ABB MEASUREMENT & ANALYTICS | OPERATING INSTRUCTIONS | FEX620-EN REV E

ProcessMaster Water FEW620, FEP620, FER620

Electromagnetic flowmeter



Devices-Firmware Version: 01.13.00

Redefining Electromagnetic Flow for the Future

—
ProcessMaster FEx620

Introduction

ProcessMaster FEx620 series is ABB's new electromagnetic flowmeter .
Enhanced features simplify commissioning, ease operation, troubleshooting and maintenance and overcome skills barriers Digital communication such as HART or Modbus combined with real-time diagnostics make ProcessMaster incredibly easy to work with.

My Measurement Assistant

The app that puts ABB measurement device support at your fingertips:

SCAN ME

Additional Information

Additional documentation on ProcessMaster FEW620 and FEP620 is available for download at www.abb.com/flow.

Alternatively simply scan this code:

ProcessMaster FEW620

ProcessMaster FEP620

ProcessMaster FER620

Contents

1 Safety 3
1.1 General information and instructions 3
1.2 Warnings 3
1.3 Intended use 3
1.4 Improper use 3

2 Product identification 4
2.1 Name plate 4
2.2 Overview 5

3 Transport and storage 6
3.1 Inspection 6
3.2 Transport 6
3.2.1 Flange devices ≤ DN 450 6
3.2.2 Flange devices > DN 450 6
3.3 Storing the device 6
3.3.1 Storage temperature range 6
3.4 Returning devices 6

4 Installation 7
4.1 Installation conditions 7
4.1.1 General information 7
4.1.2 Brackets and supports 7
4.1.3 Gaskets 7
4.1.4 Devices with a hard/soft rubber liner 7
4.1.5 Devices with a PTFE, PFA or ETFE liner 7
4.1.6 Mounting position 8
4.1.7 Minimum distance 8
4.1.8 Inlet and outlet sections 8
4.1.9 Free inlet or outlet 9
4.1.10 Strongly contaminated measuring media 9
4.1.11 Installation in the vicinity of pumps 9
4.1.12 Installation in pipelines with larger nominal diameters 10
4.2 Installing the sensor 10
4.3 Opening and closing the terminal box 10
4.3.1 Rotating the LCD indicator 11
4.3.2 Installation of the optional MODBUS module 11
4.3.3 Conduit adaptor installation 11
4.4 Grounding the flowmeter sensor 11
4.4.1 General information on ground connections 11
4.4.2 Metal pipe with fixed flanges 12
4.4.3 Metal pipe with loose flanges 12
4.4.4 Plastic pipes, non-metallic pipes or pipes with insulating liner 12
4.4.5 Grounding for devices with protective plates 12
4.4.6 Grounding with conductive PTFE grounding plate 12
4.4.7 Installation and grounding in pipelines with cathodic 13
4.4.8 Internally insulated pipelines with cathodic corrosion protection potential 13
4.4.9 Mixed system pipeline with corrosion protection and functional earth potentials 13
4.5 Electrical connections 14
4.5.1 Connecting the power supply 14
4.5.2 Installing the connecting cables 14
4.5.3 Connection using a cable conduit 15
4.5.4 Connection with IP 68 rating 15
4.5.5 Electrical connection 17
4.5.6 Connection to integral mount design 20
4.5.7 Connection to remote mount design 21
4.6 Communication 23
4.6.1 Hart Communication 23
4.6.2 Modbus Communication 23

5 Commissioning 24
5.1 Safety instructions 24
5.2 Write-protection switch, service LED and local operating interface 24
5.3 Checks prior to commissioning 25
5.3.1 Parameterization of the device 25
5.4 Switching on the power supply 26
5.5 Parameterization via the “Easy Set-up” menu function 26
5.6 Measuring range table 29

6 Operation 30
6.1 Safety instructions 30
6.2 Safety instructions 30
6.3 Menu levels 31
6.3.1 Process display 32
6.3.2 Switching to the information level (operator menu) 32
6.3.3 Error messages on the LCD display 33
6.3.4 Switching to the configuration level (parameterization) 33

7 Operation 34

8 Diagnosis / error messages 72

9 Maintenance 78

10 Repair 81

11 Recycling and disposal 83

12 Specifications 84
12.1 Permitted pipe vibration 84
12.2 Temperature data 84
12.2.1 Ambient temperature as a function of measuring medium temperature 85
12.2.2 LVD information 86

13 Additional documents 88

14 Appendix 89

1 Safety

1.1 General information and instructions

These instructions are an important part of the product and must be retained for future reference.

Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly. The specialist personnel must have read and understood the manual and must comply with its instructions.

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 nor an amendment to any previous or existing agreement, promise or legal relationship.

Modifications and repairs to the product may only be performed if expressly permitted by these instructions. Information and symbols on the product must be observed. These may not be removed and must be fully legible at all times.

The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

1.2 Warnings

The warnings in these instructions are structured as follows:

⚠ DANGER

The signal word "**DANGER**" indicates an imminent danger. Failure to observe this information will result in death or severe injury.

⚠ WARNING

The signal word "**WARNING**" indicates an imminent danger. Failure to observe this information may result in death or severe injury.

⚠ CAUTION

The signal word "**CAUTION**" indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word'**NOTICE**'indicates possible material damage.

Note

The signal word '**Note**' is not a signal word indicating a danger to personnel. The signal word "NOTE" can also refer to material damage.

1.3 Intended use

This device is intended for the following uses:

- To transmit fluid, pulpy or pasty measurement media with electrical conductivity.
- For volume flow measurement (under operating conditions).
- For mass flow measurement (based on a fixed density to be programmed).

The device has been designed for use exclusively within the technical limit values indicated on the identification plate and in the data sheets.

In terms of the measuring medium, observe following points:

- Wetted parts such as measuring electrodes, liner, grounding electrodes, grounding rings and protection flanges must not be damaged because of the chemical and physical characteristic of the measuring medium.
- Media with unknown properties or abrasive measuring media may only be used if regular and suitable tests can be performed to ensure the safe condition of the device.
- The information on the name plate must be observed.
- Prior to using corrosive and abrasive measurement media, the operator must check the level of resistance of all parts coming into contact with the measuring medium. ABB will gladly support you in selecting the materials, but cannot accept any liability in doing so.

1.4 Improper use

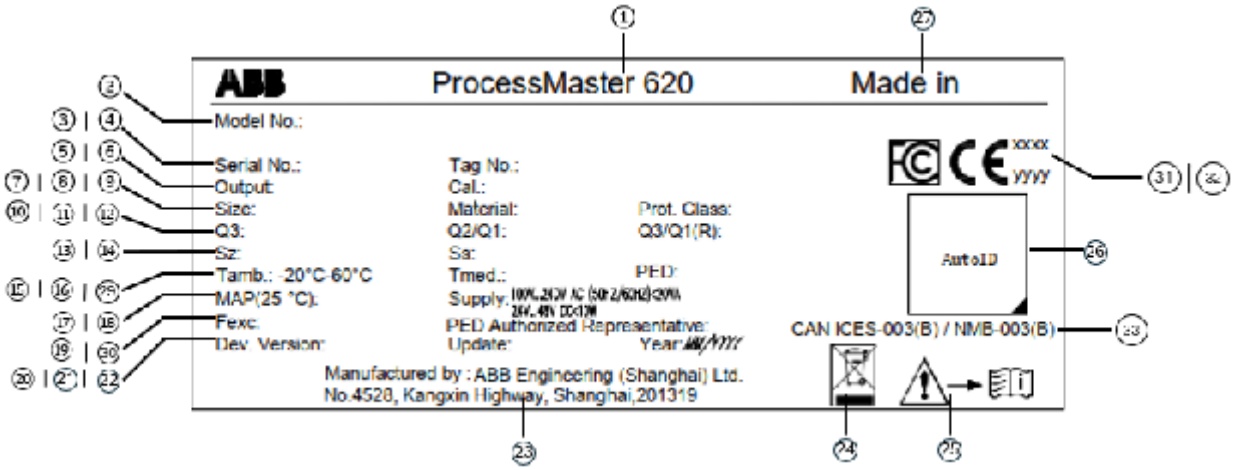
The following are considered to be instances of improper use of the device:

- For operating as a flexible adapter in piping, e.g. for compensating pipe offsets, pipe vibrations, pipe expansions, etc.
- For use as a climbing aid, e.g. for mounting purposes
- For use as a support for external loads, e.g. as a support for piping, etc.
- Material application, e.g. by painting over the name plate or welding/soldering on parts
- Material removal, e.g. by spot drilling the housing

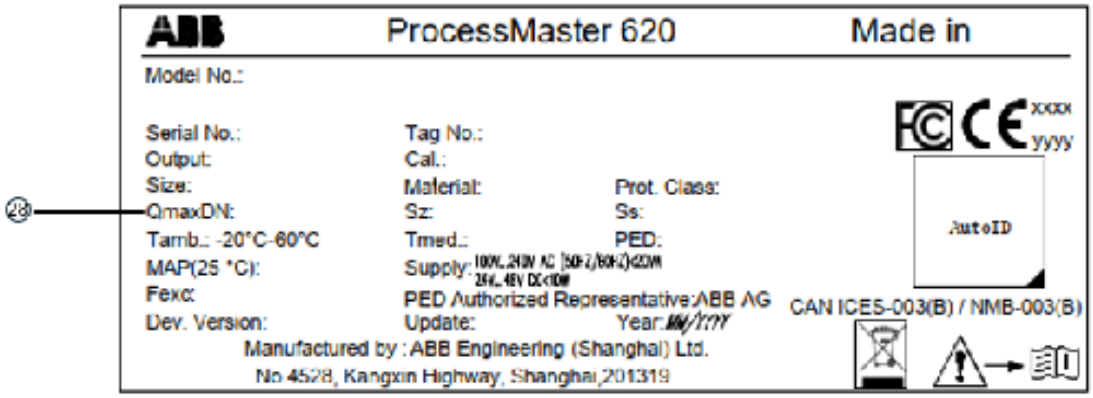
2 Product identification

2.1 Name plate

Nameplate for Meters with MCERTs Calibration



Nameplate for Meters with other than MCERTs Calibration



① Type designation
② Model number (for more detailed information about the technical design, refer to the data sheet or the order confirmation)
③ Order number / Serial number for identification by the manufacturer
④ Tag number for identification by the customer
⑤ Signal communication
⑥ Accuracy
⑦ Include the meter size and the pressure rating
⑧ Include the material of liner and electrode
⑨ IP rating in accordance with EN 60529
⑩ Maximum permissible flowrate
⑪ OIML defined value Q2/Q1 for calibration
⑫ OIML defined value Q3/Q1(R) for calibration
⑬ Calibration value Sz (zero point)
⑭ Calibration value Ss (range)
⑮ $T_{amb.}$ = maximum permissible ambient temperature
⑯ $T_{med.}$ = maximum permissible measuring medium temperature
⑰ Maximum allowable pressure at 25°C
⑱ Power supply
⑲ Excitation frequency
⑳ Software version
㉑ Date of software version updated
㉒ Year of manufacture
㉓ Manufacturer address
㉔ WEEE logo
㉕ 'Follow operating instruction' symbol
㉖ AutoID QR code
㉗ Manufacturer country
㉘ Calibration value Q_{max}DN
㉙ Label indicating whether the device is subject to the Pressure Equipment Directive
㉚ Authorized Representative: ABB AG
㉛ FCC logo
㉜ CE Marking
㉝ ICES Statement for Canada

Figure 1 FEx620 Nameplate, English



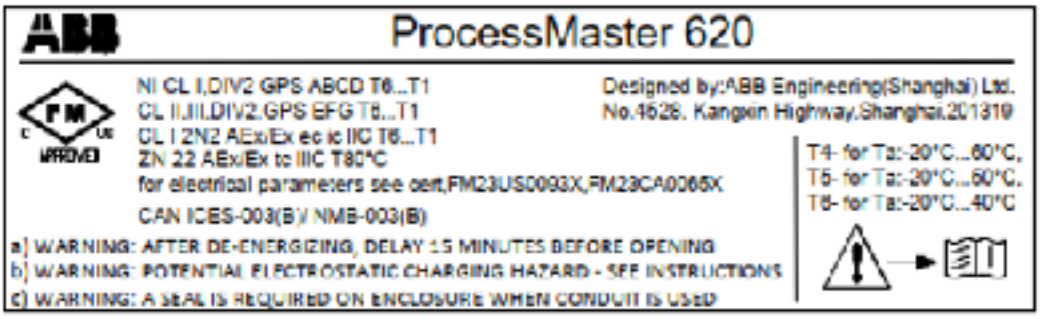


Figure 2 FEX Nameplate, English

2.2 Overview



Figure 3 Design

3 Transport and storage

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 Transport

⚠ DANGER

Life-threatening danger due to suspended loads.
In the case of suspended loads, a danger of the load falling exists.
Remaining under suspended loads is prohibited.

⚠ WARNING

Risk of injury due to device slipping.
The device's center of gravity may be higher than the harness suspension points.

- **Make sure that the device does not slip or turn during transport.**
- **Support the device laterally during transport.**

NOTICE

Potential damage to device!
The protection plates or protective caps installed on the process connections of devices lined with PTFE / PFA must not be removed until just before installation.
To prevent possible leakage, make sure that the liner on the flange is not cut or damaged.

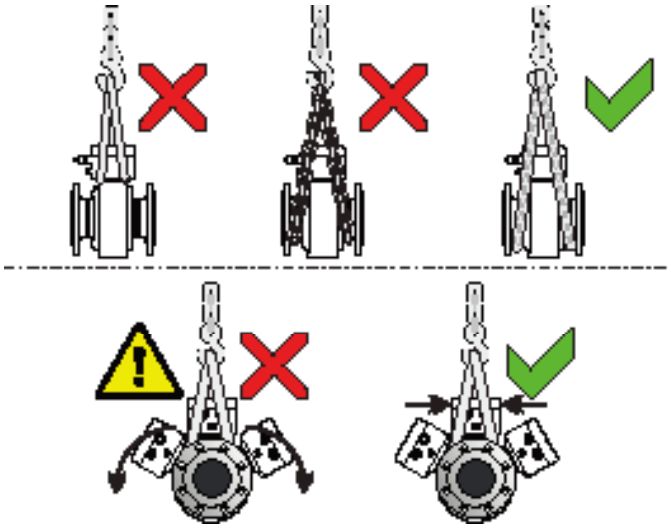


Figure 4 Transport instructions - ≤ DN 450

3.2.1 Flange devices ≤ DN 450

- Carrying straps must be used to transport flange designs smaller than DN 450
- Wrap the straps around both process connections when lifting the device
- Chains should not be used, since these may damage the housing.

3.2.2 Flange devices > DN 450

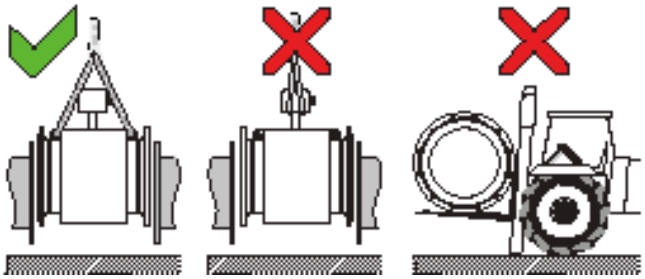


Figure 5 Transport instructions - > DN 450

- Using a forklift to transport flange device can bend the housing
- Flange devices must not be lifted by the center of the housing when using a forklift for transport
- Flange devices must not be lifted by the terminal box or by the center of the housing
- Only the transport lugs fitted to the device can be used to lift the device and insert it into the piping

3.3 Storing the device

Bear the following points in mind when storing devices:

- Store the device in its original packaging in a dry and dust- free location.
- Observe the permitted ambient conditions for transport and storage.
- Avoid storing the device in direct sunlight.
- In principle, the devices may be stored for an unlimited period. However, the warranty conditions stipulated in the order confirmation of the supplier apply.

3.3.1 Storage temperature range

-40 ° C to 70 ° C (-40F to 158F)

The ambient conditions for the transport and storage of the device correspond to the ambient conditions for operation of the device.

Adhere to the device data sheet!!

3.4 Returning devices

Please contact Customer Center Service acc. to back cover for **nearest service location**.

4 Installation

4.1 Installation conditions

4.1.1 General information

The following points must be observed during installation:

- The flow direction must correspond to the marking, if present.
- The maximum torque for all flange screws must be complied with.
- Secure flange screws and nuts against pipe vibration.
- The devices must be installed without mechanical tension (torsion, bending).
- Use gaskets made from a material that is compatible with the measuring medium and measuring medium temperature.
- Gaskets must not extend into the flow area, since possible turbulence could influence the accuracy of the device.
- The piping may not exert any inadmissible forces or torques on the device.
- Make sure that the temperature limits are not upscaled during operation of the device.
- Make sure cavitation (e.g. caused by Valves) does not occur within the Flowmeter tube.
- Do not remove the sealing plugs in the cable glands until you are ready to install the electrical cable.
- Make sure the gaskets for the housing cover are seated correctly. Carefully seal the cover. Tighten the cover fittings.
- The transmitter with a remote mount design 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.

In case of a remote mount transmitter, make sure the serial number on the sensor and the serial number on the tarnsmitter connected to this sensor are matching (same numbers)

4.1.2 Brackets and supports

NOTICE

Potential damage to device!
Improper support for the device may result in deformed housing and damage to internal magnet coils.
Place the supports at the edge of the flowmeter sensor housing (see arrows in Fig. 7).

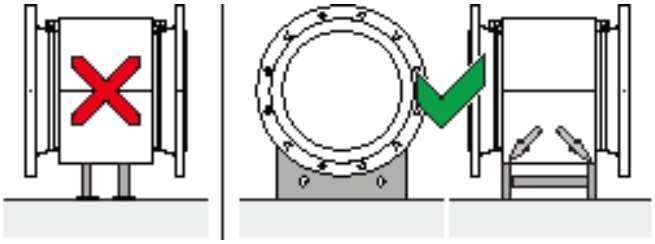


Figure 6 Support for meter sizes larger than DN 400

Devices with meter sizes larger than DN 400 must be mounted with support on a sufficiently strong foundation.

4.1.3 Gaskets

The following points must be observed when installing gaskets:

- To achieve the best results, make sure that the gaskets and meter tube fit concentrically.
- To make sure that the flow profile is not distorted, the gaskets may not intrude in the piping cross-section.
- The use of graphite with the flange or process connection gaskets is prohibited. This is because, in some instances, an electrically conductive coating may form on the inside of the meter tube.

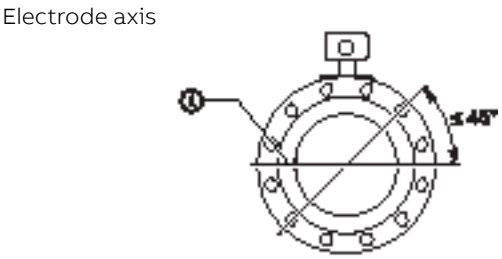
4.1.4 Devices with a hard/soft rubber liner

- Devices with a hard/soft rubber liner always require additional gaskets.
- ABB recommends using gaskets made from rubber or rubber-like sealing materials.

4.1.5 Devices with a PTFE, PFA or ETFE liner

- In principle, devices with a PTFE, PFA or ETFE liner do not require additional gaskets.

The device measures the flow rate in both flow directions. Forward flow is the factory setting, as shown in Fig. 10.



① Electrode axis

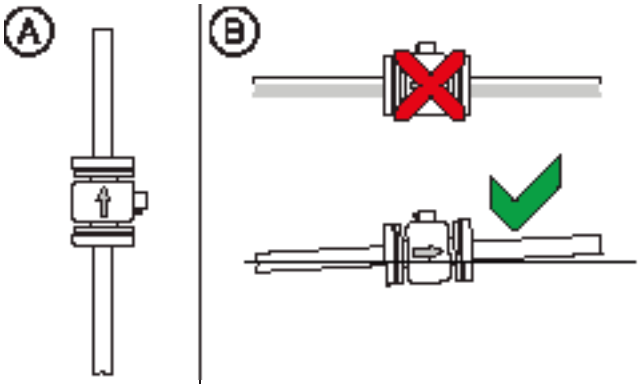
Figure 7 Orientation of the electrode axis

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

...4 Installation

...4.1 FEW/FEP620 Installation conditions

4.1.6 Mounting position



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

Ⓑ In case of horizontal installation, the meter tube must always be completely full of measuring medium. Provide for a slight incline of the connection for degassing.

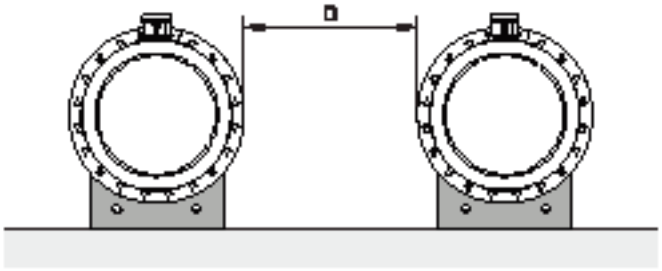
Figure 8 Mounting position

Note

Prefer vertical installation in hygienic applications!

With horizontal installation, assure the sensor is self drainable

4.1.7 Minimum distance

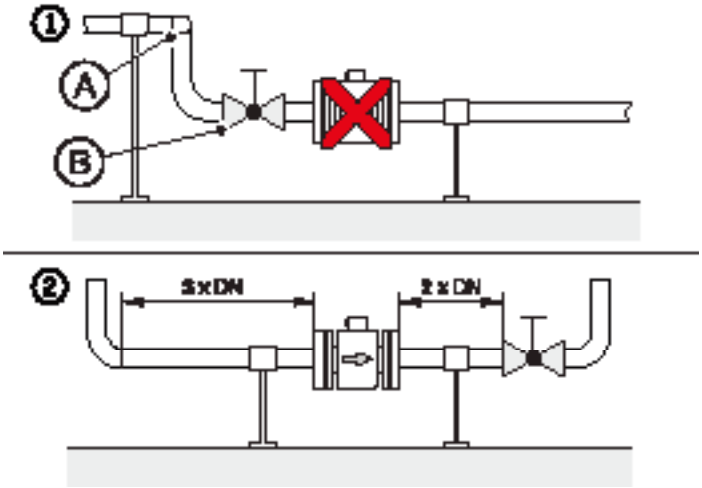


Distance D: ≥ 1.0 m (3.3 ft)

Figure 9 Minimum distance

- In order to prevent the devices from interfering with each other, a minimum distance as shown in Fig. 12 must be maintained between the devices.
- 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) should be maintained.
- For installation on or to steel parts (e.g. steel brackets), a minimum spacing of 100 mm (3.94 in) should be maintained (based on IEC801-2 and IECTC77B).

4.1.8 Inlet and outlet sections



① Double elbow ② Turn-off component

Figure 10 Inlet and outlet section, turn-off component

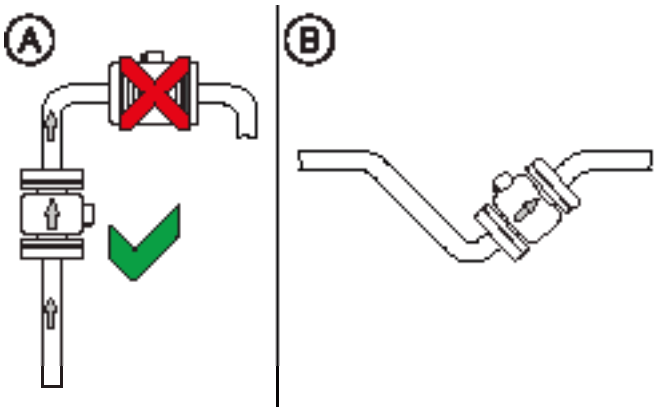
The metering principle is independent of the flow profile as long as standing eddies do not extend into the metering section, such as may occur after double elbows, in the event of tangential inflow, or where half-open gate valves are located upstream of the flowmeter sensor.

In such cases, measures must be put in place to normalize the flow profile.

Ⓐ Do not install fittings, manifolds, valves, etc., directly in front of the flowmeter sensor.

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

4.1.9 Free inlet or outlet



Ⓐ Do not install the flowmeter at the highest point or in the draining off side of the pipeline, or the flowmeter runs empty and air bubbles can form.

Ⓑ Provide for a siphon fluid intake for free inlets or outlets so that the pipeline is always full.

