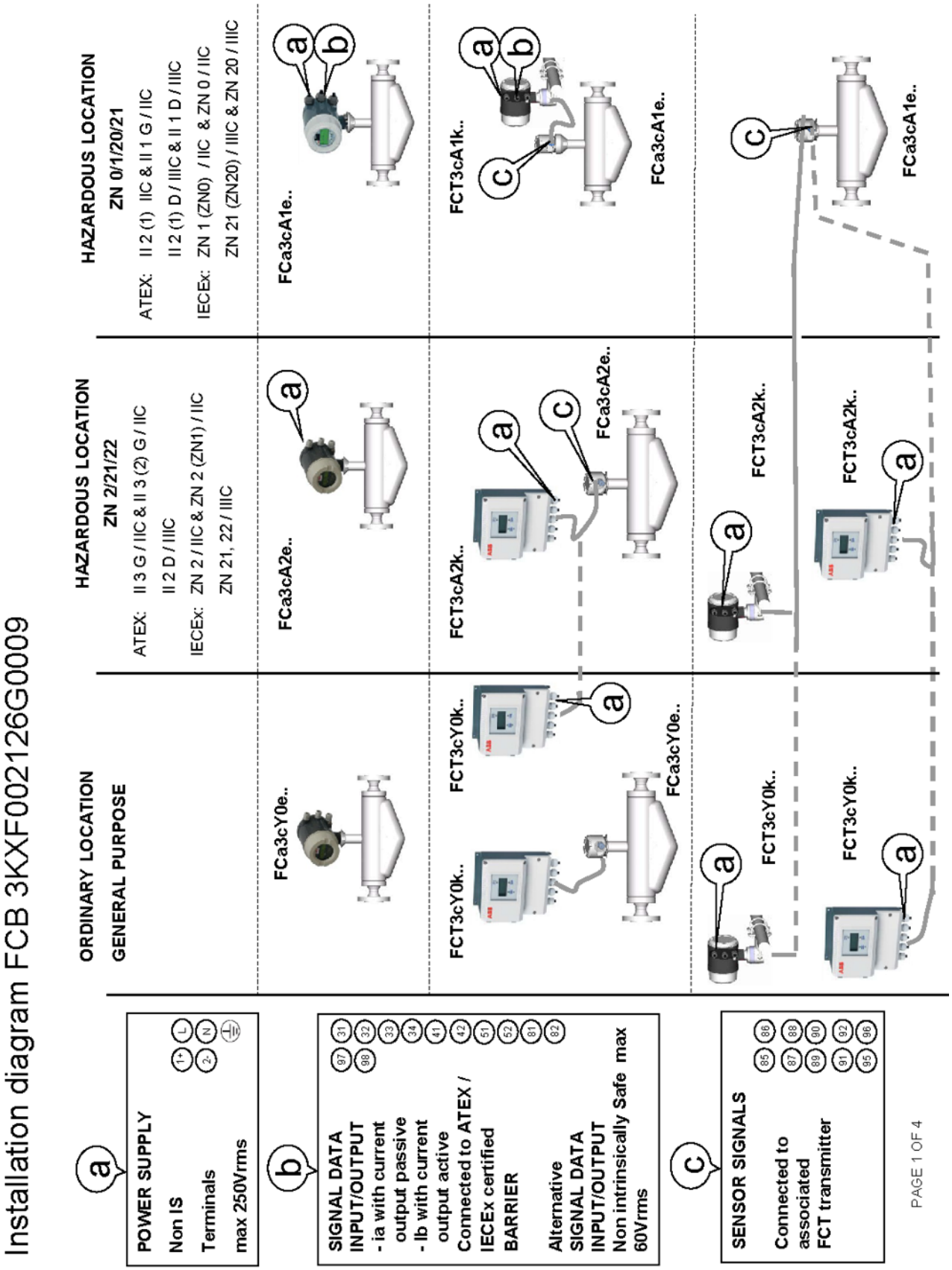
i.V. Klaus Schäfer
(QM Manager)