Figure 11 Free inlet or outlet

4.1.10 Strongly contaminated measuring media

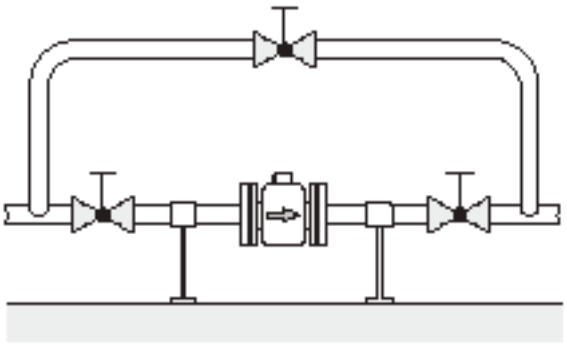
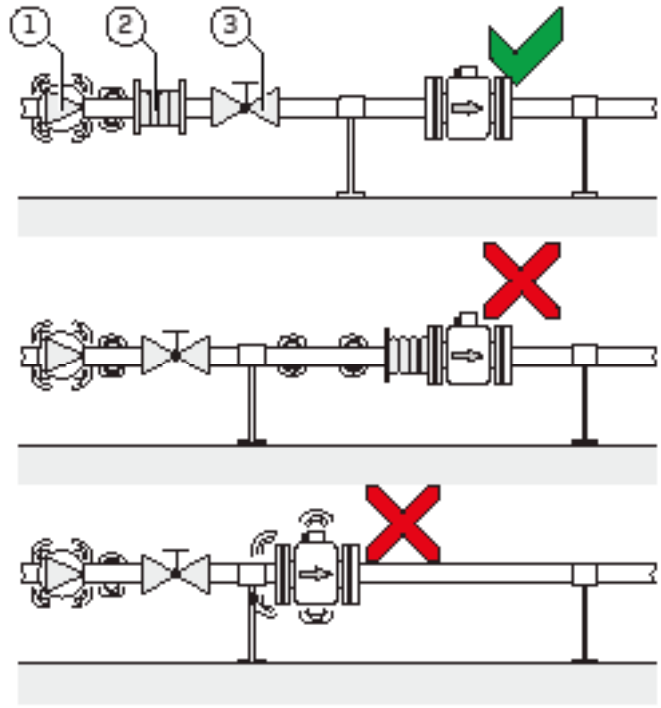


Figure 12 Bypass connection

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

4.1.11 Installation in the vicinity of pumps



① Pump ② Damping device ③ Shut-off device

Figure 13 Vibration damping

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

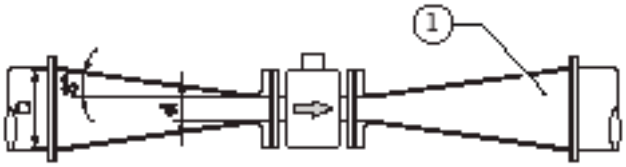
The damping devices must be installed beyond the supported flowmeter section and outside of the section between the shut-off devices.

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

...4 Installation

...4.1 FEW/FEP620 Installation conditions

4.1.12 Installation in pipelines with larger nominal diameters



① Transition piece

Figure 14 Using reduction pieces

Determine the resulting pressure loss when using transition pieces:

1. Calculate the diameter ratio d/D.
2. Determine the flow velocity based on the flow range nomograph (Figure 18).
3. Read the pressure drop on the Y-axis in Figure 18.

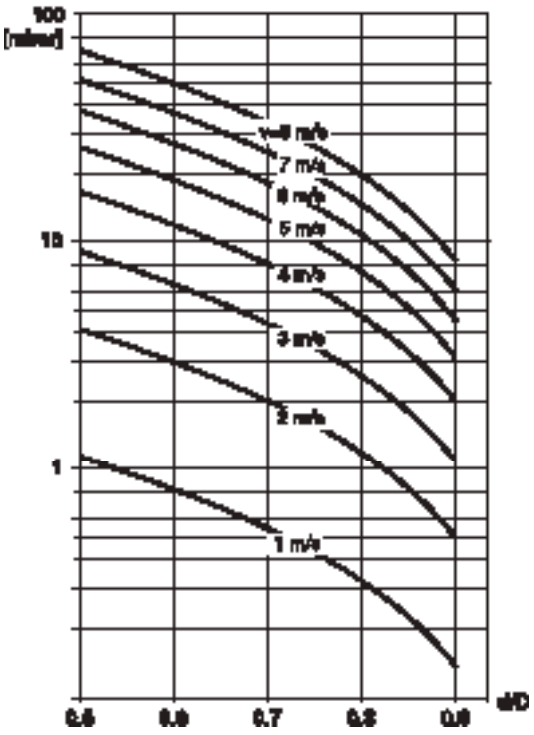
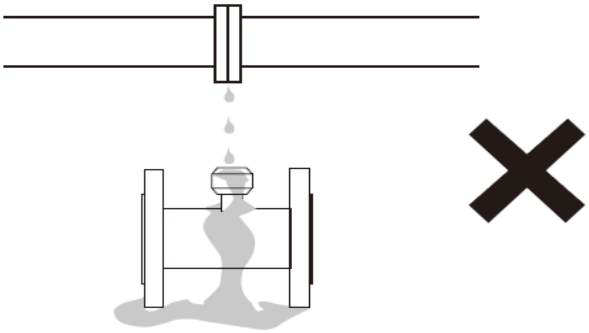
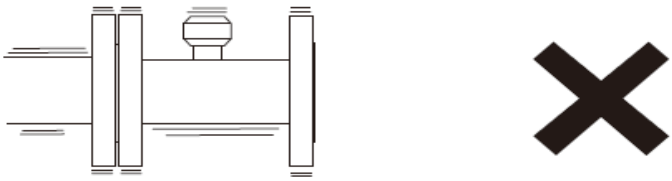


Figure 15 Nomograph for pressure drop calculations for flange transition piece with α/2 = 8°

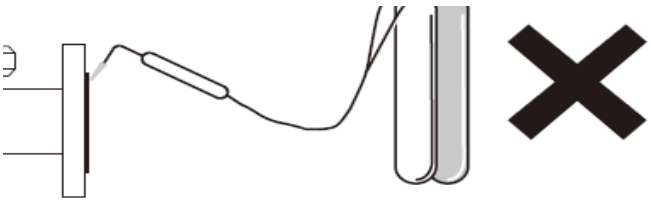
FER620 installation



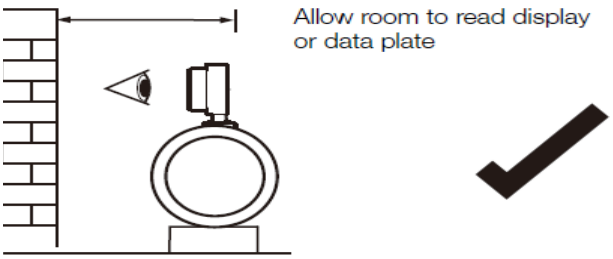
Spillage



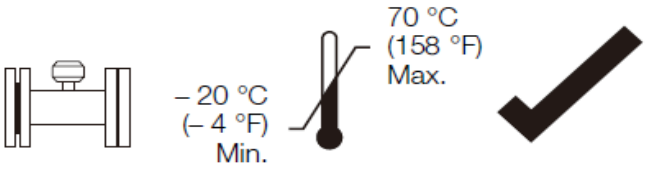
Vibration



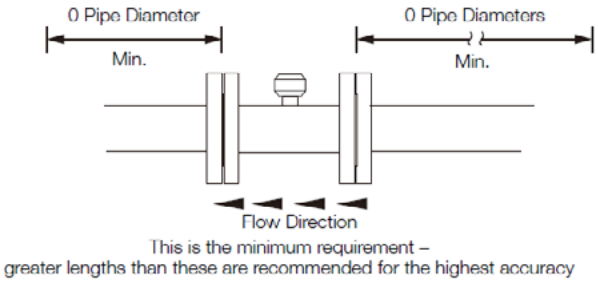
Localized Heat



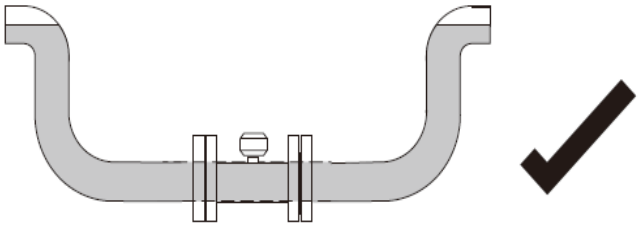
Siting



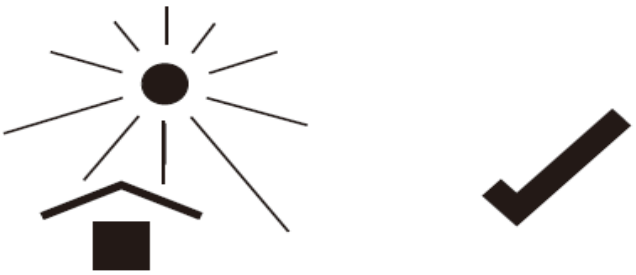
Within Temperature Limits



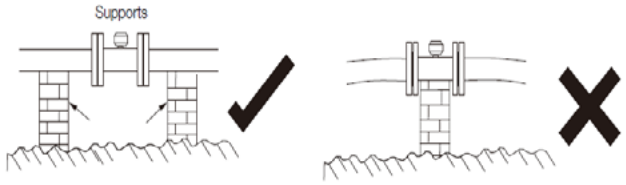
Straight Pipe Requirements



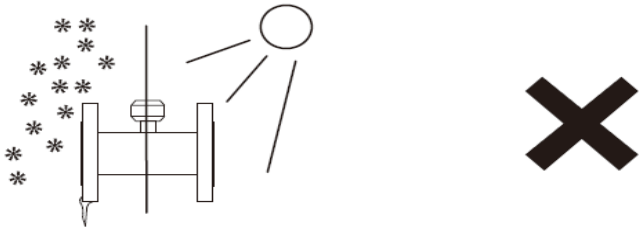
Fluid Level



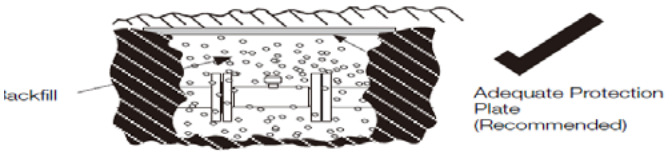
Shade



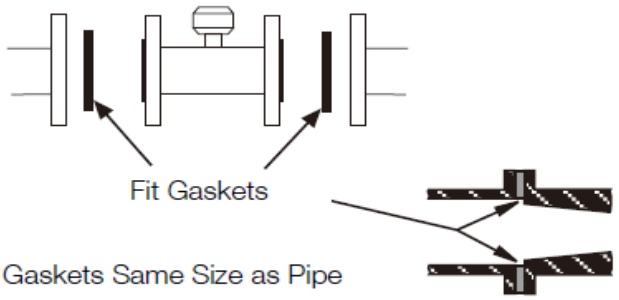
Above Ground



Temperature Difference



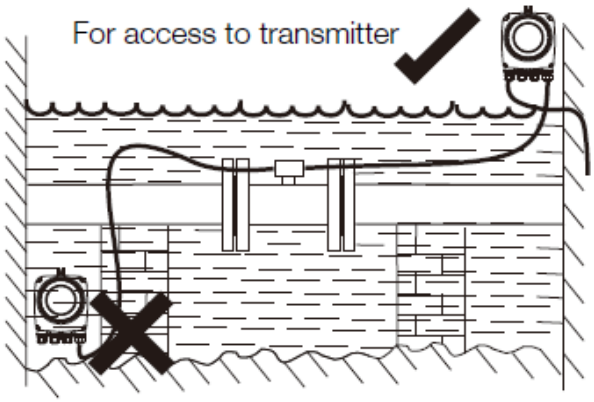
Underground



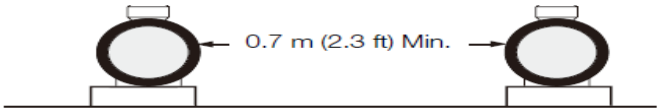
Gasket Fitting

...4 Installation

...4.1 FEW/FEP620 Installation conditions



Access to Transmitter



Separation of Sensors

4.2 Installing the sensor

NOTICE

Potential damage to device!

- The use of graphite with the flange or process connection gaskets is prohibited. This is because, in some instances, an electrically conductive coating may form on the inside of the meter tube.
- Vacuum shocks in the piping should be avoided to prevent damage to the liners (PTFE). Vacuum shocks can destroy the device.

The flowmeter sensor can be installed at any location in the piping while taking the installation conditions into account.

1 Remove protective plates, if present, to the right and left of the meter tube. To prevent possible leakage, make sure that the liner on the flange is not cut or damaged.

2 Position the flowmeter sensor coplanar and centered between the piping.

3 Install gaskets between the surfaces; see chapter "**Gaskets**" on page 7.

Note

For achieve the best results, ensure the gaskets fit concentrically with the meter tube.
To ensure that the flow profile is not distorted, the gaskets must not protrude into the piping.

4 Slightly grease the threaded nuts.

5 Tighten the nuts in a crosswise manner as shown in the figure.

First tighten the nuts to approx. 50 % of the maximum torque, then to 80 %, and finally a third time to the maximum torque. Do not exceed the maximum torque.

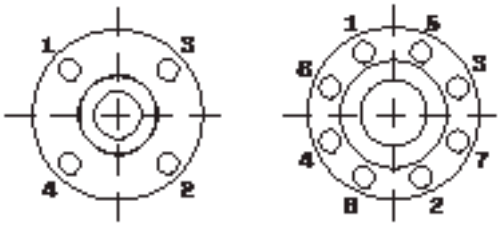


Figure 1 Tightening sequence for the flange screws

4.3 Opening and closing the terminal box

⚠ WARNING

Risk of injury due to live parts!

When the housing is open, contact protection is not provided and EMC protection is limited.
Before opening the housing, switch off the power supply.

NOTICE

Impairment of the IP rating

- Make sure that the cover of the power supply terminals is mounted correctly.
- Check the O-ring gasket for damage and replace it if necessary before closing the housing cover.
- Check that the O-ring gasket is properly seated when closing the housing cover.

4.3.1 Rotating the LCD indicator

Depending on the installation position, the LCD display can be rotated in 4 increments of 90° to enable horizontal readings.

Refer to chapter “**Opening and closing the terminal box**” on page 11!

Rotating the LCD display: Perform steps Ⓐ … Ⓒ .

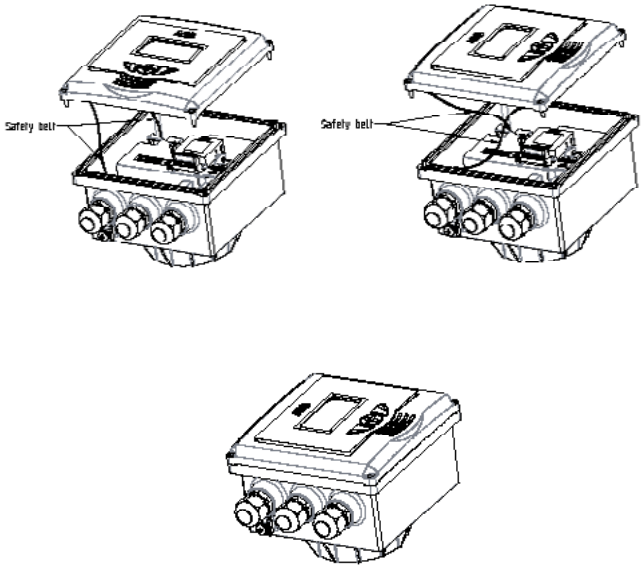


Figure 16 Rotating the LCD display (example)

4.3.2 Installation of the optional MODBUS module

Modbus card can be a daughter board stacked over the main board, one 2X3 connector on the MIB are used to connect power and signal between MIB and MTB, and a pair of screw and nut is used to connected Power Earth between MIB and MTB.

5POS connector is the Modbus communication interface, terminals are A, B, A2, B2, PE. A and A2 signal, B and B2 signal are shorted on the board, this design provides daisy chain connection.

This card does not support hot plug. To install it as optional card need power off before installation.

4.3.3 Conduit adaptor installation

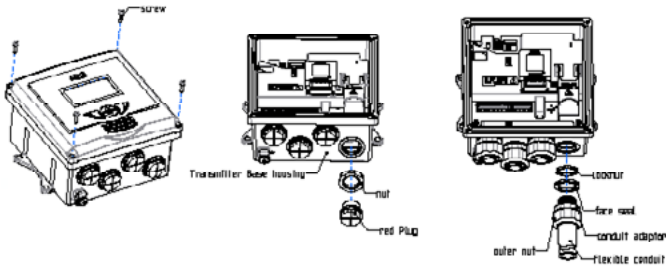


Figure 17 Flexible conduit fittings installation

Step 1: Loose the four screws on transmitter Lid and open the transmitter
Step 2: Remove the four red plugs on the transmitter base housing
Step 3: Install the conduit adaptors to the transmitter base housing with locknut
Step 4: Fit the flexible conduit to the conduit adaptor another side through the outer nut
Step 5: Screw back the four screws on transmitter lid with 1N.M tight torque

⚠ WARNING

Rigid conduit must not be fitted to the transmitter
Transmitter conduit adaptors must incorpoorate a face seal

The plug for through holes should be replaced by those suitable connectors for related applications. And our through holes housing only used for flexible metal conduit.

For recommended flexible metal conduit, please see below links:

4.4 Grounding the flowmeter sensor

4.4.1 General information on ground connections

Observe the following items when grounding the device:

- For plastic pipes or pipes with insulating lining, the earth is provided by the grounding rings or grounding electrodes.
- When stray potentials are present, install a grounding ring upstream and downstream of the flowmeter sensor.
- For measurement-related reasons, the potentials in the station ground and in the pipeline should be identical.

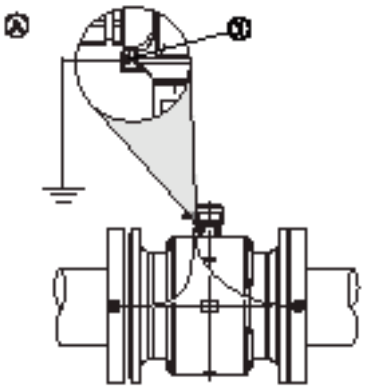
...4 Installation

...4.4 Grounding the flowmeter sensor

NOTICE

If the flowmeter sensor is installed in plastic or earthenware pipelines, or in pipelines with an insulating lining, transient current may flow through the grounding electrode in special cases. In the long term, this may destroy the sensor, since the grounding electrode will in turn degrade electrochemically.
In these special cases, the connection to the earth must be performed using grounding rings. Install a grounding ring upstream and downstream of the device in this case.

4.4.2 Metal pipe with fixed flanges



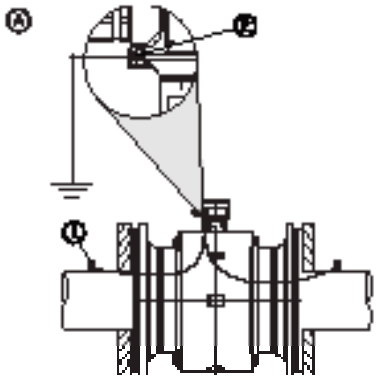
Ⓐ Flange design

① Ground terminal

Figure 18 Metal pipe, without liner (example)

Use a copper wire (at least 2.5 mm² (14 AWG)) to establish the ground connection between the sensor, the pipeline flanges and an appropriate grounding point.

4.4.3 Metal pipe with loose flanges



Ⓐ Flange design

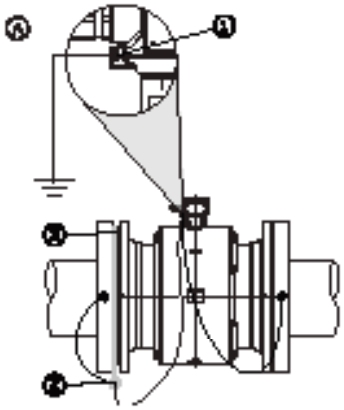
① Threaded nuts M6 ② Ground terminal

Figure 19 Metal pipe, without liner (example)

1 Solder the threaded nuts M6 to the pipeline and connect the ground as shown in the illustration.

2 Use a copper wire (at least 2.5 mm² (14 AWG)) to establish the ground connection between the sensor and an appropriate grounding point.

4.4.4 Plastic pipes, non-metallic pipes or pipes with insulating liner



Ⓐ Flange design

① Ground terminal ② Terminal lug ③ Grounding ring

Figure 20 Plastic pipes, non-metallic pipes or pipes with insulating liner

For plastic pipes or pipes with insulating lining, the grounding for the measuring medium is provided by the grounding ring as shown in the figure below or via grounding electrodes that must be installed in the device (option). If grounding electrodes are used, the grounding ring is not necessary.

1 Install the flowmeter sensor with grounding ring in the pipeline.

2 Connect the terminal lug for the grounding ring and ground connection on the flowmeter sensor with the grounding strap.

3 Use a copper wire (min. 2.5 mm² (14 AWG)) to link the ground terminal to a suitable grounding point.

Ground the stainless steel model as shown in the figure. The measuring fluid is grounded via the process connection adapter and an additional ground is not required.

4.4.5 Grounding for devices with protective plates

The protective plates are used to protect the edges of the liner in the meter tube, e.g., for abrasive fluids. In addition, they function as a grounding ring.

- For plastic or pipes with insulating lining, electrically connect the protective plate in the same manner as a grounding ring.

4.4.6 Grounding with conductive PTFE grounding plate

For devices with a meter size between DN 10 … 250, grounding rings made of conductive PTFE are available. These are installed in a similar way to conventional grounding ring.

4.4.7 Installation and grounding in pipelines with cathodic

corrosion protection

The installation of electromagnetic flowmeters in systems with cathodic corrosion protection must be made in compliance with the corresponding system conditions.

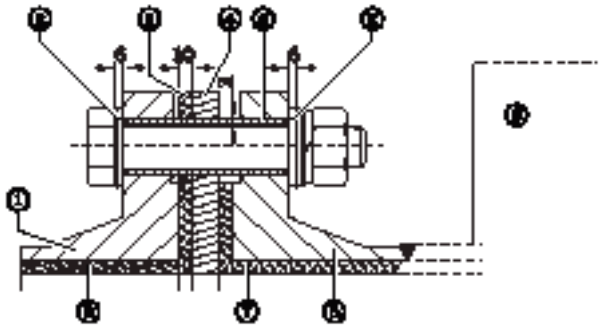
The following factors are especially important:

1 Pipelines inside electrically conductive or insulating.

2 Pipelines completely or for the most part with cathodic corrosion protection (CCP) or mixed systems with CCP areas and PE areas.

- When installing an electromagnetic flowmeter in pipes with insulating inner lining and free from foreign matter, it should be insulated with grounding rings on the upstream and downstream side. The corrosion protection potential is diverted. The grounding rings upstream and downstream of the electromagnetic flowmeter are connected to functional earth (Fig. 24 / Fig. 25).
- If the occurrence of external stray currents is to be expected in pipelines with internal insulation (e.g. in the case of long pipe sections in the vicinity of power supply units), an uninsulated pipe of approx. ¼ x DN of length should be provided upstream and downstream of the flowmeter sensor in order to deviate these currents away from the measuring system (Fig. 26).

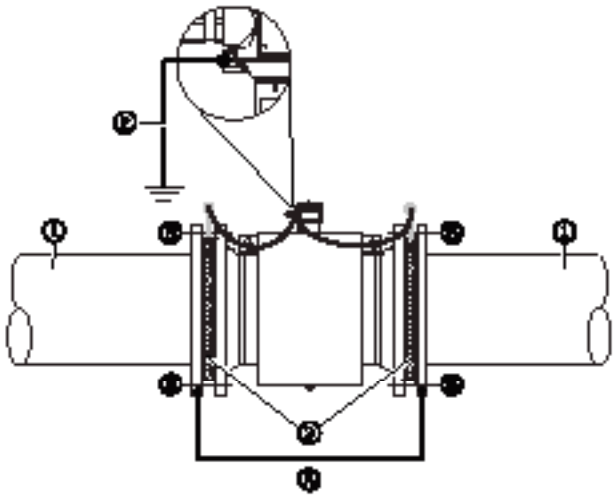
4.4.8 Internally insulated pipelines with cathodic corrosion protection potential



① Pipe flange ② Insulating plate ③ Gasket/insulating ring
④ Grounding ring ⑤ Insulating pipe ⑥ Flange
⑦ Lining ⑧ Insulation ⑨ Flowmeter sensor

Figure 21 Bolt screw view

Install grounding rings on each side of the flowmeter sensor. Insulate the grounding rings from the pipe flanges and connect them to the flowmeter sensor and to functional earth. Insulate the screw bolts for the flange connections when mounting. The insulation plates and the insulation pipe are not included in the delivery. They must be provided onsite by the customer.