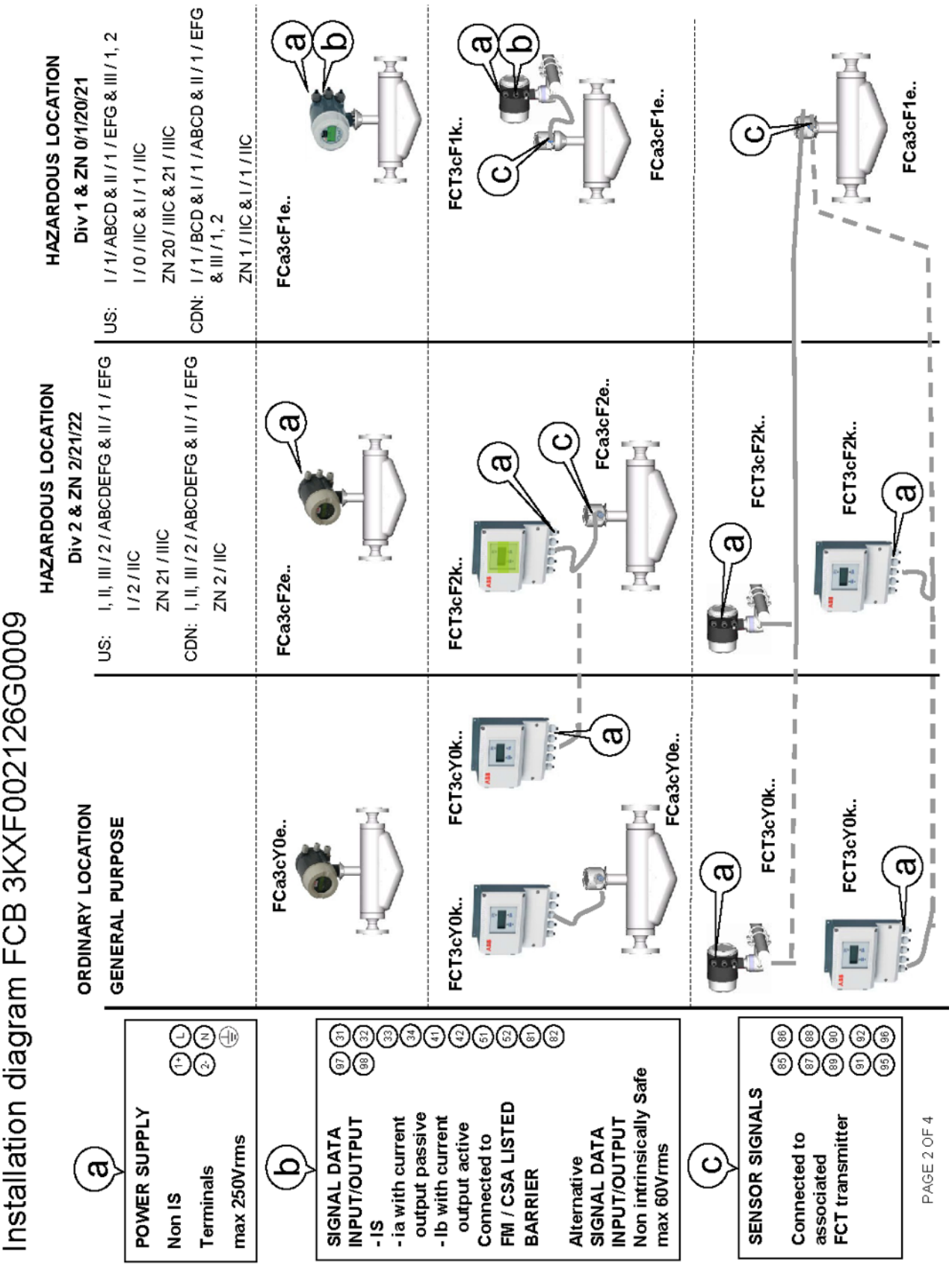
i.V. Dr. Günter Kuhlmann
(R&D Manager)