Ⓐ Connecting line for corrosion protection potential*

Ⓑ Insulated screw bolt insulated from grounding rings

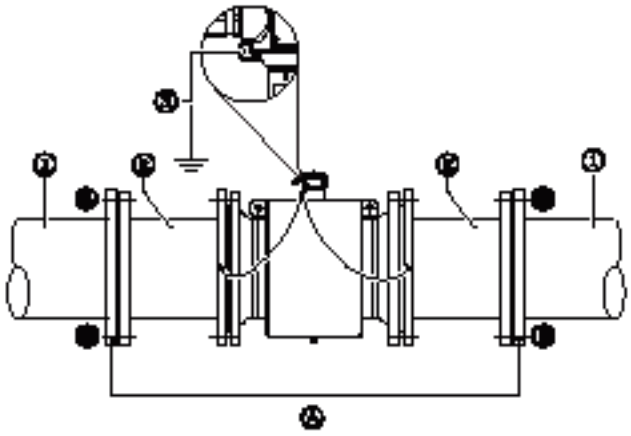
① Insulated pipe ② Functional earth ③ Grounding ring

Figure 22 Flowmeter sensor with grounding plate and functional earth

* ≥ 4 mm²Cu, not included in the delivery, to be provided onsite.

The corrosion protection potential must be diverted through a connecting line Ⓐ away from the insulated flowmeter sensor.

4.4.9 Mixed system pipeline with corrosion protection and functional earth potentials



Ⓐ Connecting line for corrosion protection potential*

Ⓑ Insulated screw bolt insulated from grounding rings

① Insulated pipe ② Bare metal pipe ③ Functional earth

Figure 23 Flowmeter sensor with grounding plate and functional earth

* ≥ 4 mm2Cu, not included in the delivery, to be provided onsite.

This mixed system has an insulated pipeline with corrosion protection potential and an uninsulated bare metal pipe (L = ¼ x flowmeter sensor size) upstream and downstream of the flowmeter sensor. The Fig. 26 shows the preferred installation for cathodic corrosion protection systems.

...4 Installation

4.5 Electrical connections

⚠ WARNING

Risk of injury due to live parts.

Improper work on the electrical connections can result in electric shock.

- Connect the device only with the power supply switched off.
- Observe the applicable standards and regulations for the electrical connection.

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.

4.5.1 Connecting the power supply

NOTICE

- Observe the power supply limit values in accordance with the information on the name plate.
- Observe the voltage drop for large cable lengths and small conductor cross-sections. The voltage at the terminals of the device may not fall below the minimum value required in accordance with the information on the name plate.

The power supply is connected to terminal L (phase), N (neutral), or 1+, 2-, and PE, as stated on the name plate. A circuit breaker with a maximum rated current of 16 A must be installed in the power supply line of the transmitter. The wire cross-sectional area of the power supply 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 cables must comply with IEC 227 and/or IEC 245.

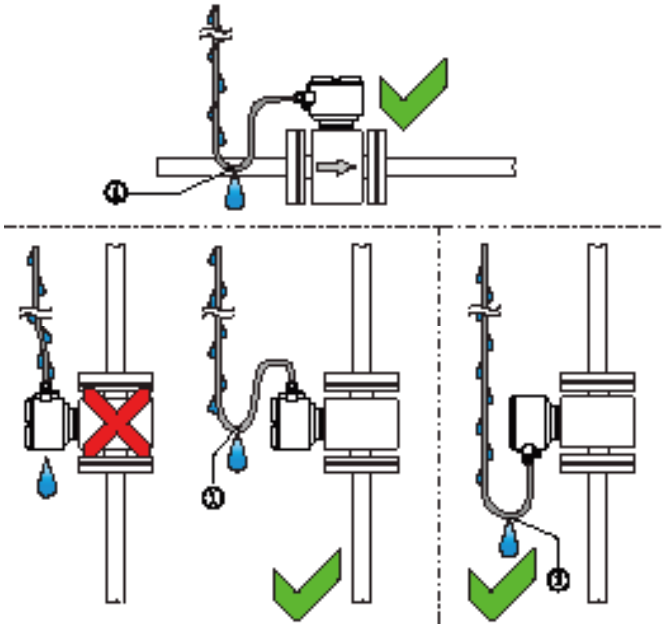
The circuit breaker should be located near the transmitter and marked as being associated with the device.

Connect the transmitter and sensor to functional earth.

4.5.2 Installing the connecting cables

Observe the following points when routing signal cables:

- The electromagnetic coil cable (reddish brown) is run parallel to the signal lines (violet and blue). As a result, only one cable is required between the flowmeter sensor and the transmitter. Do not run the cable over junction boxes or terminal strips.
- The signal cable carries a voltage signal of only a few millivolts and must, therefore, be routed over the shortest possible distance.
- The max. allowable signal cable length is 50 m (164 ft) without pre-amplifier and 200 m (656 ft) with pre-amplifier.
- 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, run the signal/ magnet coil cable through a metal pipe and connect this to the station ground potential.
- All leads must be shielded and connected to the station ground potential.
- To shield against electromagnetic interference, the cable contains outer shielding. This is attached to the SE clamp.
- The supplied stranded steel wire is also connected to the SE clamp.
- Do not damage the sheathing of the cable during installation.
- Ensure that a drip loop (water trap) is used when installing the connecting cables for the sensor.



① Drip loop

Figure 24 Laying of the connecting cable

4.5.3 Connection using a cable conduit



Figure 25 Installation set for cable conduit

NOTICE

Condensate formation in terminal box
If the flowmeter sensor is connected to cable conduits, there is a possibility that humidity may get into the terminal box because of condensate formation in the cable conduit. Ensure that the cable entry points on the terminal box are sealed.

An installation set for sealing the cable conduit is available via order number 3KXF081300L0001.

IP rating of FEW/FEP 620 Sensor

IP66/67 in accordance with EN 60529

IP 68 in accordance with EN 60529 (for remote mount design only)

Test conditions for IP68 to EN60529:

Continous submergence for 14 days (2 weeks) at 7 m (23 ft) depth

Temperature data

Storage temperature range
-40 to 70°C (-40 to 158 °F)

The temperature range offered by the device is dependent on a number of different factors.
These factors include the measuring medium temperature T_{medium}, the ambient temperature T_{amb}, the operating pressure P_{medium}, the liner material and the approvals for the explosion protection.

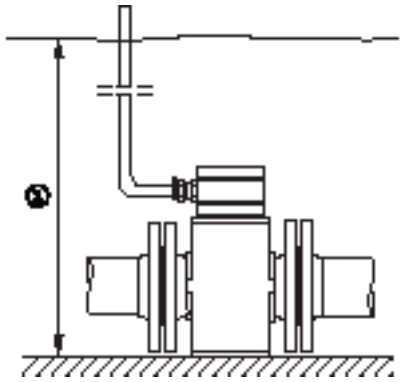
Signal cable length and preamplifier

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

Maximum signal cable length between flowmeter sensor and transmitter

Preamplifier	Signal cable length
Without	Max. 50 m (164 ft)
With	Max. 200 m (656 ft)

4.5.4 Connection with IP 68 rating



① Maximum flooding height 7m 2wks for FEW/FEP620 sensor

Figure 26

For sensors with IP 68 rating, the maximum flooding height is 7m 2wks. The supplied cable fulfills all submersion requirements.

Test conditions for IP68 to EN60529:
Continous submergence for 14 days (2 weeks) at 7 m (23 ft) depth

...4 Installation

...4.5 Electrical connections

Connection

NOTICE

Potential adverse effect on IP 68 rating!
The IP 68 rating of the sensor may be adversely affected as a result of damage to the signal cable.
The sheathing of the signal cable must not be damaged.

1 Use the supplied signal cable to connect the sensor and the transmitter.

2 Connect the signal cable in the terminal box of the sensor.

3 Route the cable from the terminal box to above the maximum flooding height of 7m for FEW/FEP620 sensor.

4 Tighten the cable gland.

5 Carefully seal the terminal box. Make sure the gasket for the cover is seated properly.

Note

As an option, the sensor can be ordered with the signal cable already connected to the sensor and the terminal box already potted.

Specification - Reduced Bore Sensors Wetted parts

Screw-end meters
Brass and stainless steel 316L and super-austenitic steel
Flanged meters
Electrodes - stainless steel 316L
Potable water approvals

WRAS Listed	NSF Approved	ACS	AS / NZS 4020	Lining material
√	in preparation x	√ ACS for FER from UK factory only (DN40 to 600 only)	√	Elastomer

FER Sensor allowed media temperature: Min -6 degC, Max 70 degC

Pressure limitations
As flange rating
PN25 Max Process Temp 50 °C (122 °F)
PN40 Max Process Temp 40 °C (104 °F)
UL Fire Service approved meters 285 psi

Pressure equipment directive 97/23/EC
This product is applicable in networks for the supply, distribution and discharge of water and associated equipment and is therefore exempt.

Environmental protection (FER sensor only)
IP rating
IP68 (NEMA 6) to 10 m (33 ft.) N

Non-wetted parts

Flange material
Carbon steel DN4O to DN6O0 (1 ½ to 24 in. NB)

Cable gland material
Plastic

Terminal box material
Polycarbonate, Stainless steel

Paint specification

Housing body and flange
Carbon steel or SG iron coated with light grey 2-pack epoxy (RAL9002)
- Primer - Interpon PZ663 zinc-based system, 70 microns thick
- Top coat - Interpon 610 light grey polyester powder coating (RAL 9002), up to 150 microns thick
- As a special requirement - 2-pack epoxy primer / finish @ 300pm DFT

Burial
Mechanical strength is verified for the meter to withstand external loads at burial depths from 0.6 m to 10 m under conditions including heavy construction vehicles, main road traffic, and field installations.

Potting the terminal box

If the terminal box is to be potted subsequently on-site, a special two-component potting compound can be ordered separately (order no. 0128499). Potting is only possible if the sensor is installed horizontally. Observe the following instructions during work activity.

⚠ WARNING

Health hazard!

The two-component potting compound is toxic – observe all relevant safety measures!

Follow the Material Safety Data Sheet that are provided by the manufacturer prior to starting any preparations.

Hazard warnings:

- R20: Harmful by inhalation.
- R36/37/38: Irritating to eyes, respiratory system and skin.
- R42/43: May cause sensitization by inhalation and skin contact.

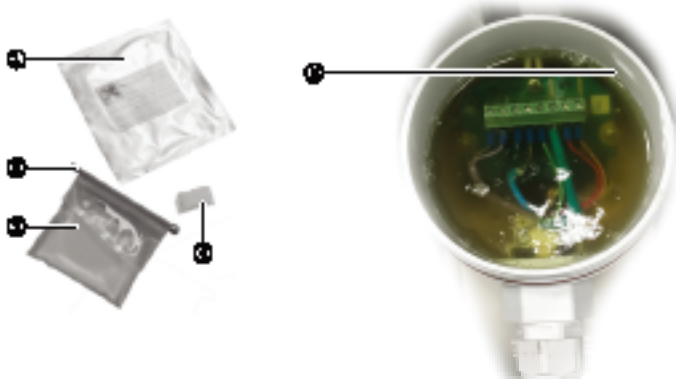
Safety advice:

- S23: Do not breathe gas/fumes/vapor/spray.
- S24: Avoid contact with skin.
- S37: Wear suitable gloves.
- S63: In case of accident by inhalation: remove casualty to fresh air and keep at rest.

Preparation

- Complete the installation before potting in order to avoid moisture penetration. Before starting, check all the connections for correct fitting and stability.
- Do not overfill the terminal box. Keep the potting compound away from the O-ring and the gasket/groove (see Fig. 30).
- Prevent the two-component potting compound from penetrating the cable conduit if an NPT ½» installation is used.

Procedure



① Packing bag
② Connection clamp
③ Two-component potting compound
④ Drying bag
⑤ Maximum filling level (Potting level should be above electronics)

Figure 27 Bolt screw view

Potting

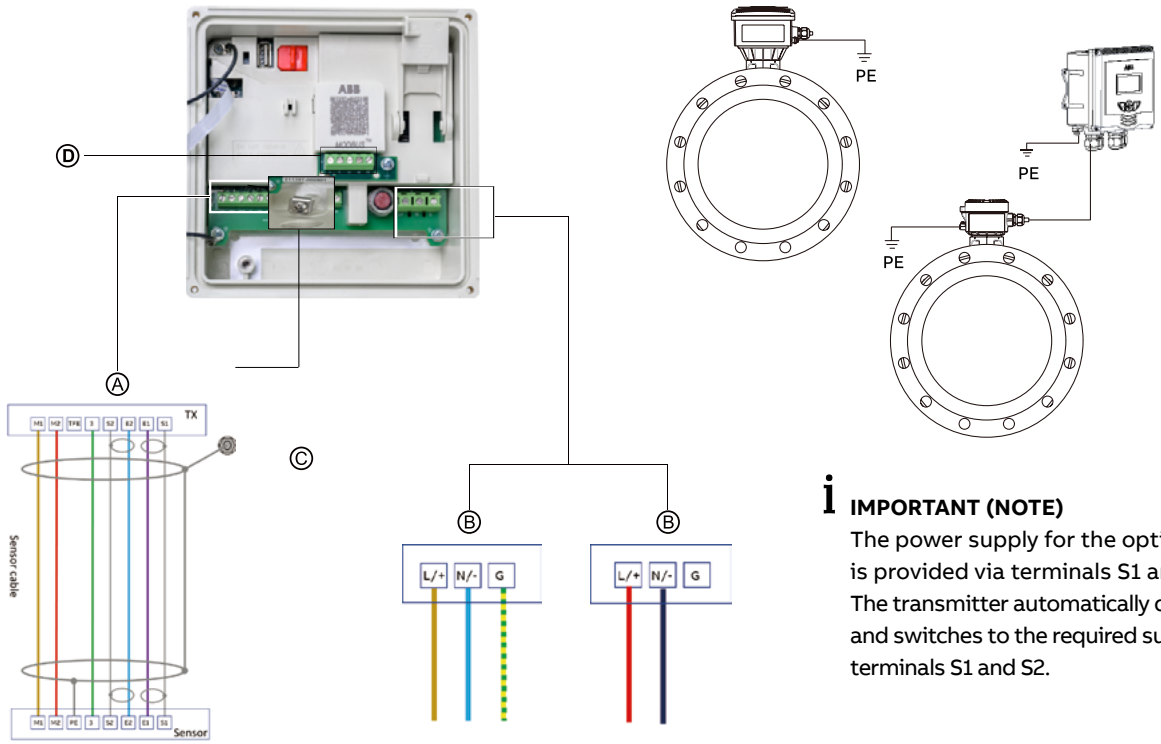
1. Cut open the protective enclosure of the two-component potting compound (see packing).
2. Remove the connection clamp of the potting compound.
3. Knead both components thoroughly until a good mix is reached.
4. Cut open the bag at a corner. Perform work activity within 30 minutes.
5. Carefully fill the terminal box with the two-component potting compound until the connection cable is covered.
6. Wait a few hours before closing the cover in order to allow the compound to dry, and to release any possible gas.
7. Ensure that the packaging material and the drying bag are disposed of in an environmentally sound manner.

...4 Installation

...4.5 Electrical connections

4.5.5 Electrical connection

Connection diagram



Ⓐ Connections for sensor signal cable (remote mount design only)
Ⓑ Connections for power supply (AC power supply/DC power supply)
Ⓒ Grounding rod
Ⓓ Optional MODBUS module binding post

Figure 28 Electrical connections

IMPORTANT (NOTE)
The power supply for the optional pre-amplifier is provided via terminals S1 and S2.
The transmitter automatically detects the sensor and switches to the required supply voltage on terminals S1 and S2.

NOTICE

For detailed information about grounding the transmitter and the flowmeter sensor, please refer to chapter 'Grounding' in the Commissioning Instructions or the Operating Instructions.

Connections for the power supply

AC power supply	
Terminal	**Function/comments**
L/+	Phase
N/-	Neutral conductor
G	Protective earth (PE)

DC power supply voltage	
Terminal	**Function/comments**
L/+	+
N/-	—
G	Protective earth (PE)

Optional MODBUS module binding post	
Terminal	**(Function/comments**
A/B, A2/B2	Two sets of MODBUS terminals
⏚	PE

Connections for output

Terminal	**Function/comments**
	Active HART+4-20mA output
31/32	The current output is 'active' mode. The source to drive the 20 mA loop is in-built in the transmitter.
	Passive digital output DO1
41/42	The output can be configured as a pulse output, frequency output or switch output on site.
	Passive digital output DO2
51/52	The output can be configured as a pulse output or switch output on site.
⏚	**PE**

Connections for the signal cable

Only for remote mount design.

Terminal	**Function/comments**	**Color**
TFE	Not connected	—
3	Reference potential for measurement	Green
S2	Shield for E2	—
E2	Signal line	Blue
E1	Signal line	Violet
S1	Shield for E1	—
M1	Magnet coil	Brown
M2	Magnet coil	Red
PE	Shield	—
—	Not connected	Orange/Yellow

Electrical data for inputs and outputs

Power supply L/N, 1+ / 2-

AC power supply	
Terminal	L/N
Operating voltage	100 to 240 V AC (–15 %/+10 %), 47 to 64 Hz
Power consumption	<20 VA
Inrush current	8.8 A

DC power supply voltage	
Terminal	+/–
Operating voltage	24 ...48V DC (-10 % / +10 %)
Ripple	< 5 %
Power consumption	< 10 W
Inrush current	5.6 A

Current output 31/32

Can be configured for outputting mass flow and volume flow.

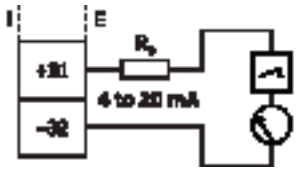


Figure 29 Connection example for active current output 31/32 (I = internal, E = external, R_B = load)

Hart Communication

The hart protocol definition is shown in the following table:

Settings	**Description**
Protocol	Hart 7.9
Device Type Code	0x1AA7
Device Revision	1
Device Address Range	0 ~ 63 Factory settings: 0
Baud rate	1200 baud
Default Primary Variable in HART	Volume Flow in %
Default Secondary Variable in HART	Mass Flow in %
Default Tertiary Variable in HART	Volume Flow Totalizer Forward
Default Quaternary Variable in HART	Volume Flow Totalizer Reverse

Modbus Communication

The modbus protocol settings is shown in the following table:

Settings	**Description**
Modbus Address Range	1 ~ 247
Baud rate	2400, 4800, 9600, 19200, 38400, 56000, 57600, 115200 baud Factory settings: 9600 baud
Parity	None, even, odd Factory settings: Odd
Stop bit	One, two Factory setting: One
IEEE format	Little endian, big endian Factory setting: Little endian
Typical response time	< 100ms
Response delay time	0 to 200 milliseconds Factory setting: 10 milliseconds

The function codes listed below are supported by FEX62X:

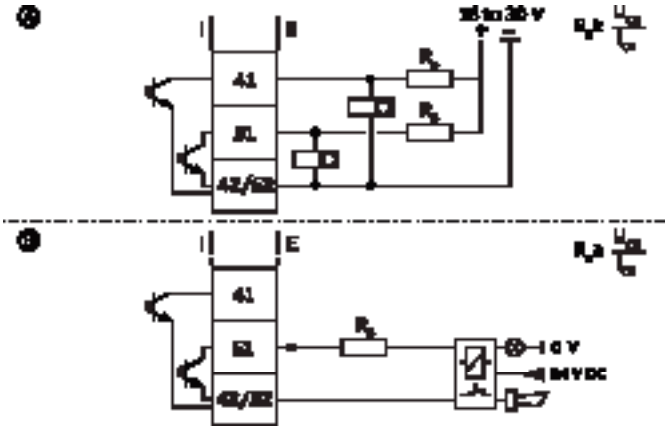
Function code	**Description**
0x02	Read Discrete Inputs
0x03	Read Holding Registers
0x04	Read Input Registers
0x06	Write Single Register
0x08	Diagnostics
0x10	Write Multiple Registers
0x11	Report Slave ID

The following table is an overview of register tables categorized by type:

Table name	Table type	Data type	Start index	End index
Unsigned Integer 8bit ReadOnly dynamic U8ROD	Single	TUSIGN8	1	32
Float 32bit ReadOnly F32RO	Single	TFLOAT	2200	2248
ReadOnly 16bit unsigned integer U16RO	Single	TUSIGN16	2100	2112
ReadWrite 32bit float F32RW	Single	TFLOAT	5000	5104
ReadWrite 32bit unsigned integer U32RW und U32RO	Single	TUSIGN32	3300	3326
ReadWrite 8bit unsigned integer U8RW	Single	TUSIGN8	4000	4175
Unsigned Integer 16bit ReadWrite U16RW	Single	TUSIGN16	3100	3236
Variant 16bit ReadOnly V16RO	Single	TUSIGN16	1100	1231
Character 8bit ReadOnly C8RO	String	TUSIGN8	2500	2759
Character 8bit ReadWrite C8RW	String	TCHAR	3400	3519
Float 64bit ReadOnly dynamic F64ROD	Single	TUSIGN8	400	432
Float 32bit ReadOnly dynamic F32ROD	Single	TDOUBLE	200	306
Unsigned Integer 8bit ReadOnly U8RO	Single	TUSIGN32	2000	2052

Digital output 41/42, 51/52

Can be configured as pulse, frequency or binary output.



Ⓐ Passive digital output 41/42, 51/52 as pulse or frequency output

Ⓑ Passive digital output 51/52 as binary output

Figure 30 Connection example (I = internal, E = external, RB = load)

Note

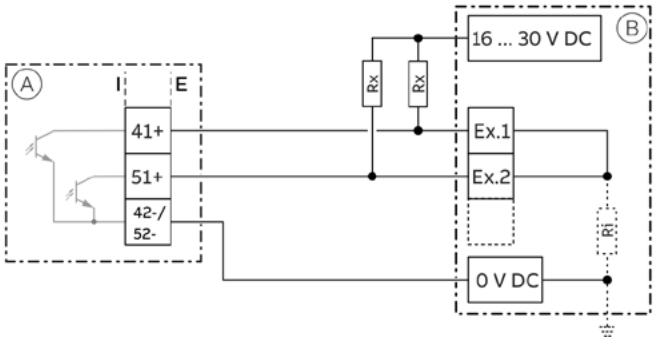
- Terminal 41&51 have the same ground potential - 42/52. Digital outputs 41/42 and 51/52 are not electrically isolated from each other.
- If a mechanical counter is used, ABB recommend setting a pulse width of ≥30 ms and a maximum frequency (f_{max}) of ≤ 3 kHz.

Pulse/frequency output (passive)	
Terminal	41/42, 51/52
U_{max}	30 V DC
I_{max}	25 mA
f_{max}	10.5 kHz
Pulse width	0.1 … 2000 ms

Binary output (passive)	
Terminal	41/42, 51/52
U_{max}	30 V DC
I_{max}	25 mA
Switching function	Can be configured using software as: System alarm, empty pipe alarm, max./min. alarm, flow direction signaling, others

Connection examples
Input and output functions are configured via the device software in accordance with the desired application.

Digital output 41 / 42, 51 / 52 passive on distributed control system



Ⓐ Transmitter
Ⓑ Distributed control system / Memory programmable controller
Ex. 1 Input 1
Ex. 2 Input 2
RX Resistor for current limitation
RI Distributed control system internal resistance

Figure 28: Digital output 41 / 42 on distributed control system (example)

The RX resistors limit the maximum current through the optoelectronic coupler of the digital outputs in the transmitter. The maximum permissible current is 25 mA. An RX value of 1000 Ω / 1 W is recommended at a voltage level of 24 V DC. The input on the distributed control system is reduced from 24 V DC to 0 V DC (falling edge) with '1' at the digital output.

Connection versions digital output 41 / 42, 51 / 52
Depending on the wiring of digital outputs DO 41 / 42 and 51 / 52, they can be used parallel or only individually. The electrical isolation between the digital outputs also depends on the wiring.

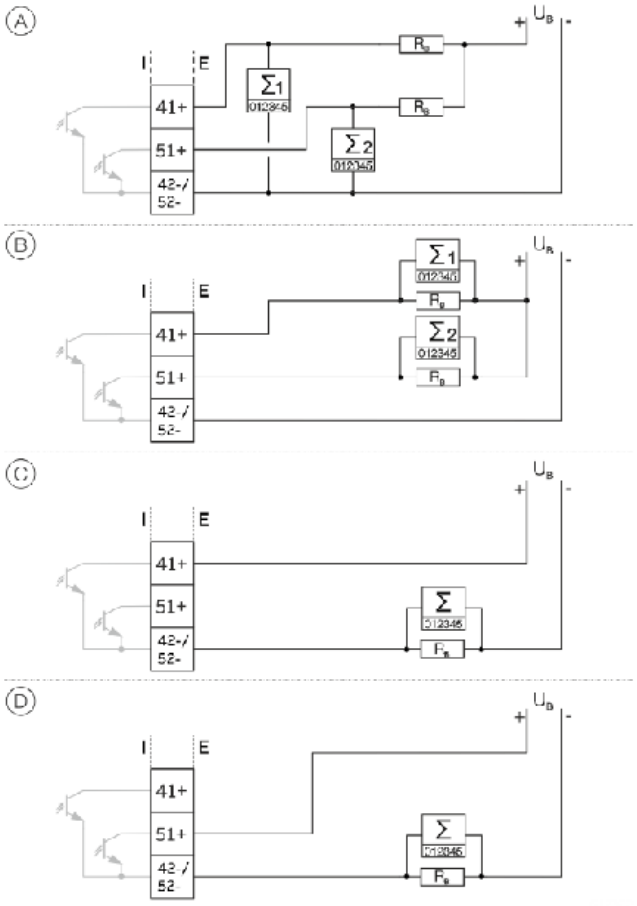


Figure 29: Connection versions digital output 41 / 42 and 51 / 52

	DO 41 / 42 and 51 / 52 can be used parallel	DO 41 / 42 and 51 / 52 electrically isolated
Ⓐ	Yes	No
Ⓑ	Yes	No
Ⓒ	No, only DO 41 / 42 can be used	No
Ⓓ	No, only DO 51 / 52 can be used	No

...4 Installation

...4.5 Electrical connections

4.5.6 Connection to integral mount design

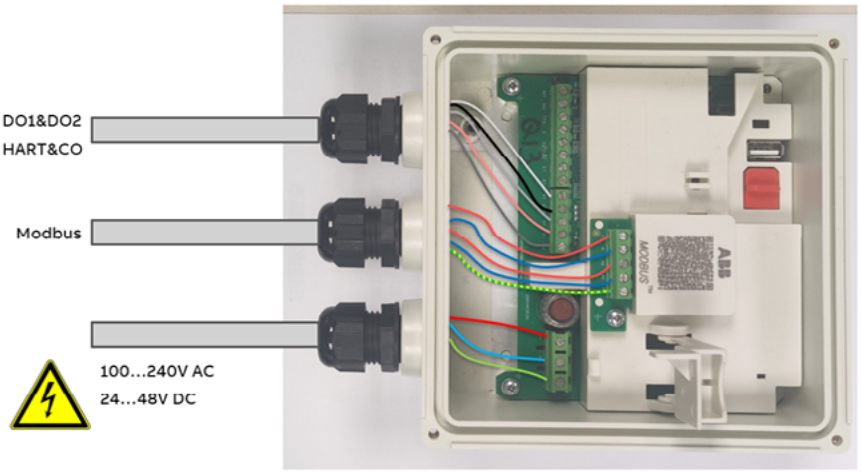


Figure 31 Connection to integral design

Notes: Cable selection: to fix the cable in the gland, cable shall meet 6mm≤ cable size≤ 12mm

PE = potential equalization

NOTICE

If the O-ring gasket is seated incorrectly or damaged, this may have an adverse effect on the housing protection class.
Follow the instructions in chapter "**Opening and closing the terminal box**" on page 11 to open and close the housing safely.

Connect the integral mount design: Perform steps Ⓐ ... Ⓒ

In the process, observe the following instructions:

- Lead the cable for the power supply into the terminal box through the right cable entry.
- Lead the cables for the analog outputs and the digital outputs into the terminal box through the left cable entry.
- Connect the cables according to the circuit diagram. Connect the cable shields to the designated earthing clamp in the terminal box.

NOTICE

- Observe the power supply limit values in accordance with the information on the name plate.
- Observe the voltage drop for large cable lengths and small conductor cross-sections. The voltage at the terminals of the device may not fall below the minimum value required in accordance with the information on the name plate.

The power supply is connected to terminal L (phase), N (neutral), or 1+, 2-, and PE, as stated on the name plate. A circuit breaker with a maximum rated current of 16 A must be installed in the power supply line of the transmitter. The wire cross-sectional area of the power supply 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 cables 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.

Connect the transmitter and sensor to functional earth.

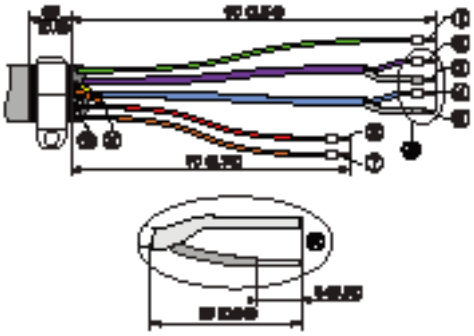
4.5.7 Connection to remote mount design

Note

Use wire end sleeves.

- Wire end sleeves 0.75 mm² (AWG 19), for shielding (S1, S2).
- Wire end sleeves 0.5 mm2 (AWG 20), for all other wires. The shields may not touch (signal short circuit).

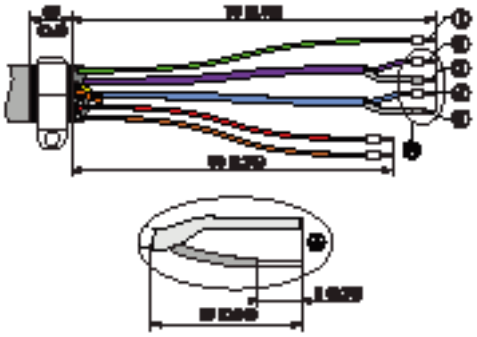
Flowmeter sensor side



Pos.	Terminal	Function/comments	Color
①	3	Reference potential for measurement	Green
②	E1	Signal line	Violet
③	S1	Shield for E1	—
④	E2	Signal line	Blue
⑤	S2	Shield for E2	—
⑥	M2	Magnet coil	Red
⑦	M1	Magnet coil	Brown
⑧	–	Not connected	Yellow
	–	Not connected	Orange
⑨	PE/ ⏚	Shield	—
Ⓐ	–	The shield terminal needs to be added with an insulated sleeve	—

Figure 32 Signal Cable Part No. D173D031U01, Dimensions in mm (inch)

Transmitter side



Pos.	Terminal	Function/comments	Color
①	3	Reference potential for measurement	Green
②	E1	Signal line	Violet
③	S1	Shield for E1	—
④	E2	Signal line	Blue
⑤	S2	Shield for E2	—
⑥	M2	Magnet coil	Red
⑦	M1	Magnet coil	Brown
⑧	–	Not connected	Yellow
	–	Not connected	Orange
⑨	PE/ ⏚	Shield	—
Ⓐ	–	The shield terminal needs to be added with an insulated sleeve	—

Figure 33 Signal Cable Part No. D173D031U01, Dimensions in mm (inch)

...4 Installation

...4.5 Electrical connections

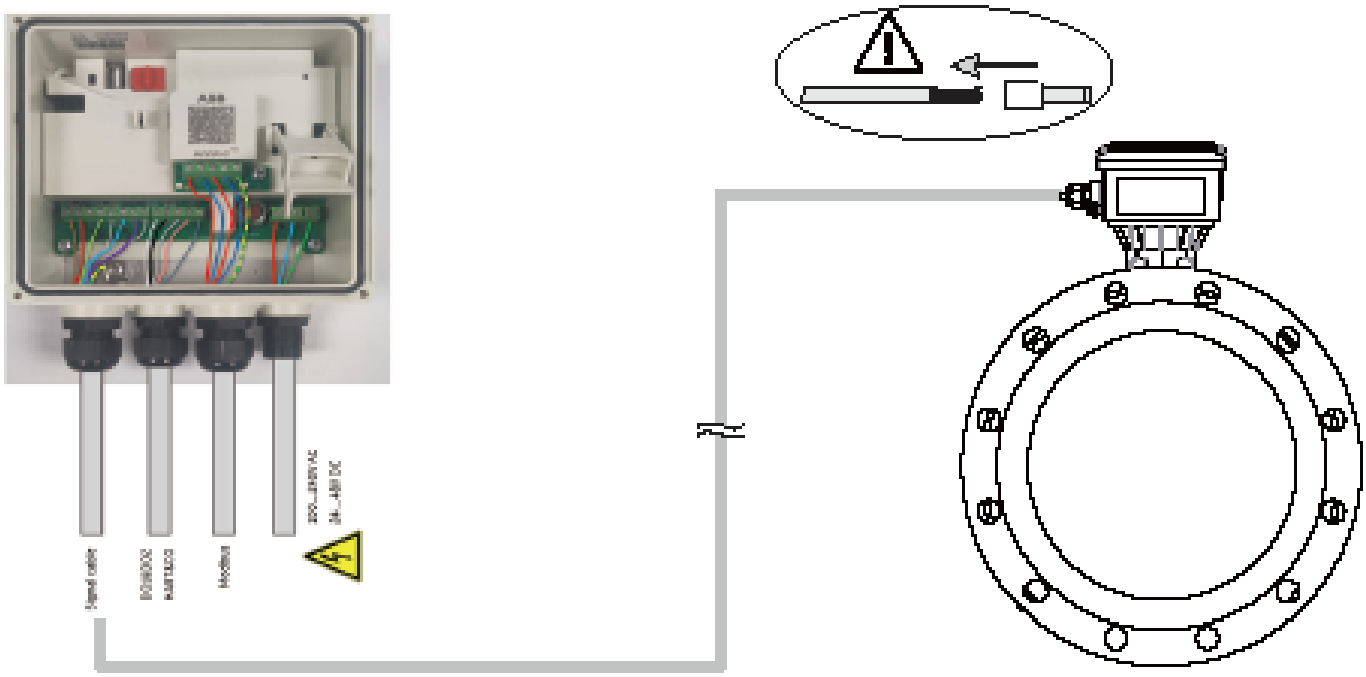


Figure 34 Connection to transmitter in remote mount design (example)

NOTICE

If the O-ring gasket is seated incorrectly or damaged, this may have an adverse effect on the housing protection class.
Follow the instructions in chapter "**Opening and closing the terminal box**" on page 11 to open and close the housing safely.

NOTICE

- Observe the power supply limit values in accordance with the information on the name plate.
- Observe the voltage drop for large cable lengths and small conductor cross-sections. The voltage at the terminals of the device may not fall below the minimum value required in accordance with the information on the name plate.

Observe the following points when connecting to an electrical supply:

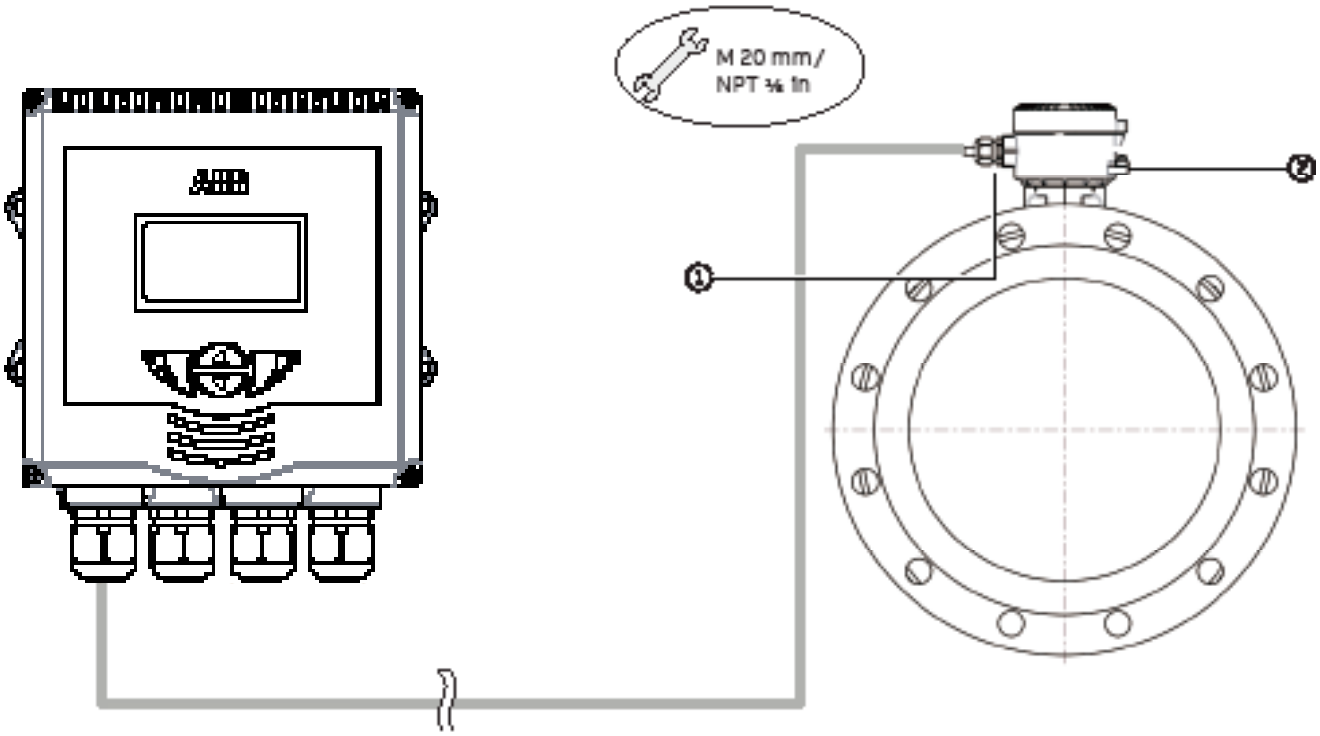
In the process, observe the following instructions:

- Lead the cables for the power supply and the signal inputs and outputs into the housing as shown.
- Connect the cables in accordance with the electrical connection diagram. If present, connect the cable shielding to the earthing clamp provided.
- Use wire end ferrules when connecting.
- Close unused cable entries using suitable plugs.

The power supply is connected to terminal L (phase), N (neutral), or 1+, 2-, and PE, as stated on the name plate. A circuit breaker with a maximum rated current of 16 A must be installed in the power supply line of the transmitter. The wire cross-sectional area of the power supply 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 cables 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.

Connect the transmitter and sensor to functional earth.



① Terminal for signal cable (see below table) ② Ground terminal

Terminal	Function/comments	Color
3	Reference potential for measurement	Green
E1	Signal line	Violet
S1	Shield for E1	—
E2	Signal line	Blue
S2	Shield for E2	—
M2	Magnet coil	Red
M1	Magnet coil	Brown
–	Not connected	Yellow
–	Not connected	Orange
PE/ ⏚	Shield	—

Figure 35 Connection to transmitter in remote mount design (example)

4.6 Communication

4.6.1 Hart Communication

The hart protocol definition is shown in the following table:

Table 83 Hart protocol definition

Settings	Description
Protocol	Hart 7.9
Device Type Code	0x1AA7
Device Revision	1
Device Address Range	0 ~ 63 Factory settings: 0
Baud rate	1200 baud
Default Primary Variable in HART	Volume Flow in %
Default Secondary Variable in HART	Mass Flow in %
Default Tertiary Variable in HART	Volume Flow Totalizer Forward
Default Quaternary Variable in HART	Volume Flow Totalizer Reverse

4.6.2 Modbus Communication

The modbus protocol settings is shown in the following table:

Table 84 Modbus protocol settings

Settings	Description
Modbus Address Range	1 ~ 247
Baud rate	2400, 4800, 9600, 19200, 38400, 56000, 57600, 115200 baud Factory settings: 9600 baud
Parity	None, even, odd Factory settings: Odd
Stop bit	One, two Factory setting: One
IEEE format	Little endian, big endian Factory setting: Little endian
Typical response time	< 100ms
Response delay time	0 to 200 milliseconds Factory setting: 10 milliseconds

The function codes listed below are supported by FEX62X:

Table 85 Supported Modbus function codes

Function code	Description
0x02	Read Discrete Inputs
0x03	Read Holding Registers
0x04	Read Input Registers
0x06	Write Single Register
0x08	Diagnostics
0x10	Write Multiple Registers
0x11	Report Slave ID

5 Commissioning

5.1 Safety instructions

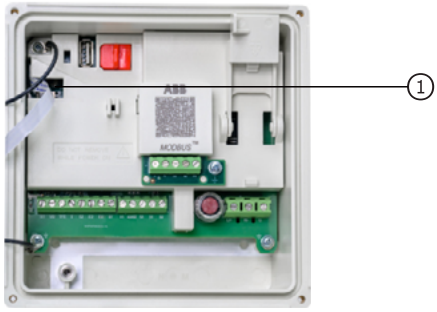
⚠ CAUTION

Risk of burns due to hot measuring media.
The device surface temperature may exceed 70 ° C (158 ° F), depending on the measuring medium temperature!
Before starting work on the device, make sure that it has cooled sufficiently.

Aggressive or abrasive measuring medium may result in damage to the wetted parts of the flowmeter sensor. As a result, pressurized measuring medium may escape prematurely.

Due to wear on the flange seal or process connection gaskets, a pressurized measuring medium may escape.

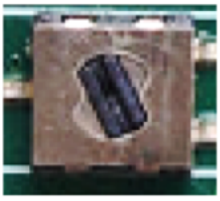
5.2 Write-protection switch, service LED and local operating interface



① Write protection switch and Service LED

Figure 36

Write protection switch



A: Write-protect switch off



B:Write-protect switch on

If write protection is active, the parameterization of the device cannot be changed via the local operating interface or the local display.

Turn the write protection switch clockwise until the notch points to the Lock mark to activate the write protection function, then configured parameters will not be accidentally changed. Turn the write protection switch counter-clockwise until the notch points to the Unlock mark to deactivate the write protection function, then parameters can be changed.

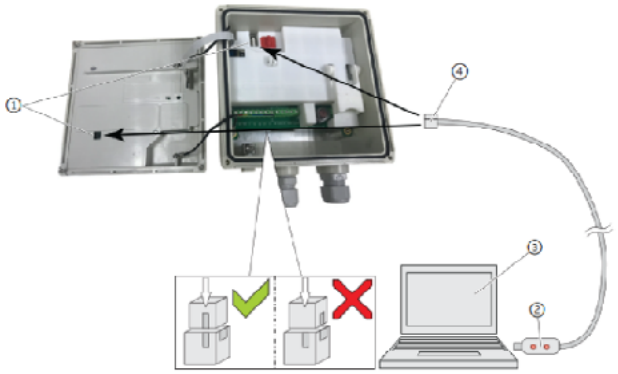
Service LED

The service LED, which indicates the operating condition of the device, is located in the transmitter.

Service LED	Description
Flashes rapidly (100 ms)	Starting sequence, device not yet ready for operation
Lit up continuously	Device operating, no critical error
Flashes slowly (1 second)	A critical error has occurred. See chapter “**Error messages on the LCD display**” on page 33

Local operating interface

The sensor can also be parameterized via the local operating interface.



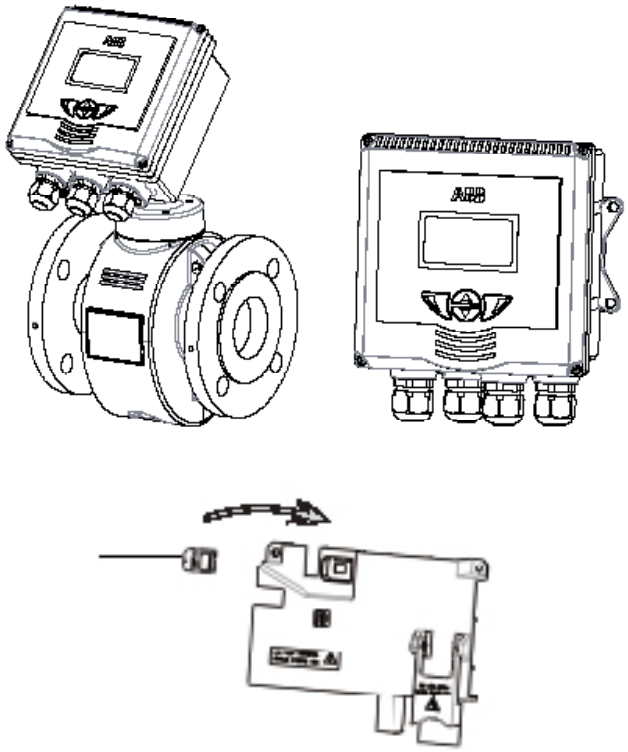
① Local operating interface ② Programming plug
③ PC/notebook
④ Special commissioning cable of ABB service 3KX065690U0100(can be ordered from ABB)

5.3 Checks prior to commissioning

The following points must be checked before commissioning the device:

- The wiring must have been completed as described in the chapter “Electrical connections” on page 14.
- The correct grounding of the sensor.
- The ambient conditions must meet the requirements set out in the technical data.
- The power supply must meet the requirements set out on the identification plate.

Remote Sensor - Checking for the correct sensor to transmitter assignment



① **SensorMemory**

Figure 37 Sensor to transmitter assignment

5.3.1 Parameterization of the device

The ProcessMaster 620 can be commissioned and operated via the integrated LCD indicator (see chapter “**Parameterization via the “Easy Set-up**” menu function” on page 26).

Alternatively, the ProcesMaster FEx620 can also be commissioned and operated via ABB FIM or other commissioning tools.

How to identify which Sensor to connect to the Transmitter

Check for the Serial No. indicated on the Transmitter and on the Sensor Nameplate.
Equal Numvers belong to eachothers.

ProcessMaster FET622	
Model No: PET622Y0P172***0M6NC1NFSTCTK1B3	
Serial No: 3K672024270208	Tag No:
Output:	
Tamb.: -20°C-60°C	Supply: 100V … 240V AC (50HZ/80HZ)<20VA
24V … 48V DC<10W	
Dev. Version: 01.13.83	Prot. Class: IP66 NEMA 4%
Update:	Year: 2024/07
Manufactured by: ABB Engineering (Shanghai) Ltd. China, No. 4528, Kangxin Highway, Kangqiao, Shanghai	

ProcessMaster FEW622		
Model No: FEW622Y0P10150S2R2B1S2A78YY0AC0CMACRACW YJ6K0M6CR08MANC1NF8RCE8C2T CTK1TV3V1SDD		
Serial No: 3K672024270208	Tag No:	
**Ze: DN150/PN16	Prot. Class: IP68, 6P	
Material: HR/1.4571	MAP(25°C): 1.6MPa	Cal: 0, 3%
QmaxDN: 600m2/h	Sz: 0.17277 Ss: 203.26	Fexc: 15_12.5 Hz
Tamb.: -20°C-60°C	Tmed: -5°C-80°C	Year: 2024/07
Manufactured by: ABB Engineering (Shanghai) Ltd. China, No. 4528, Kangxin Highway, Kangqiao, Shanghai		

...5 Commissioning

...5.3 Checks prior to commissioning

Parameterization via the local operating interface

Configuration via the local operating interface on the device requires a PC/notebook and a USB interface cable.

All parameters can also be set using the HART-DTM available at www.abb.com/flow and FIM software.

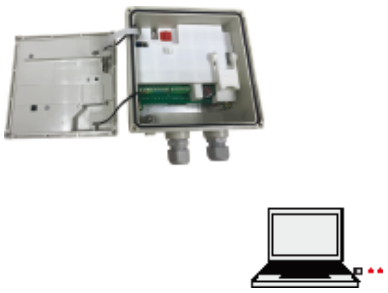


Figure 38 Connection to the local operating interface

cable with USB to USB connector	3KXF065601U0100

1 Open device terminal box.

2 Connect programming plug to the local operating interface of the device.

3 Insert USB interface cable into a free USB female connector on the PC/notebook.

4 Switch on the device power supply.

5 Perform the parameterization of the equipment.

Detailed information on operating the software is available in the relevant operating instructions and the DTM online help.

5.4 Switching on the power supply

Switch on the power supply.

The LCD display shows the following display during the startup process:

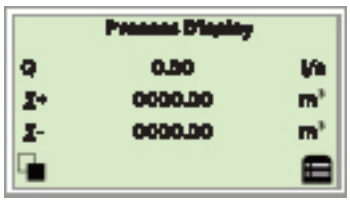


The process display is displayed after the startup process.

5.5 Parameterization via the “Easy Set-up” menu function

Settings for the most common parameters are summarized in the “Easy Set-up” menu. This menu provides the fastest way to configure the device.

The following section describes parameterization via the “Easy Set-up” menu function.