BZ-13-8029, Rev.2

10.2 Installation diagram 3KXF002126G0009

Page 1 of 4




Installation diagram FCB 3KXF002126G0009
ORDINARY LOCATION
GENERAL PURPOSE
HAZARDOUS LOCATION
Div 2 & ZN 2/21/22
US: I, II, III / 2 / ABCDEFG & II / 1 / EFG
I / 2 / IIC
ZN 21 / IIIC
CDN: I, II, III / 2 / ABCDEFG & II / 1 / EFG
ZN 2 / IIC
HAZARDOUS LOCATION
Div 1 & ZN 0/1/20/21
US: I / 1 / ABCD & II / 1 / EFG & III / 1, 2
I / 0 / IIC & I / 1 / IIC
ZN 20 / IIIC & 21 / IIIC
CDN: I / 1 / BCD & I / 1 / ABCD & II / 1 / EFG & III / 1, 2
ZN 1 / IIC & I / 1 / IIC
a
POWER SUPPLY
Non IS
Terminals
max 250Vrms
1+ L
2- N
b
SIGNAL DATA INPUT/OUTPUT
-IS
-ia with current output passive
-Ib with current output active
Connected to FM / CSA LISTED BARRIER
Alternative SIGNAL DATA INPUT/OUTPUT
Non intrinsically Safe
max 60Vrms
97 31
98 32
33
34
41
42
51
52
81
82
c
SENSOR SIGNALS
Connected to associated FCT transmitter
85 86
87 88
89 90
91 92
95 96
FCa3cY0e..
FCT3cY0k..
FCa3cF2e..
FCT3cF2k..
FCa3cF1e..
FCT3cF1k..
PAGE 2 OF 4

Notes: ATEX & IECEx application

1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO ATEX/IECEx APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN: Uo OR Voc OR Vt < V MAX, Io OR Ioc OR It < I MAX; Ca OR Co > Ci + Ccable; La OR Lo > Li + Lcable; Po < Pi.
2. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN Zone 21/22 ENVIROMENTS.
3. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.
4. INSTALLATION SHOULD BE IN ACCORDANCE WITH THE RELEVANT INTERNATIONAL OR NATIONAL REGULATIONS „INSTALLATION OF INTRINSICALLY SAFE FOR HAZARDOUS LOCATIONS" REGULATIONS.
5. THE CONFIGURATION OF ASSOCIATED APPARATUS MUST BE ATEX or IECEx APPROVED UNDER ENTITY CONCEPT.
6. ASSOCIATED APPARATUS MANUFACTURER´S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
7. THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURE´S INSTALLATION DIAGRAM
8. SELECTED ASSOCIATED APPARATUS MUST BE THIRD PARTY LISTED AS PROVIDING INTRINSICALLY SAFE CIRCUITS FOR THE APPLICATION. IT MUST MEET THE REQUIREMENTS LISTED IN TABLE OF THIS INSTALLATION DIAGRAM:

Notes: US and Canadian application

1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO FM AND/OR CSA APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN: Uo OR Voc OR Vt < V MAX, Io OR Ioc OR It < I MAX; Ca OR Co > Ci + Ccable; La OR Lo > Li + Lcable; Po < Pi.
2. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND III ENVIROMENTS.
3. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.
4. INSTALLATION FOR U.S. AND CANADIAN APPROVED EQUIPMENT SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.6 „INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS", THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) SECTIONS 504, 505 AND THE CANADIAN ELECTRICAL CODE (C22.1-02).
5. THE CONFIGURATION OF ASSOCIATED APPARATUS MUST BE FM AND/OR CSA APPROVED UNDER ENTITY CONCEPT.
6. ASSOCIATED APPARATUS MANUFACTURER´S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
7. THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURE´S INSTALLATION DIAGRAM
8. SELECTED ASSOCIATED APPARATUS MUST BE THIRD PARTY LISTED AS PROVIDING INTRINSICALLY SAFE CIRCUITS FOR THE APPLICATION. IT MUST MEET THE REQUIREMENTS LISTED IN TABLE OF THIS INSTALLATION DIAGRAM:

Dieses ist eine zertifizierte Zeichnung
Änderungen nur mit Zustimmung der Prüfstelle
THIS IS A CERTIFIED DRAWING
REVISIONS ONLY WITH APPROVAL OF THE NOTIFIED BODY

PAGE 3 OF 4

For Model	Projection method 1	General tolerances:	Tolerancing:
FCB	ABB Automation Products GmbH	Work piece edges	Surface:
	Date / Name: 17.04.12 FBu	Installation diagram FCB	
04 02.11.12 KHR		3KXF002126G0009	
Rev. Date Number Name	Replaces:	Material / St. Ext.	

Current active, HART FCa3c_kA1m_ FCa3c_kH1m_ FCa3c_kA2m_ FCa3c_kH2m_		Ex e / XP		Operating Value		Ex nA / NI		Ex i b/IS					
HART communication		U_M [V]	I_M [A]	U_N [V]	I_N [mA]	U_N [V]	I_N [mA]	U_O [V]	I_O [mA]	P_O [mW]	C_O [nF]	C_{OPA} [nF]	L_O [mH]
Current 1 Active	Terminal 31/32 Terminal 32–PA	60	35	30	30	30	30	20	100	500	217	0	3,8
								U_I [V]	I_I [mA]	P_I [mW]	C_I [nF]	C_{IPA} [nF]	L_I [mH]
								60	100	500	2,4	2,4	0,17
								U_I [V]	I_I [mA]	P_I [mW]	C_I [nF]	C_{IPA} [nF]	L_I [mH]
Current 2 Passive	Terminal 33/34 Terminal 34–PA	60	35	30	30	30	30	30	100	760	2,4	2,4	0,17
Contact Output	Terminal 41/42	60	35	30	65	30	65	15	30	115	2,4	2,4	0,17
Contact Input	Terminal 81/82	60	35	30	10	30	10	30	60	500	2,4	2,4	0,17
Pulse Output	Terminal 51/52	60	35	30	65	30	65	15	30	115	2,4	2,4	0,17

Current passive, HART FCa3c_kA3m_ FCa3c_kH3m_		Ex e / XP		Operating Value		Ex nA / NI		Ex i a/IS					
HART communication		U_M [V]	I_M [A]	U_N [V]	I_N [mA]	U_N [V]	I_N [mA]	U_I [V]	I_I [mA]	P_I [mW]	C_I [nF]	C_{IPA} [nF]	L_I [mH]
Current 1 Passive	Terminal 31/32	60	35	30	30	30	30	60	300	2000	0,47	0,47	0,17
Current 2 Passive	Terminal 33/34	60	35	30	30	30	30	60	300	2000	0,47	0,47	0,17
Contact Output	Terminal 41/42	60	35	30	65	30	65	60	300	2000	0,47	0,47	0,17
Contact Input	Terminal 81/82	60	35	30	10	30	10	60	300	2000	0,47	0,47	0,17
Pulse Output	Terminal 51/52	60	35	30	65	30	65	60	300	2000	0,47	0,47	0,17

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Änderungen nur mit Zustimmung der Prüfstelle
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REVISIONS ONLY WITH APPROVAL OF THE NOTIFIED BODY

PAGE 4 OF 4

For Model: FCB_
04 02.11.12 KHR
Rev. Date Number Name

Projection method 1
ABB
ABB Automation Products GmbH
Date 17.04.12 Name FBu
Replaces:

General tolerances: Tolerancing:
Work piece edges: Surface:
Installation diagram FCB
3KXF002126G0009
Material Ref. B/M

Notes

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www.abb.com/flow

3KXF411008R4401
Translation of the original instruction

CI/FCB300/FCH300-EN Rev. F 05.2014

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