1 Use to switch to the configuration level.

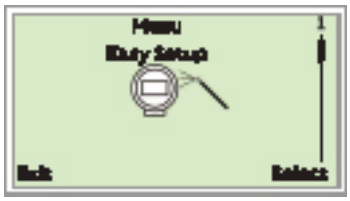


2 Use / to select “Standard”.

3 Confirm the selection with .



4 Use to confirm the password. A password is not available as factory default; you can continue without entering a password.



5 Use ▲/▼ to select “Easy Set-up”.

6 Confirm the selection with ◩.

7



Use ◩ to call up the edit mode.

8 Use ▲/▼ to select the desired language.

9 Confirm the selection with ◩.



10 Use ◩ to call up the edit mode.

11 Use ▲/▼ to select the desired unit for the volume flow.

12 Confirm the selection with ◩.



13 Use ◩ to call up the edit mode.

14 Use ▲/▼ to select the desired upper range value.

15 Confirm the selection with ◩.

The device is factory calibrated to the flow range end value QmaxDN, unless other customer information is available. The ideal flow range end values are approximately 2 ... 3 m/s (0.2 0.3 x QmaxDN).

The possible flow range end values are shown in the table in chapter “**Measuring range table**” on page 29.

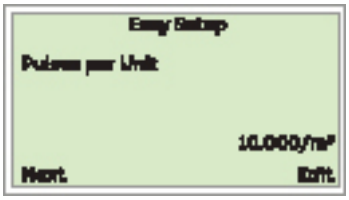
16



Use ◩ to call up the edit mode.

17 Use ▲/▼ to select the desired unit for the volume totalizer.

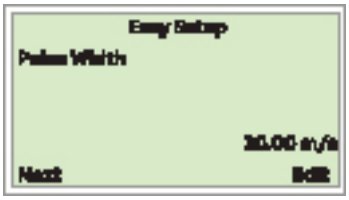
18 Confirm the selection with ◩.



19 Use ◩ to call up the edit mode.

20 Use ▲/▼ to set the desired value.

21 Confirm the selection with ◩.



22 Use ◩ to call up the edit mode.

23 Use ▲/▼ to set the desired pulse width.

24 Confirm the selection with ◩.



25 Use ◩ to call up the edit mode.

26 Use ▲/▼ to set the damping for the volume flow.

27 Confirm the selection with ◩.



...5 Commissioning

...5.5 Parameterization via the “Easy Set-up” menu function

28 Use to call up the edit mode.

29 Use / to select the desired operating mode (Off, Logic, Pulse, Frequency) for the digital output.

30 Confirm the selection with .



31 Use to call up the edit mode.

32 Use / to select the desired alarm mode.

33 Confirm the selection with .



34 Use to call up the edit mode.

35 Use / to set the alarm current for “Low Alarm”.

36 Confirm the selection with .



37 Use to call up the edit mode.

38 Use / to set the alarm current for “High Alarm”.

39 Confirm the selection with .

Zero point adjustment of the flowmeter

Note

Prior to starting the zero point adjustment, make sure that:

- There is no flow through the sensor (close valves, shutoff devices etc.).
- The sensor is completely filled with the medium to be measured.



- Use to start automatic balancing of the zero point for the system.



Once all parameter have been set, the main menu appears again. The most important parameters now have been set.

40 Use to switch to the process display.

5.6 Measuring range table

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

Nominal diameter		Lower range value	Q_{max}DN	Upper range value
DN	**in**	**0.02 x Q_{max}DN**		**2 x Q_{max}DN**
3	1/10	0.08 L/min (0.02 US gal/min)	4 L/min (1.06 US gal/min)	8 L/min (2.11 US gal/min)
4	5/32	0.16 L/min (0.04 US gal/min)	8 L/min (2.11 US gal/min)	16 L/min (4.23 US gal/min)
6	1/4	0.4 L/min (0.11 US gal/min)	20 L/min (5.28 US gal/min)	40 L/min (10.57 US gal/min)
8	5/16	0.6 L/min (0.16 US gal/min)	30 L/min (7.93 US gal/min)	60 L/min (15.85 US gal/min)
10	3/8	0.9 L/min (0.24 US gal/min)	45 L/min (11.9 US gal/min)	90 L/min (23.78 US gal/min)
15	1/2	2 L/min (0.53 US gal/min)	100 L/min (26.4 US gal/min)	200 L/min (52.8 US gal/min)
20	3/4	3 L/min (0.79 US gal/min)	150 L/min (39.6 US gal/min)	300 L/min (79.3 US gal/min)
25	1	4 L/min (1.06 US gal/min)	200 L/min (52.8 US gal/min)	400 L/min (106 US gal/min)
32	1 1/4	8 L/min (2.11 US gal/min)	400 L/min (106 US gal/min)	800 L/min (211 US gal/min)
40	1 1/2	12 L/min (3.17 US gal/min)	600 L/min (159 US gal/min)	1200 L/min (317 US gal/min)
50	2	1.2 m³/h (5.28 US gal/min)	60 m³/h (264 US gal/min)	120 m³/h (528 US gal/min)
65	2 1/2	2.4 m³/h (10.57 US gal/min)	120 m³/h (528 US gal/min)	240 m³/h (1057 US gal/min)
80	3	3.6 m³/h (15.9 US gal/min)	180 m³/h (793 US gal/min)	360 m³/h (1585 US gal/min)
100	4	4.8 m³/h (21.1 US gal/min)	240 m³/h (1057 US gal/min)	480 m³/h (2113 US gal/min)
125	5	8.4 m³/h (37 US gal/min)	420 m³/h (1849 US gal/min)	840 m³/h (3698 US gal/min)
150	6	12 m³/h (52.8 US gal/min)	600 m³/h (2642 US gal/min)	1200 m³/h (5283 US gal/min)
200	8	21.6 m³/h (95.1 US gal/min)	1080 m³/h (4755 US gal/min)	2160 m³/h (9510 US gal/min)
250	10	36 m³/h (159 US gal/min)	1800 m³/h (7925 US gal/min)	3600 m³/h (15850 US gal/min)
300	12	48 m³/h (211 US gal/min)	2400 m³/h (10567 US gal/min)	4800 m³/h (21134 US gal/min)
350	14	66 m³/h (291 US gal/min)	3300 m³/h (14529 US gal/min)	6600 m³/h (29059 US gal/min)
400	16	90 m³/h (396 US gal/min)	4500 m³/h (19813 US gal/min)	9000 m³/h (39626 US gal/min)
450	18	120 m³/h (528 US gal/min)	6000 m³/h (26417 US gal/min)	12000 m³/h (52834 US gal/min)
500	20	132 m³/h (581 US gal/min)	6600 m³/h (29059 US gal/min)	13200 m³/h (58117 US gal/min)
600	24	192 m³/h (845 US gal/min)	9600 m³/h (42268 US gal/min)	19200 m³/h (84535 US gal/min)
700	28	264 m³/h (1162 US gal/min)	13200 m³/h (58118 US gal/min)	26400 m³/h (116236 US gal/min)
750	30	312 m³/h (1374 US gal/min)	15600 m³/h (68685 US gal/min)	31200 m³/h (137369 US gal/min)
800	32	360m³/h (1585 US gal/min)	18000 m³/h (79252 US gal/min)	36000 m³/h (158503 US gal/min)
900	36	480 m³/h (2113 US gal/min)	24000 m³/h (105669 US gal/min)	48000 m³/h (211337 US gal/min)
1000	40	540 m³/h (2378 US gal/min)	27000 m³/h (118877 US gal/min)	54000 m³/h (237754 US gal/min)
1050	42	616 m³/h (2712 US gal/min)	30800 m³/h (135608 US gal/min)	61600 m³/h (271217 US gal/min)
1100	44	690 m³/h (3038 US gal/min)	34500 m³/h (151899 US gal/min)	69000 m³/h (303798 US gal/min)
1200	48	840 m³/h (3698 US gal/min)	42000 m³/h (184920 US gal/min)	84000 m³/h (369841 US gal/min)
1350	54	1020 m³/h (4491 US gal/min)	51000 m³/h (224546 US gal/min)	102000 m³/h (449092 US gal/min)
1400	54	1080 m³/h (4755 US gal/min)	54000 m³/h (237755 US gal/min)	108000 m³/h (475510 US gal/min)
1500	60	1260 m³/h (5548 US gal/min)	63000 m³/h (277381 US gal/min)	126000 m³/h (554761 US gal/min)
1600	66	1440 m³/h (6340 US gal/min)	72000 m³/h (317006 US gal/min)	144000 m³/h (634013 US gal/min)
1650	66	1512 m³/h (6657 US gal/min)	75600 m³/h (332856 US gal/min)	151200 m³/h (665712 US gal/min)
1800	72	1800 m³/h (7925 US gal/min)	90000 m³/h (396258 US gal/min)	180000 m³/h (792516 US gal/min)
2000	80	2280 m³/h (10039 US gal/min)	114000 m³/h (501927 US gal/min)	228000 m³/h (1003853 US gal/min)
2100	84	2520 m³/h (11095 US gal/min)	126000 m³/h (554760 US gal/min)	252000 m³/h (1109520 US gal/min)
2200	88	2760 m³/h (12152 US gal/min)	138000 m³/h (607594 US gal/min)	276000 m³/h (1215188 US gal/min)
2300	92	3000 m³/h (13209 US gal/min)	150000 m³/h (660429 US gal/min)	300000 m³/h (1320858 US gal/min)
2400	96	3240 m³/h (14265 US gal/min)	162000 m³/h (713263 US gal/min)	324000 m³/h (1426526 US gal/min)
2600	104	3820 m³/h (16819 US gal/min)	191000 m³/h (840946 US gal/min)	382000 m³/h (1681892 US gal/min)
2800	112	4440 m³/h (19549 US gal/min)	222000 m³/h (977434 US gal/min)	444000 m³/h (1954868 US gal/min)
3000	120	5080 m³/h (22367 US gal/min)	254000 m³/h (1118326 US gal/min)	508000 m³/h (2236652 US gal/min)

6 Operation

6.1 Safety instructions

⚠ CAUTION

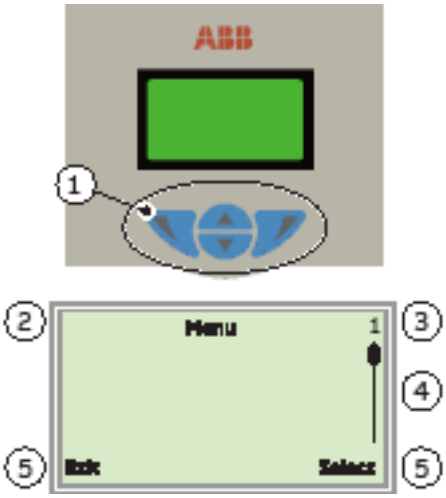
Risk of burns due to hot measuring media.
The device surface temperature may exceed 70 ° C (158 ° F), depending on the measuring medium temperature!
Before starting work on the device, make sure that it has cooled sufficiently.

Aggressive or abrasive measuring medium may result in damage to the wetted parts of the flowmeter sensor. As a result, pressurized measuring medium may escape prematurely.

Due to wear on the flange seal or process connection gaskets (e.g., threaded pipe connections, Tri-Clamp, etc.), a pressurized measuring medium may escape.

When using internal flat gaskets, these can become embrittled through CIP/SIP processes. If there is a chance that safe operation is no longer possible, take the device out of operation and secure it against unintended startup.

6.2 Safety instructions



① Operating buttons for menu navigation
② Menu name display ③ Menu number display
④ Marker for indicating relative position within the menu
⑤ Display showing the current functions of the and operating buttons

Figure 39 LCD display

The LCD indicator has capacitive operating buttons. These enable you to control the device through the closed housing cover.

Note

You can use the or operating buttons to browse through the menu or select a number or character within a parameter value.

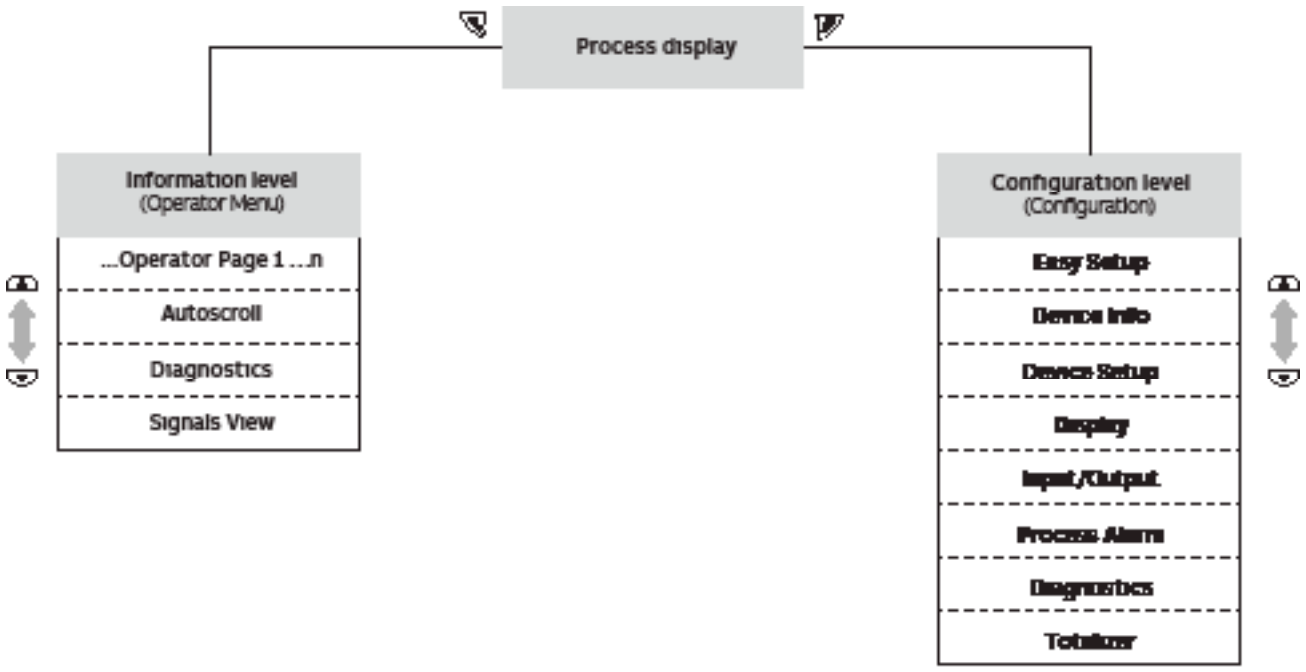
Different functions can be assigned to the and operating buttons. The function that is currently assigned to them is shown on the LCD display.

Control button functions

	Meaning
Exit	Exit menu
Back	Go back one submenu
Cancel	Cancel a parameter entry
Next	Select the next position for entering numerical and alphanumeric values

	Meaning
Select	Select submenu/parameter
Edit	Edit parameter
OK	Save parameter entered

6.3 Menu levels



Process display

The process display shows the current process values. There are two menu levels under the process display.

Information level (Operator Menu)

The information level contains the parameters and information that are relevant for the operator. The device configuration cannot be changed on this level.

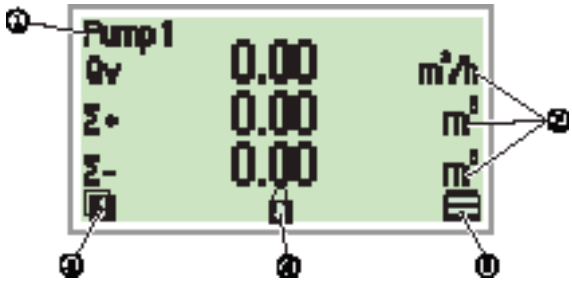
Configuration level (Configuration)

The configuration level contains all the parameters required for device commissioning and configuration. The device configuration can be changed on this level.

...6 Operation

...6.3 Menu levels

6.3.1 Process display



① Measuring point tag
② Current process values
③ “Button function” icon
④ “Parameterization protected” icon

Figure 40 Process display (example)

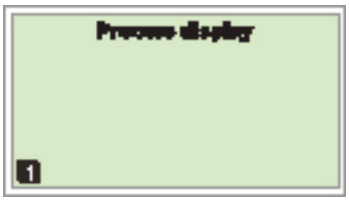
The process display appears on the LCD display when the device is switched on. It shows information about the device and current process values. The way in which the current process value is displayed can be adjusted at the configuration level.

The symbols at the bottom of the process display are used to indicate the functions of the operating buttons and , in addition to other information.

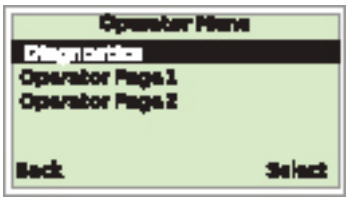
Symbol	Description
	Call up information level. When Autoscroll mode is activated, the - icon appears here and the operator pages are automatically displayed one after the other.
	Call up configuration level.
	The device is protected against changes of the parameter settings.

6.3.2 Switching to the information level (operator menu)

On the information level, the operator menu can be used to display diagnostic information and choose which operator pages to be displayed.



1 Use to open the Operator Menu.



2 Use / to select the desired submenu.

3 Confirm the selection with .

Symbol	Description
... /Operator Menu	
Diagnostics	Selection of sub-menu “**Diagnostics**”; see also chapter “**Error messages on the LCD display**” on page 33.
Operator Page 1 ... n	Selection of operator page to be displayed.
Autoscroll	When Autoscroll is activated, automatic switching of the operator pages is initiated on the process screen.
Signals View	Selection of submenu “**Signals View**” (only for service purposes).

6.3.3 Error messages on the LCD display

In the event of an error, a message consisting of a symbol and text (e.g. Electronics) appears at the bottom of the process screen.

The text displayed provides information about the area in which the error has occurred.



The error messages are divided into four groups in accordance with the NAMUR classification scheme. The group assignment can only be changed using a DTM or EDD:

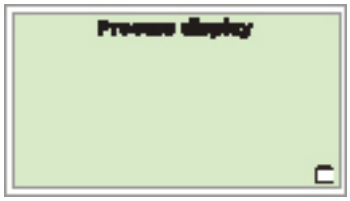
Symbol	Description
	Error/failure
	Function check
	Outside of the specification
	Maintenance required

The error messages are also divided into the following areas:

Symbol	Description
Operation	Error/alarm due to the current operating conditions.
Sensor	Error/alarm of the flowmeter sensor.
Electronics	Error/alarm of the electronics.
Configuration	Error/alarm due to device configuration.

6.3.4 Switching to the configuration level (parameterization)

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



1 Use to switch to the configuration level.



2 Use / to select the desired level of access.

3 Use to confirm the selection.

Note

There are three levels of access. A password can be defined for level “Standard”.

There is no factory default password.

Access Level	Description
Read Only	All parameters are locked. Parameters are read only and cannot be modified.
Standard	All the parameters can be altered.
Service	Only Customer Service has access to the Service menu.

Once you have logged on to the corresponding access level, you can edit or reset the password. Reset (status “no password defined”) by selecting “
“ as a password.



4 Enter the corresponding password. No password is preset in the factory settings. Users can switch to the configuration level without entering a password. The selected access level remains active for 3 minutes. Within this time period, you can toggle between the process display and the configuration level without reentering the password.

5 Use to confirm the password.

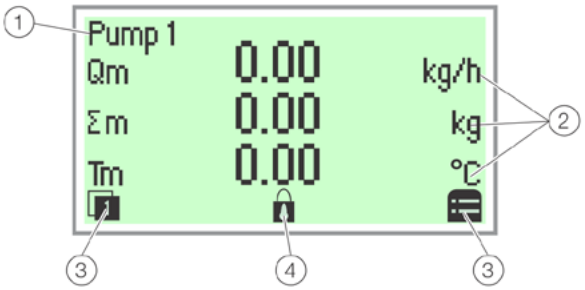
The LCD display now indicates the first menu item on the configuration level.

6 Use / to select a menu.

7 Use to confirm the selection.

7 Operation

Process display



1	Measuring point tagging	3	'Button function' symbol
2	Current process values	4	'Parameterization protected' symbol

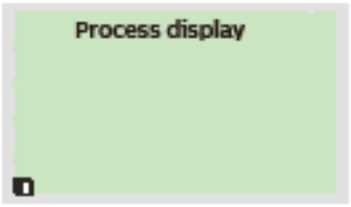
Figure 41 Process display (example)

The process display appears on the LCD display when the device is powered on. It shows information about the device and current process values.
The way in which the current process values are shown can be adjusted on the configuration level.
The symbols at the bottom of the process display are used to indicate the functions of the operating buttons and , in addition to other information.

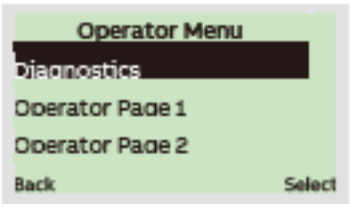
Symbol	Description
/	Call up information level. When Autoscroll mode is activated, the icon appears here and the operator pages are automatically displayed one after the other.
	Call up configuration level.
	The device is protected against changes in the parametrization.

Switching to the information level

On the information level, the operator menu can be used to display diagnostic information and choose which operator pages to display.



1. Open the using Operator Menu.

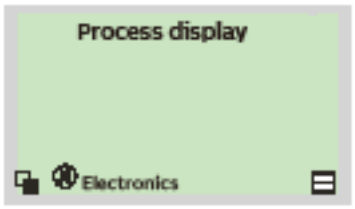


2. Select the desired submenu using / .
3. Confirm the selection with .

Menu	Description
... / Operator Menu	
Diagnostics	Selection of sub-menu 'Diagnostics'; see also **Error messages on the LCD display** on page 75.
Operator Page 1 to n	Selection of operator page to be displayed.
Autoscroll	When 'Autoscroll' is activated, automatic switching of the operator pages is initiated on the process screen.
Signals View	Selection of submenu 'Signals View' (only for service purposes).

Error messages on the LCD display

In the event of an error, a message consisting of a symbol and text (e.g. Electronics) appears at the bottom of the process screen.
The text displayed provides information about the area in which the error has occurred.



The error messages are divided into four groups in accordance with the NAMUR classification scheme. The group assignment can only be changed using a DTM or EDD:

Symbol	Description
	**Error / failure**
	**Function check**
	**Outside of the specification**
	**Maintenance required**

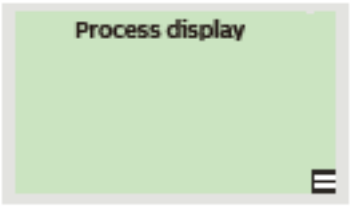
The error messages are also divided into the following areas:

Range	Description
Operation	Error / alarm due to the current operating conditions.
Sensor	Error / alarm of the flowmeter sensor.
Electronics	Error / alarm of the electronics.
Configuration	**Error / alarm due to device configuration.**

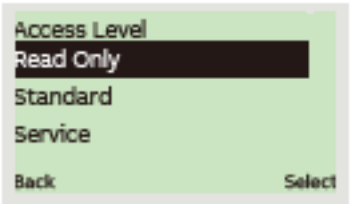
Note
For a detailed description of errors and troubleshooting instructions, please see **Diagnosis / error messages** on page 126.

Switching to the configuration level (parameterization)

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



1. Switch to the configuration level with .



2. Select the desired level of access using / .
3. Confirm the selection with .

Note
There are three levels of access. A password can be defined for level ‘Standard’.

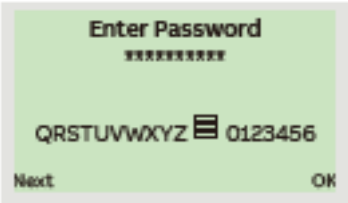
- There is no factory default password. For security reasons it is recommended to set a password.
- The password prevents access to the parameterization via the buttons on the device. For further access protection via DTM or EDD (HART®, PROFIBUS®, Modbus®) the hardware write protection switch must be set (see **Write-protect switch** on page 62).

Access Level	Description
Read Only	All parameters are locked. Parameters are read only and cannot be modified.
Standard	All the parameters can be changed.
Service	Only ABB Customer Service has access to the Service menu.

… 7 Operation

… Switching to the configuration level (parameterization)

Once you have logged on to the corresponding access level, you can edit or reset the password. Reset (status 'no password defined') by selecting '▤' as a password.



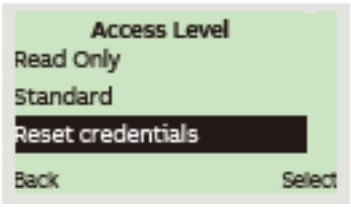
4. Enter the appropriate password. No password is preset in the factory settings. Users can switch to the configuration level without entering a password.
   The selected access level remains active for 3 minutes. Within this time period you can toggle between the process display and the configuration level without re-entering the password.
5. Use ◤ to confirm the password.

The LCD display now indicates the first menu item on the configuration level.

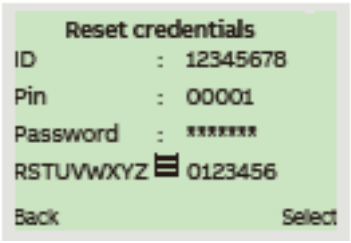
6. Select a menu using ▲ / ▼.
7. Confirm the selection with ◤.

Resetting the customer password
If the set password has been forgotten, the password can be reset and reassigned.
A one-time password is needed for this purpose and can be generated by ABB Service upon request.
To reset the password, the password has to be entered incorrectly once for the 'Standard' user level. When the configuration level is called up again, a new entry 'Reset credentials' then appears in the list of access levels.

1. Switch to the configuration level with ◤.



2. Use ▲ / ▼ to select the 'Reset credentials' entry.
3. Confirm the selection with ◤.



4. Contact ABB Service and request a one-time password, stating the 'ID' and 'Pin' shown.
5. Enter the one-time password.

Note
The one-time password is only valid once and needs to separately requested with each password reset.

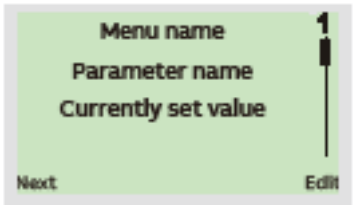
6. Confirm the input with ◤.

After the one-time password has been entered, the password for the 'Standard' access level is reset and can be reassigned.

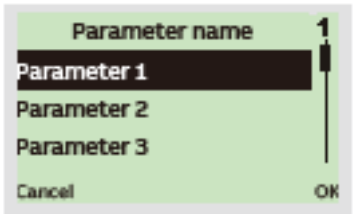
Selecting and changing parameters

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 to call up the list of available parameter values. The parameter value that is currently set is highlighted.

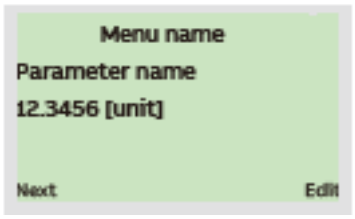


3. Select the desired value using / .
4. Confirm the selection with .

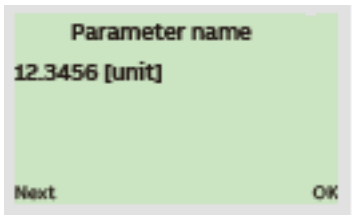
This concludes the procedure for selecting a parameter value.

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 to call up the parameter for editing. The decimal place that is currently selected is highlighted.

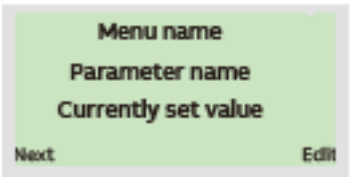


3. Use to select the decimal place to change.
4. Use / to set the desired value.
5. Use to select the next decimal place.
6. If necessary select and set additional decimal places in accordance with steps 3 to 4.
7. Use to confirm your setting.

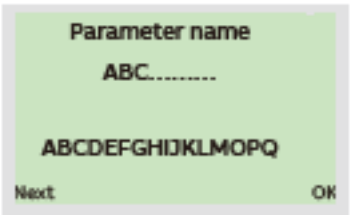
This concludes the procedure for changing a parameter value.

Alphanumeric entry

When an alphanumeric 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 to call up the parameter for editing. The decimal place that is currently selected is highlighted.



3. Use to select the decimal place to change.
4. Use / to set the desired value.
5. Use to select the next decimal place.
6. If necessary select and set additional decimal places in accordance with steps 3 to 4.
7. Use to confirm your setting.

This concludes the procedure for changing a parameter value.

… 7 Operation

… Switching to the configuration level (parameterization)

Exiting the setup

For some menu items, values must be entered. If you don't want to change the parameter, you can exit the menu as described below.

1. Pressing (Next) repeatedly moves the cursor to the right. Once the cursor reaches the end position, 'Cancel' is displayed in the lower right of the screen.
2. terminates editing and exits the menu item. Use to return to the start.

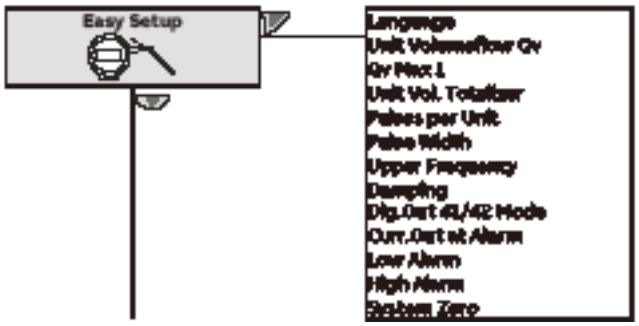
Note

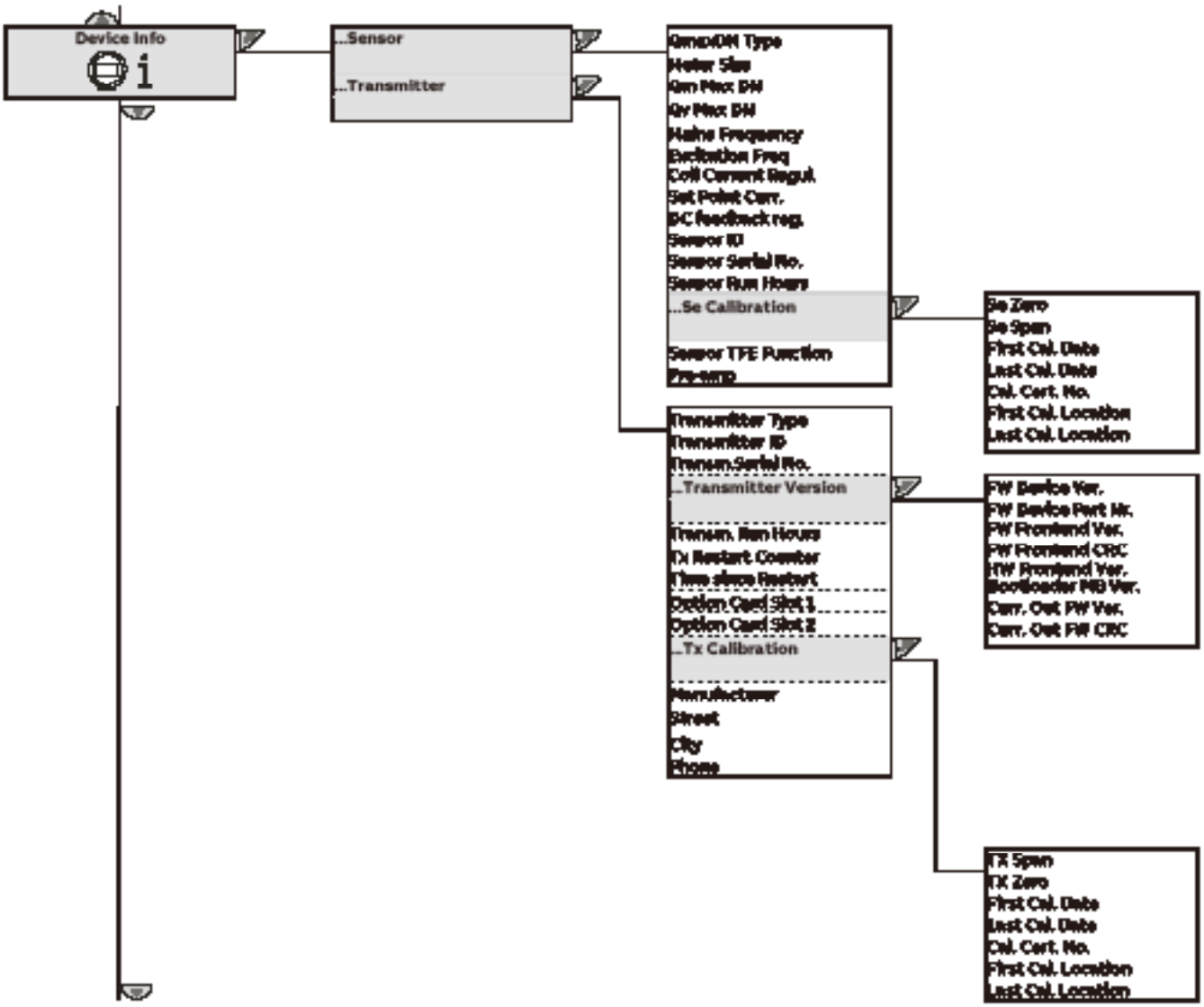
The LCD display automatically returns to the process display three minutes after the last button has been actuated.

Parameter overview

Note

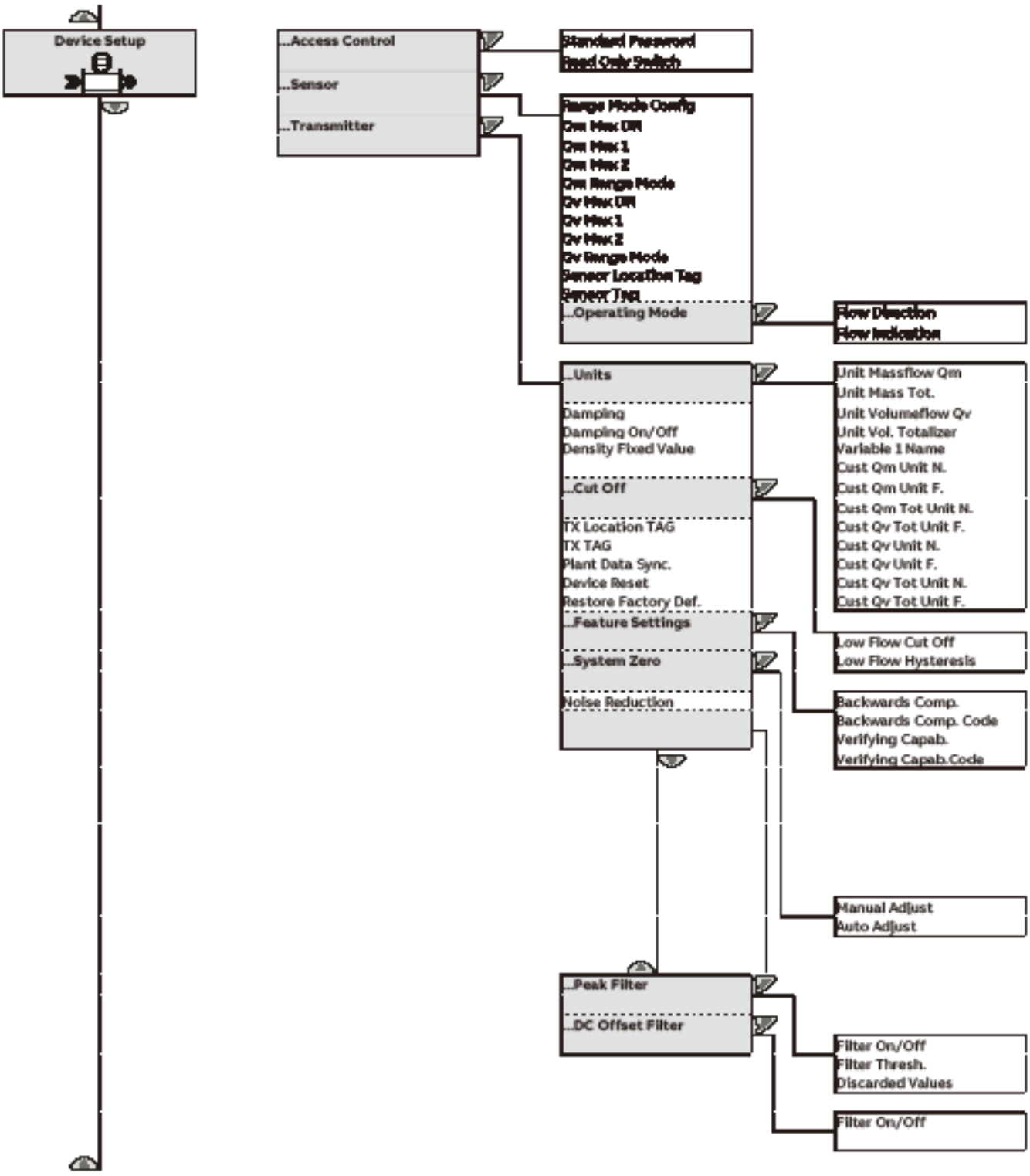
This overview of parameters shows all the menus and parameters available on the device. Depending on the version and configuration of the device, not all of the menus and parameters may be visible in it.

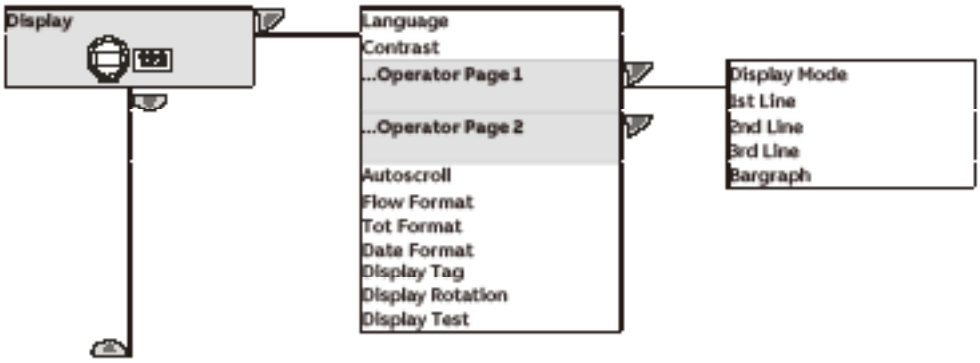



Device Info
...Sensor
...Transmitter
Sensor Type
Meter Size
Qm Max DN
Qv Max DN
Mains Frequency
Excitation Freq
Coil Current Regul.
Set Point Curr.
DC feedback reg.
Sensor ID
Sensor Serial No.
Sensor Run Hours
...Se Calibration
Sensor TPE Function
Se Zero
Se Span
First Cal. Date
Last Cal. Date
Cal. Cert. No.
First Cal. Location
Last Cal. Location
Transmitter Type
Transmitter ID
Transm.Serial No.
...Transmitter Version
Transm. Run Hours
Tx Restart Counter
Time since Restart
Option Card Slot 1
Option Card Slot 2
...Tx Calibration
Manufacturer
Street
City
Phone
FW Device Ver.
FW Device Part Nr.
FW Frontend Ver.
FW Frontend CRC
HW Frontend Ver.
Bootloader PID Ver.
Curr. Out FW Ver.
Curr. Out FW CRC
TX Span
TX Zero
First Cal. Date
Last Cal. Date
Cal. Cert. No.
First Cal. Location
Last Cal. Location

… 7 Operation

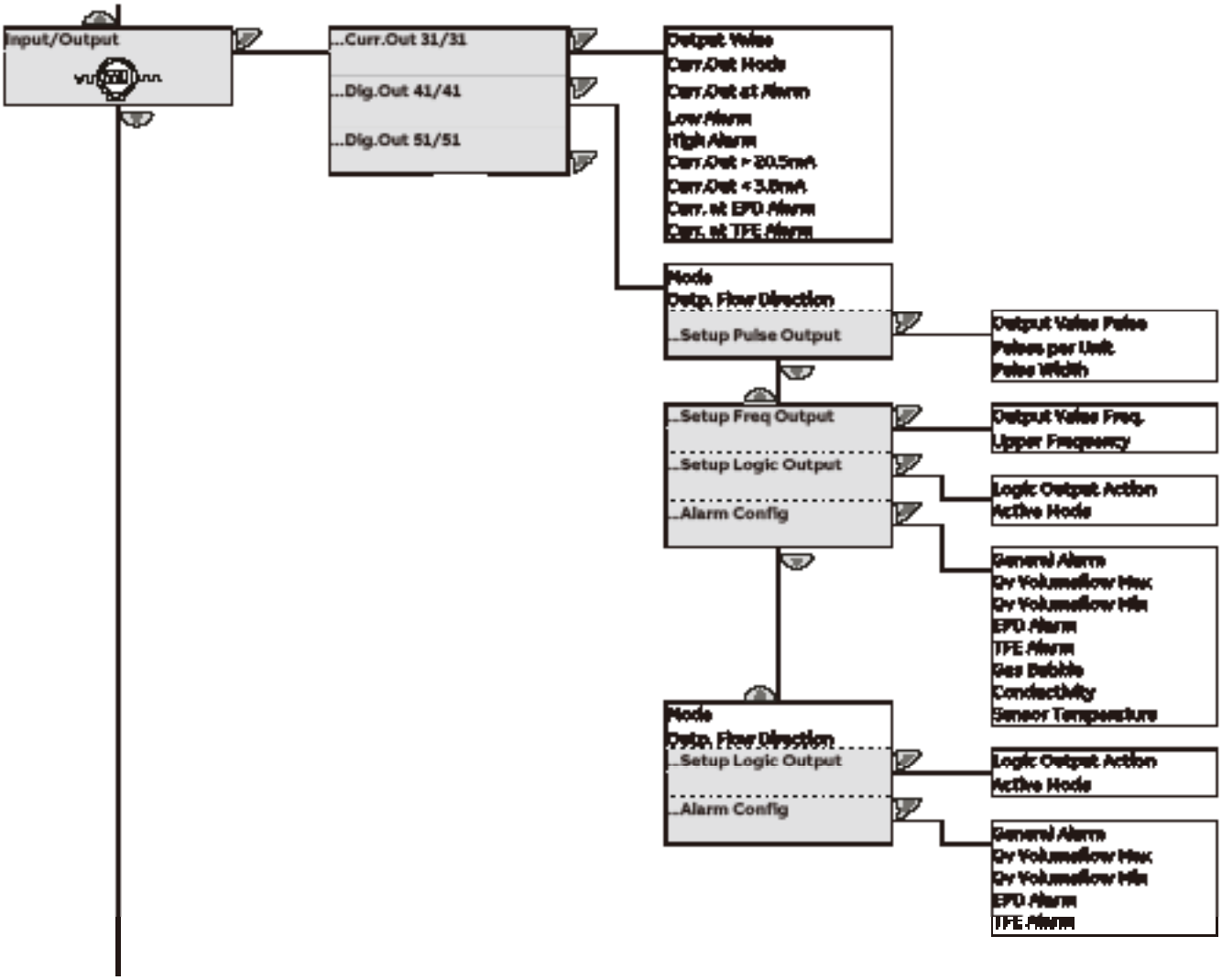
… Parameter overview




Display
Language
Contrast
...Operator Page 1
...Operator Page 2
Autoscroll
Flow Format
Tot Format
Date Format
Display Tag
Display Rotation
Display Test
Display Mode
1st Line
2nd Line
3rd Line
Bargraph

… 7 Operation

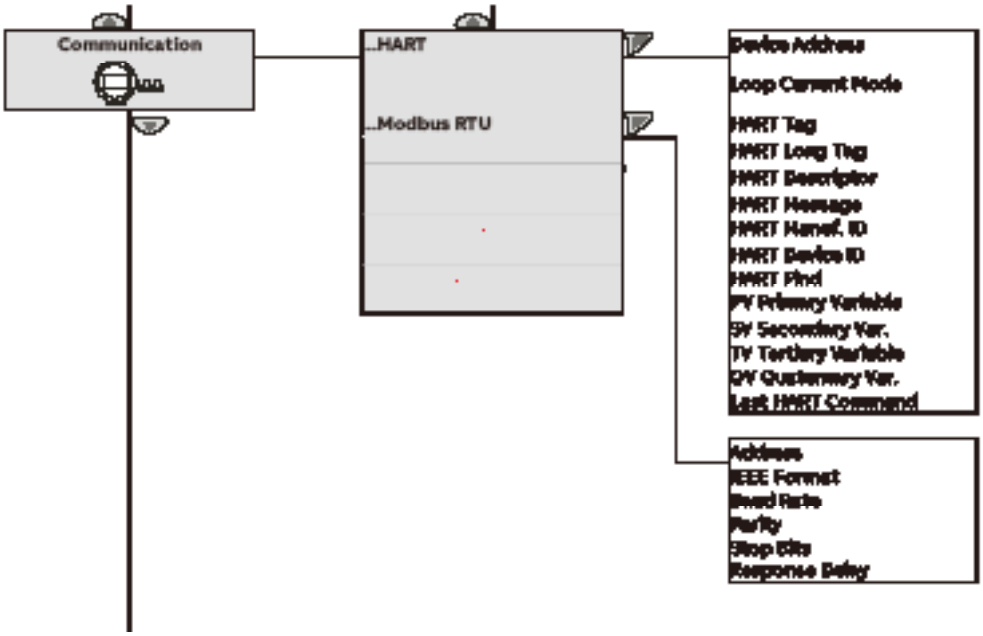
… Parameter overview

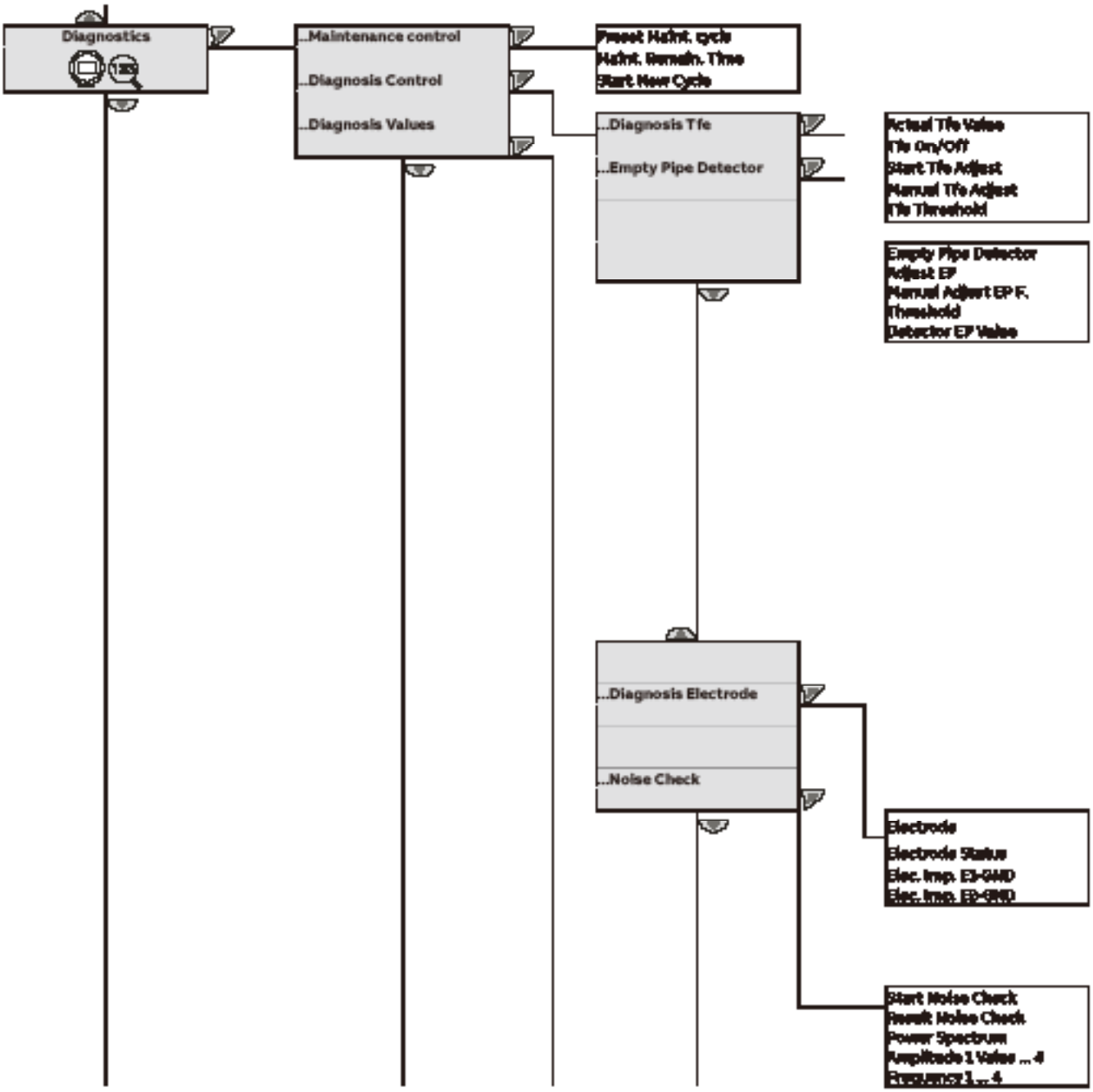



Process Alarm
Alarm history
Clear Alarm History
...Group Masking
...Alarm Limits
Maintenance Required
Function Check
Out Of Specification
Qm Massflow Min
Qm Massflow Max
Qv Volumeflow Min
Qv Volumeflow Max

… 7 Operation

… Parameter overview

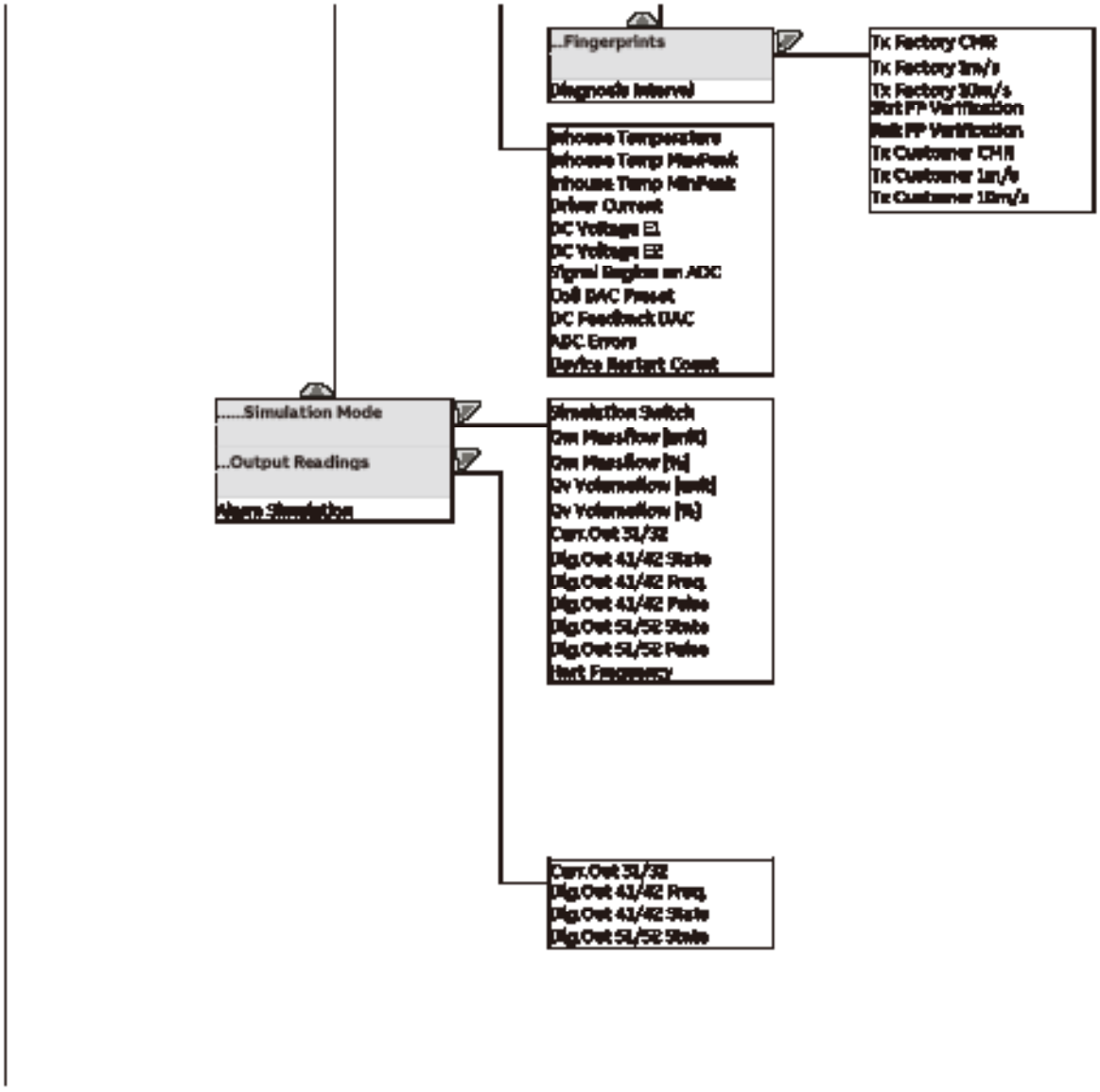


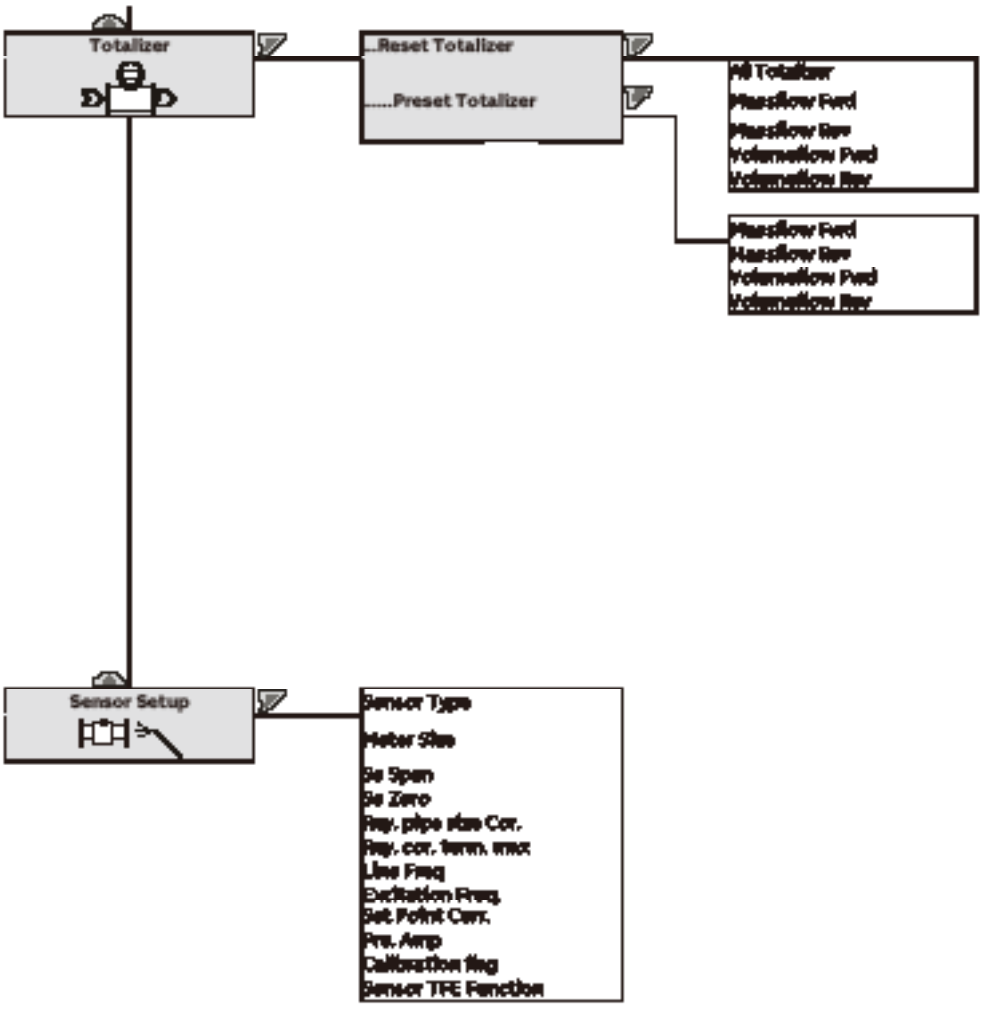


* The PROFINET® menu is only available if PROFINET has been activated under Base Protocol Stack.

… 7 Operation

… Parameter overview




Totalizer
...Reset Totalizer
.....Preset Totalizer
All Totalizer
Massflow Fwd
Massflow Rev
Volumeflow Fwd
Volumeflow Rev
Massflow Fwd
Massflow Rev
Volumeflow Fwd
Volumeflow Rev
Sensor Setup
Sensor Type
Meter Size
Se Span
Se Zero
Reg. pipe size Cor.
Reg. cor. term. exor
Line Freq
Excitation Freq.
Set Point Corr.
Pre. Amp
Calibration flag
Sensor TPE Function

... 7 Operation

Parameter descriptions

Available units

For certain parameters it is possible to choose among the following units.

Note

The 'Code' column indicates the value to which the corresponding parameter must be set, e.g. using the communications interface.

Table 1: Units for the volume flow

Selection	Code	Description
m^3/s	13	Cubic meters per second
m^3/min	14	Cubic meters per minute
m^3/h	15	Cubic meters per hour
m^3/d	16	Cubic meters per day
ft^3/s	29	Cubic feet per second
ft^3/min	30	Cubic feet per minute
ft^3/h	31	Cubic feet per hour
ft^3/d	32	Cubic feet per day
ml/s	46	Milliliters per second
ml/min	47	Milliliters per minute
l/s	48	Liters per second
l/min	49	Liters per minute
l/h	50	Liters per hour
l/d	51	Liters per day
hl/h	54	Hectoliters per hour
Ml/d	62	Megaliters per day
ugal/s	71	US gallons per second
ugal/min	72	US gallons per minute
ugal/h	73	US gallons per hour
ugal/d	74	US gallons per day
Mugal/d	82	Mega US gallons per day
igal/s	91	Imperial gallons per second
igal/min	92	Imperial gallons per minute
igal/h	93	Imperial gallons per hour
Igal/d	94	Imperial gallons per day
bbl/s	112	Oil barrels per second
bbl/min	113	Oil barrels per minute
bbl/h	114	Oil barrels per hour
bbl/d	115	Oil barrels per day
bls/s	130	Brew barrels per second
bls/min	131	Brew barrels per minute
bls/h	132	Brew barrels per hour
bls/d	133	Brew barrels per day
xx/yy	254	User-defined unit

Table 2: Units for the mass flow

Selection	Code	Description
g/s	1	Grams per second
g/min	2	Grams per minute
g/h	3	Grams per hour
g/d	4	Grams per day
kg/s	5	Kilograms per second
kg/min	6	Kilograms per minute
kg/h	7	Kilograms per hour
kg/d	8	Kilograms per day
lb/s	9	Pounds (avdp) per second
lb/min	10	Pounds (avdp) per minute
lb/h	11	Pounds (avdp) per hour
lb/d	12	Pounds (avdp) per day
t/min	30	Metric tons per minute
t/h	31	Metric tons per hour
t/d	32	Metric tons per day
xx/yy	254	User-definable unit

Table 3: Units for the mass totalizer

Selection	Code	Description
kg	2	Kilograms
g	3	Grams
t	5	Tons (metric)
Pounds	8	Pounds (advp)
xx/yy	254	User-definable unit

Table 4: Units for the volume totalizer

Selection	Code	Description
m^3	4	Cubic meters
ft^3	7	Cubic feet
ml	11	Milliliters
l	13	Liters
hl	14	Hectoliters
ugal	20	US gallons
igal	21	Imperial gallons
bbl	22	Barrels (petroleum, USA)
bls	31	Barrels (beer, USA)
xx/yy	254	User-definable unit

Menu: Easy Setup

Menu / parameter	Description
Easy Setup	
Language	Selection of the menu language (German, English, French, Spanish, Italian, Chinese, Portuguese).
Unit Volumeflow Qv	Selection of the unit for the volume flow (for example for the parameters Qv_{Max} / Qv_{Max}DN and for the corresponding process value). Default setting: l/min **Table 1: Units for the volume flow** on page 90
Qv Max 1	Setting the upper range value 1 (Measuring range = 0 to Qv Max 1) for the volume flow for forward flow and reverse flow . **Default setting: 1 × Q_{max}DN**
Unit Vol. Totalizer	Selection of the unit for the volume totalizers and the pulse outputs. Default: l (liter) **Table 4: Units for the volume totalizer** on page 90
Dig.Out 41/42 Mode	Selection of the operating mode for the digital output 41 / 42. • Off: Digital output 41 / 42 deactivated. • Logic: Digital output 41 / 42 as a binary output (e.g. as an alarm output). • Pulse: Digital output 41 / 42 as a pulse output. In pulse mode, pulses are output per unit (e.g. 1 pulse per m^3). • Frequency: Digital output 41 / 42 as a frequency output. In frequency mode, a frequency is issued that is proportional to the flow rate. The maximum frequency can be configured in accordance with the upper range value. Default setting: Pulse
Pulses per Unit **Pulse Width**	Set pulses per volume or per mass flow unit, and the pulse width for the digital output operating mode ‘Pulse’. The pulse value and pulse width are interdependent and calculated dynamically (pulses per unit: 1 to 10000 / s, pulse width: 0.1 to 2000 mS). Only available if a digital output has been configured as a pulse output, and the volume flow or mass flow has been selected as the process variable to be output.
Upper Frequency	Sets the upper range value frequency for the digital output operating mode ‘Frequency’. The entered value (0 to 10500 Hz) corresponds to 100 % flow. Only available if a digital output has been configured as a frequency output, and the volume flow or mass flow has been selected as the process variable to be output.
Damping	Select the damping. The value set here (0.02 to 60 s) refers to 1 τ (Tau). The value refers to the response time for a step flowrate change. It affects the instantaneous value in the display and at the current output. **Default setting: 1 second**
Curr.Out at Alarm	Selection of status of the current output in error condition. The output ‘Low Alarm’ or ‘High Alarm’ current is set in the subsequent menu.
Low Alarm	Setting the current (3.5 to 3.6 mA) for low alarm.
High Alarm	Setting the current (21 to 22.6 mA) with high alarm.
System Zero	Starts the automatic zero point balancing using . Automatic zero point balancing takes approx. 60 seconds. Note Prior to starting the zero point adjustment, make sure that: • There is no flow through the sensor (close all valves, shut-off devices etc.) • The sensor must be filled completely with measuring medium for measurement.

... 7 Operation

... Parameter descriptions

Menu: Device Info

This menu is only used to display the device parameters. The parameters are displayed independently of the configured access level, but cannot be changed.

Menu / parameter	Description
Device Info	
...Sensor	Selection of submenu '**...Sensor**' using .
...Transmitter	Selection of submenu '**...Transmitter**' using .

Device Info / **...Sensor**	
QmaxDN Type	For informational purposes only.
Meter Size	Nominal diameter of sensor.
Qm Max DN	The value is the maximum mass flow at a flow velocity of 10 m/s. The value is automatically set through the selected nominal diameter, multiplied by the set density.
Qv Max DN	The value provides the maximum volume flow at a flow velocity of 10 m/s. The value is set automatically via the selected nominal diameter.
Mains Frequency	Supply frequency for the power supply.
Excitation Freq	Frequency used to operate the magnetic coils of the flowmeter sensor.
Coil Current Regul.	For service information only.
Set Point Curr.	Current used to operate the magnetic coils of the flowmeter sensor.
DC feedback reg.	For service information only.
Sensor ID	ID number of the sensor.
Sensor Serial No.	Serial number of the sensor.
Sensor Run Hours	Operating hours of the sensor.
...Se Calibration	Selection of submenu '**...Se Calibration**' using .
Sensor TFE Function Pre-amp	Shows if the total filling electrode (TFE) has been activated or deactivated. Shows if the power supply for the Sensor pre-amp is enabled in the Transmitter

Device Info / ...Sensor / **...Se Calibration**	
Se Span	Calibration value in the forward flow (direction) and reverse flow (direction) of the sensor.
Se Zero	
First Cal. Date	Date of first calibration of sensor (calibration of new device).
Last Cal. Date	Date of last calibration of sensor.
Cal. Cert. No.	Identification (number) of the relevant calibration certificate.
First Cal. Location	Place of first calibration of the sensor.
Last Cal. Location	Place of last calibration of sensor.

Menu / parameter	Description
Device Info / **...Transmitter**	
Transmitter Type	Transmitter type, e.g. B. FExx31 integral.
Transmitter ID	ID number of transmitter.
Transm.Serial No.	Serial number of transmitter.
...Transmitter Version	Selection of submenu '**...Transmitter Version**' using .
Transm. Run Hours	Run hours of the transmitter.
Tx Restart Counter	Number of device restarts (cyclically switching the power supply off and on).
Time since Restart	Device operating hours since the last restart.
...Tx Calibration	Selection of submenu '**...Tx Calibration**' using .
Manufacturer	Name of manufacturer.
Street	Manufacturer's address (street).
City	Manufacturer's address (city).
Phone	Manufacturer's address (phone number).

Device Info / ...Transmitter / ...Transmitter Version	
FW Device Ver.	Version and item number of device software package.
FW Device Part Nr.	
FW Frontend Ver.	Version and checksum (CRC) of the frontend board (FEB) software.
FW Frontend CRC	
HW Frontend Ver.	Hardware version of the frontend board (FEB).
Bootloader FEB Ver.	Version of frontend board (FEB) bootloader.
Curr. Out FW Ver.	Current output module software version and checksum (CRC).
Curr. Out FW CRC	

Device Info / ...Transmitter / **...Tx Calibration**	
TX Span	Calibration value of the transmitter.
TX Zero	
First Cal. Date	Date of first calibration of transmitter (calibration of new device).
Last Cal. Date	Date of last calibration of transmitter.
Cal. Cert. No.	Identification (number) of the relevant calibration certificate.
First Cal. Location	Place of first calibration of transmitter.
Last Cal. Location	Place of last calibration of transmitter.

... 7 Operation

... Parameter descriptions

Menu: Device Setup

Menu / parameter	Description
Device Setup	
...Access Control	Selection of submenu '**...Access Control**' using .
...Sensor	Selection of submenu '**...Sensor**' using .
...Transmitter	Selection of submenu '**...Transmitter**' using .

Device Setup / **...Access Control**	
Standard Password	Entry / change of the password for the 'Standard' access level.
Read Only Switch	Indicator of the position of the write protection switch. For additional information, see **Hardware settings** on page 62.

Device Setup / **...Sensor**	
Range Mode Config	Activation of the second measuring range for the mass and volume flow. The setting can be performed separately for the mass flow rate (Qm) and volume flow (Qv). Thus you have the possibility to quickly switch between two measuring ranges (e.g. Qm Max and Qm Max2). The switchover is performed via the parameters 'Qm Range Mode' and 'Qv Range Mode'. • Disabled: Second measuring range for mass and volume flow rate deactivated. • Qm and Qv: Second measuring range for mass and volume flow rate activated. • Qm only: Second measuring range for mass flow activated. • Qv only: Second measuring range for volume flow activated. Default setting: Disabled
Qm Max DN	The value is the lower mass flow at a flow velocity of 10 m/s. The value is automatically set through the selected nominal diameter, multiplied by the set density.
Qm Max 1	Setting the upper range value 1 (Measuring range = 0 to Qm Max 1) for the mass flow for forward flow and reverse flow . Default setting: 1 × Q_{max}DN
Qm Max 2	Setting the upper range value 2 (Measuring range = 0 to Qm Max 2) for the mass flow for forward flow and reverse flow . This parameter is only available if the value 'Max2 active' has been selected for the parameter 'Qm Range Mode'.
Qm Range Mode	Manual switchover between the measuring ranges (Max1 active / Max2 active) for the mass flow measurement. This parameter is only available if the value Qm and Qv or Range Mode Config has been selected for the parameter 'Qm only'.

Menu / parameter	Description
Device Setup / **...Sensor**	
Qv Max DN	The value provides the lower volume flow at a flow velocity of 10 m/s. The value is set automatically via the selected nominal diameter.
Qv Max 1	Setting the upper range value 1 (Measuring range = 0 to Qv Max 1) for the volume flow for forward flow and reverse flow . Default setting: 1 × Q_{max}DN
Qv Max 2	Setting the upper range value 2 (Measuring range = 0 to Qv Max 2) for the volume flow for forward flow and reverse flow . This parameter is only available if the value 'Max2 active' has been selected for the parameter 'Qv Range Mode'. Default setting: 1 × Q_{max}DN
Qv Range Mode	Manual switchover between the measuring ranges (Max1 active / Max2 active) for the volume flow measurement. This parameter is only available if the value Qm and Qv or Range Mode Confighas been selected for the parameter 'Qv only'
Sensor Location Tag	Entry of the measuring point tag for the sensor. Alphanumeric, max. 20 characters
Sensor Tag	Enter the tag number of the sensor. Alphanumeric, max. 20 characters.
...Operating Mode	Selection of submenu '**...Operating Mode**' using .

Device Setup / ...Sensor / **...Operating Mode**	
Flow Direction	Set the measuring direction for the sensor. As delivered, the device measures and counts in both flow directions. • Forward & Reverse: The device measures in both flow directions. • Forward only: The device measures only forward flow direction. • Reverse only: The device measures only reverse flow direction. Default setting: Forward & Reverse
Flow Indication	Inversion of the displayed flow direction. Default setting: Normal

… 7 Operation

… Parameter descriptions

Menu / parameter	Description
Device Setup / **…Transmitter**	
…Units	Selection of submenu '**…Units**' using .
Damping	Select the damping. The value set here (0.02 to 60 s) refers to 1 **τ** (Tau). The value refers to the response time for a step flowrate change. It affects the instantaneous value in the display and at the current output. **Default setting: 1 second**
Damping On/Off	Switches the damping on or off.
Density Fixed Value	If the flow count and display are performed using mass flow units, a fixed density value must be included in the calculations. To convert to mass flow, a density value in the range of 0.01 to 5.0 g/cm^3 can be set.
…Cut Off	Selection of submenu '**…Cut Off**' using .
TX Location TAG	Entry of the measuring point tag for the transmitter. Alphanumeric, max. 20 characters
TX TAG	Enter the tag number for the transmitter. Alphanumeric, max. 20 characters
Device Reset	For service purposes only. Restart the device without having to switch the power supply on and off.
Restore Factory Def.	All user-accessible parameters will be reset to the factory default settings.
…Feature Settings	Selection of submenu '**…Feature Settings**' using .
…System Zero	Selection of submenu '**…System Zero**' using .
Noise Reduction	Activates the filter technology for noise reduction. For more detailed information see **Noise Reduction** on page 123. Filter: Off, Filter 15, 30, 60 (15: lower filtering, 60: strong filtering) Filter setting affects 20 mA signal (damping). Default setting: Off
…Peak Filter	Selection of submenu '**…Peak Filter**' using .
…DC Offset Filter	Selection of submenu '**…DC Offset Filter**' using .

Menu / parameter	Description
Device Setup / ...Transmitter / **...Units**	
Unit Massflow Qm	Selection of unit for mass flow. Refer to **Table 2: Units for the mass flow** on page 90. The selection applies to the display of the current mass flow, and for the parameters related to mass flow such as QmMax and Qm_{Max}DN.
Unit Mass Tot.	Select the unit for the mass totalizer. Refer to **Table 3: Units for the mass totalizer** on page 90.
Unit Volumeflow Qv	Selection of unit for volume flow. Refer to **Table 1: Units for the volume flow** on page 90. The selection applies to the display of the current volume flow and for the parameters related to volume flow such as QvMax and Qv_{Max}DN.
Unit Vol. Totalizer	Selection of unit for the volume totalizers. Refer to **Table 4: Units for the volume totalizer** on page 90.
Variable 1 Name	Selection of the unit for external process variables. The transmitter can show two external process variables in the display. The process variables can be transferred from the fieldbus master to the transmitter via the HART, Modbus or PROFIBUS DP protocol. You can configure the display through the '**Display**' menu.
Cust Qm Unit N.	Enter the name for the user-defined mass flow unit.
Cust Qm Unit F.	Enter the factor for a user-defined mass flow unit. The factor relates to the flow per liter.
Cust Qm Tot Unit N.	Enter the name of the user-defined totalizer unit for mass flow.
Cust Qm Tot Unit F.	Enter the factor for a user-defined mass flow unit. The factor relates to the flow per liter.
Cust Qv Unit N.	Enter the name for the user-defined volume flow unit.
Cust Qv Unit F.	Enter the factor for a user-defined volume flow unit. The factor relates to the flow per liter.
Cust Qv Unit N.	Enter the name for the user-defined volume flow unit.
Cust Qv Tot Unit F.	Enter the factor for a user-defined volume flow unit. The factor relates to the flow per liter.

Device Setup / ...Transmitter / **...Cut Off**	
Low Flow Cut Off	Set the switching threshold (0 to 10 %) for the low flow cut-off. If the flow rate is below the switching threshold, there is no flow measurement. The setting of 0 % deactivates the low flow cut-off. Default setting: 1.0 %
Low Flow Hysteresis	Set the hysteresis (0 to 50 %) for the low flow cut-off as it is defined in the parameter 'Low Flow Cut Off'. Default setting: 20 %

… 7 Operation

… Parameter descriptions

Menu / parameter	Description
Device Setup / …Transmitter / **…Feature Settings**	
Backwards Comp.	Indicator as to whether the backward compatibility function has been activated.
Backwards Comp. Code	Set the device-specific code for activating the function. To use this function subsequently, contact the ABB service team or sales organization. After entering the code, restart the device (e.g. using the parameter 'Device Reset' or by briefly switching off the power supply).
Verifying Capab.	Indicator as to whether the verification function has been activated.
Verifying Capab.Code	Set the device-specific code for activating the verification function. To use this function subsequently, contact the ABB service team or sales organization. After entering the code, restart the device (e.g. using the parameter 'Device Reset' or by briefly switching off the power supply).

Device Setup / **…System Zero**	
Manual Adjust	Sets the value for zero point adjustment in % of Q_{max}DN Manual adjustment: −50 to +50 mm/s
Auto Adjust	Starts the automatic zero point balancing using . Automatic zero point balancing takes approx. 60 seconds. **Note** Prior to starting the zero point adjustment, make sure that: • There is no flow through the sensor (close all valves, shut-off devices etc.) • The sensor must be filled completely with measuring medium for measurement.

Device Setup / **…Peak Filter**	
Filter On/Off	Enables the peak filter function. For more detailed information see **Peak filter** on page 124.
Filter Thresh.	Indicates the value for a still valid change in the measured value [m/s] per measurement cycle.
Discarded Values	Indicate the number of invalid measurement values in percent

Device Setup / **…DC Offset Filter**	
Filter On/Off	Enables the DC offste filter function. For more detailed information see **DC Offset Filter** on page 124.

Menu: Display

Menu / parameter	Description
Display	
Language	**Selection of menu language.** (German, English, French, Spanish, Italian, Polish, Turkish, Chinese, Portuguese).
Contrast	Contrast setting for the LCD display.
...Operator Page 1	Selection of submenu '**...Operator Page 1**' using .
...Operator Page 2	Selection of submenu '**...Operator Page 2**' using .
Autoscroll	If Autoscroll is enabled, the 'Autoscroll' function can also be activated on the information level of the operator menu. In this function, operator pages are automatically displayed in succession on the process screen, changing every 10 seconds. Manual scrolling through pre-configured operator pages as described above is no longer necessary. When Auto scroll mode is enabled, the icon is displayed in the lower left corner of the screen. Default setting: Disabled.
Flow Format	Selection of number of decimal places (maximum 6) used to display the corresponding process variables. Default setting: X.XX.
Tot Format	
Date Format	Set the display format for the date and time.
Display Tag	Configuration of the top line in the display. Off, Sensor Location Tag, Bus Address, HART Address, Ethernet Status
Display Rotation	The display on the display can be rotated through software by 180°.
Display Test	Start the test of the LCD display with ' '. The display test lasts approx. 10 seconds. Various patterns are shown on the LCD display to check the display.

Display / ...Operator Page 1 (n)		
Display Mode	Configure each operator page. The following versions can be selected: Off, 1x4, 1x6A, 1x6A Bar, 1x9, 1x9 Bar, 2x9, 2x9 Bar, 3x9. Selecting 'Off' deactivates the corresponding operator page.	
1st Line	Selection of process variable displayed in the respective row.	
2nd Line 3rd Line	• Qv [unit]: Volume flow rate in the selected unit. • Qv [%]: Volume flow in % • ∑V+: Volume totalizer forward • ∑V-: Volume totalizer reverse • ∑Vn: Volume totalizer net • CO1 Current: Output current in mA	• Qm [unit]: Mass flow in the selected unit. • Qm [%]: Mass flow in % • ∑M+: Mass totalizer forward • ∑M-: Mass totalizer reverse • ∑Mn: Mass totalizer net • scaled velocity: Flow velocity • HART Variable 1
Bargraph	Selection of process variable displayed as a bar graph. • Qm [%]: Mass flow in % • Qv [%]: Volume flow in % • CO1 Current: Output current in mA	

… 7 Operation

… Parameter descriptions

Menu: Input/Output

Menu / parameter	Description
Input/Output	
…Curr.Out 31/32	Selection of submenu '**…Curr.Out 31/32**' using .
…Dig.Out 41/42	Selection of submenu '**…Dig.Out 41/42**' using .
…Dig.Out 51/52	Selection of submenu '**…Dig.Out 51/52**' using .

Input/Output / **…Curr.Out 31/32**	
Output Value	Selection of process variable issued at the corresponding current output. • Qm [%]: The current output provides the mass flow in percent. • Qv [%]: The current output provides the volume flow in percent.
Curr.Out Mode	Select the operating mode for the current output. • '4-20mA FWD' Output flow rate in forward flow: 4 mA = no flow 20 mA = maximum flow • '4-12-20 mA': Output flow rate in forward and reverse flow: 4 mA = maximum flow in reverse flow 12 mA = no flow 20 mA = maximum flow in forward flow • '4-20mA FWD/REV': Output flow rate in forward and reverse flow without distinction of flow direction: 4 mA = no flow 20 mA = maximum flow Default setting: 4-20mA FWD/REV.
Curr.Out at Alarm	Selection of status of the current output in error condition. The output 'low' or 'high' current is set in the subsequent menu. Default setting: High Alarm.
Low Alarm	Sets the current for Low Alarm.
High Alarm	Sets the current for High Alarm.
Curr.Out > 20.5mA	Behavior of current output if 20.5 mA is exceeded. • Hold Last Value: The last measured value is retained and issued. • High Alarm: The high alarm current is issued. • Low Alarm: The low alarm current is issued. Default setting: Hold Last Value.

Menu / parameter	Description
Input/Output / **...Curr.Out 31/32**	
Curr.Out < 3.8mA	Behavior of the current output if 3.8 mA is not reached. • Hold Last Value: The last measured value is retained and issued. • High Alarm: The high alarm current is issued. • Low Alarm: The low alarm current is issued. Parameter is not available if the parameter 'Curr.Out Mode' 4-20mA FWD/REV has been selected. Default setting: Low Alarm.
Curr. at EPD Alarm	Behavior of the current output with an empty meter tube. • Off: no effect on current output. • Q = 0%: Current output is set to 4 mA, 'no flow'. • High Alarm: The high alarm current is issued. • Low Alarm: The low alarm current is issued. Default setting: Off.
Curr. at TFE Alarm	TFE alarm (complete filling alarm) is issued when the meter tube is partially filled. • Off: no effect on current output. • Q = 0%: Current output is set to 4 mA, 'no flow'. • High Alarm: The high alarm current is issued. • Low Alarm: The low alarm current is issued. Default setting: Off.

Input/Output / **...Dig.Out 41/42**	
Mode	Selection of the operating mode for the digital output 41 / 42. • Off: Digital output 41 / 42 deactivated. • Logic: Digital output 41 / 42 as a binary output (e.g. as an alarm output). • Pulse: Digital output 41 / 42 as a pulse output. In pulse mode, pulses are output per unit (e.g. 1 pulse per m3). • Frequency: Digital output 41 / 42 as a frequency output. In frequency mode, a frequency is issued that is proportional to the flow rate. The maximum frequency can be configured in accordance with the upper range value.
Outp. Flow Direction	Selection of flow direction in which the pulse / frequency output issues the selected process value. The parameter is only available if the digital output has been configured as a pulse or frequency output. • Forward & Reverse: Pulses for both flow directions are output via digital output 41/42. • Forward: Only pulses in the forward flow (direction) (flow in direction of arrow) are output via digital output 41 / 42. • Reverse: Only pulses (in the) reverse flow (direction) (flow in opposite direction to arrow) are output via digital output 41 / 42.
...Setup Pulse Output	Selection of submenu '**...Setup Pulse Output**' using . Only available if 'ModePulse' has been selected.
...Setup Freq Output	Selection of submenu '**...Setup Freq Output**' using . Only available if 'ModeFrequency' has been selected.
...Setup Logic Output	Selection of submenu '**...Setup Logic Output**' using . Only available if 'ModeLogic' has been selected.
...Alarm Config	Selection of submenu '**...Alarm Config**' using . Only available when 'Logic' Mode is selected in the 'Alarm Signal' ...Setup Logic Output / Logic Output Action menu.

… 7 Operation

… Parameter descriptions

Menu / parameter	Description
Input/Output / …Dig.Out 41/42 / **…Setup Pulse Output**	
Output Value Pulse	Selection of process variable that is issued via the pulse output. • Off: The pulse output is deactivated. • Pulse Mass Flow: The pulse output indicates the mass flow. • Pulse Volume Flow: The pulse output indicates the volume flow.
Pulses per Unit	Sets the pulses per mass unit or volume unit (see table **Available units** on page 90) and the pulse width for the pulse output. The potential pulse width depends on the configured pulse value and is calculated dynamically.
Pulse Width	

Input/Output / …Dig.Out 41/42 / **…Setup Freq Output**	
Output Value Freq.	Selection of process variable that is issued via the frequency output. • Off: The pulse output is deactivated. • Pulse Mass Flow: The pulse output indicates the mass flow. • Pulse Volume Flow: The pulse output indicates the volume flow.
Upper Frequency	Sets the frequency for the upper range value. The entered value corresponds to 100 % flow.

Input/Output / …Dig.Out 41/42 / **…Setup Logic Output**	
Logic Output Action	Selection of binary output function. • Off: The binary output is deactivated. • F/R Signal: The binary output signals the flow direction. • Alarm Signal: The binary output indicates an active alarm. The alarm is selected in the '„…Alarm Config' menu. • Dual Range: The binary output is activated when measuring range 2 (Qm Max 2 / Qv Max 2) is selected. This selection is only available if the parameter 'Dual Range' has been configured to Qm or Qv. • Batch End Contact: The binary output is activated when the set fill quantity is reached (only if the FillMass function is activated).
Active Mode	Select switching properties for the binary output. • Active High: Normally open • Active Low: Normally closed Default setting: Active High.

Menu / parameter	Description
Input/Output / …Dig.Out 41/42 / **…Alarm Config**	
General Alarm	Select error messages signaled via the binary output 41 / 42. Only if the parameter 'Logic Output Action' is set to Alarm Signal.
Qv Volumeflow Max	
Qv Volumeflow Min	
EPD	
TFE	
In house Temp	

Input/Output / ...Dig.Out 51/52	
Mode	Selection of the operating mode for the digital output 51 / 52. The following operating mode 'Follow DO 41/42, <90° Shift, 180° Shift' is only available if the digital output 51 / 52 has been configured as a pulse output. • Off: Digital output deactivated. • Logic: Digital output functions as binary output (for function see parameter '...Setup Logic Output'). • Follow DO 41/42: The digital output 51 / 52 follows the pulses from the digital output 41 / 42. The function depends on the setting of the parameter 'Outp. Flow Direction'. • 90° Shift: 90° phase-shifted output of the same pulses as for digital output 41 / 42. • 180° Shift: 180° phase-shifted output of the same pulses as for digital output 41 / 42.
Outp. Flow Direction	Selection of flow direction in which the pulse / frequency output issues the selected process value. The parameter is only available if Follow DO 41/42 has been configured for digital output 51 / 52 in parameter 'Mode'. • No pulses are issued if 'Forward & Reverse' is selected. Only digital output 41 / 42 is active. • When 'Forward' is selected, pulses for forward flow are issued at digital output 41 / 42 and pulses for reverse flow at digital output 51 / 52 . • When 'Reverse' is selected, pulses for forward flow are issued at digital output 41 / 42 and pulses for reverse flow at digital output 51 / 52
...Setup Logic Output	Selection of submenu '**...Setup Logic Output**' using . Only available if 'ModeLogic' has been selected.
...Alarm Config	Selection of submenu '**...Alarm Config**' using . Only available if 'ModeLogic' has been selected.

Menu / parameter	**Description**
Input/Output / ...Dig.Out 51/52 / **...Setup Logic Output**	
Logic Output Action	Selection of binary output function. See description „Input/Output / ...Dig.Out 41/42 / ...Setup Logic Output'.
Active Mode	Select switching properties for the binary output. • Active High: Normally open • Active Low: Normally closed Default setting: Active High.

Input/Output / ...Dig.Out 51/52 / **...Alarm Config**	
General Alarm	Selection of error messages signaled via the binary output 51 / 52. Only if the parameter 'Logic Output Action' is set to Alarm Signal.
Qv Volumeflow Max	
Qv Volumeflow Min	
EPD	
TFE	
In house Temp	

… 7 Operation

… Parameter descriptions

Menu: Process Alarm

Menu / parameter	Description
Process Alarm	
Diagnostic History	Display all active alarms and the alarm history.
Clear Alarm History	Reset of the alarm history.
…Group Masking	Selection of submenu '**…Group Masking**' using .
…Alarm Limits	Selection of submenu '**…Alarm Limits**' using .

Process Alarm / **…Group Masking**	
Maintenance Required	Alarm messages are divided into groups. If masking is activated for a group (On), no alarm is issued. For additional information, see **Diagnosis / error messages** on page 126.
Function Check	
Out Of Specification	
DC Feedback masking	With masking activated, the Error DC Feedback is masekd and no longer stored in error register

Process Alarm / **…Alarm Limits**	
Qm Massflow Min	Set the minimum / maximum limit value (0 to 110 %) for mass measurement. If the process value 'Qm [unit]' exceeds or falls below the limit value, an alarm is triggered.
Qm Massflow Max	
Qv Volumeflow Min	Set the minimum / maximum limit value (0 to 110 %) for volume measurement. If the process value 'Qv [unit]' exceeds or falls below the limit value, an alarm is triggered.
Qv Volumeflow Max	

Menu: Communication

Menu / parameter	Description
Communication	
…HART	Selection of submenu '**…HART**' using .
…Modbus RTU	Selection of submenu '**…Modbus RTU**' using .

Communication / **...HART**	
Device Address	Selection of HART device address. Note The HART protocol has provisions for creating a bus with up to 15 devices (1 to 15)). If an address greater than 0 is set, the device operates in multidrop mode. The current output 31 / 32 / Uco is fixed to 4 mA. HART communication takes place only through current output 31 / 32 / Uco.
Loop Current Mode	Selection of the operating mode for current output with HART communication. • Multidrop Fixed • Normal Signaling
HART Tag	Entry of a HART TAG number as unique identifier for the device. Alphanumeric, a maximum of 8 characters, upper case only, no special characters.
HART Long Tag	Entry of a HART TAG number as unique identifier for the device. Alphanumeric, maximum of 32 characters, ASCII Only starting from HART version 7!
HART Descriptor	Entry of a HART descriptor. Alphanumeric, a maximum of 16 characters, upper case only, no special characters.
HART Message	Display of the alphanumeric TAG number.
HART Manuf. ID	Display of the HART manufacturer ID. ABB = 26
HART Device ID	Display of the HART device ID.
HART Find	Select whether the transmitter must respond to the HART command 73 (Find Device). • Off: The transmitter does not respond to command 73. • Once: The transmitter responds once to command 73. • Continuous: The transmitter always responds to command 73.
PV Primary Variable	Selection of process variables that are issued through the PV Primary Variable. Factory Default: Volume Flow in % For Changing the setting navigate to “Input/Output/Current Out/Output Value”. Possible settings: Volume Flow in %, Mass Flow in %,
SV Secondary Var.	Selection of process variables that are issued through the SV Secondary Var. Factory Default: Massflow in % Possible selections: Massflow (Unit), Massflow (%), Volumeflow (Unit), Volumeflow (%), MassflowTotalizer QmFwd, MassflowTotalizer Qm Rev, MassflowTotalizer QmDiff, VolumeFlowTotalizer QvFwd, VolumeFlowTotalizer Qv Rev, VolumeFlowTotalizer QvDiff
TV Tertiary Variable	Selection of process variables that are issued through the TV Tertiary Variable Factory Default: VolumeFlowTotalizer Qv Fwd, for possible setting, see above
QV Quaternary Var.	Selection of process variables that are issued through the QV Quaternary Var. Factory Default: VolumeFlowTotalizer Qv Fwd, for possible setting, see above
Last HART Command	Display of the most recently sent HART command.

Menu / parameter	**Description**
Communication / **Modbus RTU**	
Address	Setting the Modbus device address (1 to 127).
IEEE Format	Selection of the byte order for the Modbus communication. • Enabled: If the IEEE format is activated, the data words are sent in the ‘little endian’ format with the lowest value word first. • Disabled: If the IEEE format is deactivated, the data words are sent in the standard Modbus ‘bigendian’ format. Factory setting: Enabled.
Baud Rate	Selection of the transmission speed (baud rate) for the Modbus communication. Factory setting: 9600 baud.
Parity	Selection of the parity for the Modbus communication. Factory setting: Odd.
Stop Bits	Selection of the stop bits for the Modbus communication. Factory setting: One stop bit
Response Delay	Setting of the pause time in milliseconds after receiving a Modbus command. The device sends a response no earlier than expiration of the set pause time. Factory setting: 10 ms

… 7 Operation

… Parameter descriptions

Menu: Diagnostics

Menu / parameter	Description
Diagnostics	
…Maintenance control	Selection of submenu '**…Maintenance control**' using .
…Diagnosis Control	Selection of submenu '**…Diagnosis Control**' using .
…Diagnosis Values	Selection of submenu '**…Diagnosis Values**' using .
……Simulation Mode	Selection of submenu '**……Simulation Mode**' using .
…Output Readings	Selection of submenu '**…Output Readings**' using .
…Alarm Simulation	Selection of submenu '**…Alarm Simulation**' using .

Diagnostics / **…Maintenance control**	
Preset Maint. cycle	Setting the service interval (0 to 9999 hours). After the service interval has expired, the corresponding error message 'M026.004' (Service interval has been reached) is set. The setting '0' deactivates the maintenance interval.
Maint. Remain. Time	Remaining service interval time until setting of error message 'M026.004.'
Start New Cycle	Resetting of the maintenance interval. The service interval is reset to the value set in 'Preset Maint. cycle'.

Diagnostics / **…Diagnosis Control**	
…Diagnosis Tfe	Selection of submenu '**…Diagnosis Tfe**' using .
…Empty Pipe Detector	Selection of submenu '**…Empty Pipe Detector**' using .
…Diagnosis Electrode	Selection of submenu '**…Diagnosis Electrode**' using .
…Noise Check	Selection of submenu '**…Noise Check**' using .
…Fingerprints	Selection of submenu '**…Fingerprints**' using .
Diagnosis Interval	Set the time span between the performance of each individual diagnosis. Default setting: 5 s.

* The menu is only available if the Expert Diagnosis function is activated. See also the 'Device Setup\…Transmitter\…Feature Settings' menu.
** Menu only available if SIL diagnostic function is activated. See also the 'Device Setup\…Transmitter\…Feature Settings' menu.

Menu / parameter	Description
Diagnostics / ...Diagnosis Control / ...	**Diagnosis Tfe**
Tfe On/Off	Activate the Partial Filling Detection function. **Note** This feature is available if the sensor is equipped with a Partial Filling Detector (optional). This function is available for sensors from size DN 50 without explosion protection or with explosion protection for Zone 2 / Div 2. The flow sensor must be installed horizontally with the terminal box pointing upwards. The conductivity of the measured medium must be in the range of 20 to 20.000 µS/cm.
Start Tfe Adjust	The partial filling detection must be set in accordance with the conditions on-site. Start the automatic adjustment of the Partial Filling Detection function. **Note** Prior to starting, make sure that: • There is no flow through the sensor (close valves, shut-off devices etc.). • The flowmeter sensor is completely filled with the medium to be measured
Manual Tfe Adjust	Manual setting of the Partial Filling Detection function.
Tfe Threshold	Manual fine adjustment of the switching threshold. The switching threshold is set automatically during automatic adjustment. If the current value should exceed the defined switching threshold, a message will appear on the display and an alarm will be triggered through the digital output, if appropriately configured.
Actual Tfe Value	Output of the TFE detection value. If the value should exceed the switching threshold, a message will appear on the display and an alarm will be triggered through the digital output, if appropriately configured.

Diagnostics / ...Diagnosis Control / ...	**Empty Pipe Detector**
Empty Pipe Detector	Activate the 'Empty Pipe Detector' function (only for sizes ≥ DN 10) and without pre-amplifier. A completely filled meter tube is essential for an accurate measurement. The 'Empty Tube Detection' function detects an empty meter tube.. In case of an alarm, the current output records the determined status in the menu 'Input/Output / ...Curr.Out 31/31 / Curr. at EPD Alarm' and the pulse output is stopped.
Adjust EP	The empty tube detection function must be set in accordance with the conditions on-site. The switching threshold is set automatically during automatic adjustment. Start the automatic adjustment of the Empty Tube Detection function.
Manual Adjust EP F.	Manual set the empty tube detection function. The value must be adapted such that the frequency for the empty tube detection (Detector EP Value) is almost 2000 Hz.. **Note** Before starting the (manual / automatic) adjustment, make sure that: • There is no flow through the sensor (close valves, shut-off devices etc.). • The flowmeter sensor is completely filled with the medium to be measured
Threshold	Set the switching threshold for the empty tube detection. The switching threshold is set automatically during automatic adjustment. The switching threshold can be changed for manual fine adjustment.
Detector EP Value	Frequency display for empty tube detection. If the current value should exceed the defined switching threshold, a message will appear on the display and an alarm will be triggered through the digital output, if appropriately configured.

… 7 Operation

… Parameter descriptions

Diagnostics / …Diagnosis Control / **…Diagnosis Electrode**	
Electrode On/Off	Activate the Electrode diagnostic function. Default setting: Off
Electrode Status	Indicates the Status of the Electrode. - Electrode short circuit or - Electrode open circuit (If fluid-conductivity is too low, this might trigger an 'Electrode open circuit' alarm)
Elec. Imp. E1-GND	Electrical impedance E1-GND. Current impedance between electrode E1 and GND (ground potential).
Elec. Imp. E2-GND	Electrical impedance E2-GND. Current impedance between electrode E2 and GND (ground potential).

Menu / parameter	**Description**
Diagnostics / …Diagnosis Control / **…Noise Check**	
Start Noise Check	Start the 'Noise Check' function, using . While the check is in progress, no flow measurement can take place. Conditions for using the function: • The measuring tube must be completely full. • No flow must occur in the flowmeter sensor. Additional installation conditions: • The flowmeter sensor must not be provided with a preamplifier.
Result Noise Check	The LCD display displays the results of the Noise Check.
Power Spectrum	**Current power spectrum.**
Amplitude 1 Value	Display the four highest amplitudes in the power spectrum.
Amplitude 2 Value	
Amplitude 3 Value	
Amplitude 4 Value	
Frequency 1	Display the four highest amplitudes in the frequency corresponding to the power spectrum.
Frequency 2	
Frequency 3	
Frequency 4	

Diagnostics / …Diagnosis Control / **…Fingerprints**	
Tx Factory CMR	The 'fingerprint database' allows for a comparison of the values at the time of factory calibration with the currently recorded values. Errors in the integrity of the device can already be detected early on. Corrective measures can be taken. Here: Display of the determined values at the time of the factory calibration.
Tx Factory 1m/s	
Tx Factory 10m/s	
Start. FP verification	Create a fingerprint and perform verification.
Result FP verification	Display of the verification result. Based on the result, one of the following messages will be issued. 'FP Verificat. passed', 'CMR failed', '1m/s failed', 'CMR, 1m/s failed'10m/s failed', 'CMR, 10m/s failed'1m/s, 10m/s failed', 'All TxFingerp.failed'Coil Fingerp. Failed', 'CMR, Coil failed'1m/s, Coil failed', 'CMR,1m/s,Coil failed'10m/s, Coil failed', 'CMR,10m/s,Coil faile'1, 10m/s,Coil failed', 'All Fingerp. failed'No Verific.performed'
Tx Customer CMR	The manual fingerprint is created on-site prior to verification of the transmitter. Here: Display of the determined values.
Tx Customer 1m/s	
Tx Customer 10m/s	

Menu / parameter	Description
Diagnostics / ...Diagnosis Values	
All values in this menu are for informational and service purposes only.	
Inhouse Temperature	Display of temperature value within the transmitter housing.
Inhouse Temp MaxPeak	
Inhouse Temp MinPeak	
Driver Current	Display of the drive current of the sensor coil.
Signal Region on ADC	Display of the measuring signal within the A / D converter input. (-100 % to +100 %)
Coil DAC Preset	Display of the D / A converter for coil drive.
DC Feedback DAC	D / A converter feedback value.
ADC Errors	A / D converter error
Device Restart Count	Number of device restarts (boots).

Diagnostics / **.....Simulation Mode**	
Simulation Switch	Manual simulation of measured values. After selecting the value to be simulated, a corresponding parameter is displayed in the menu 'Diagnostics / .....Simulation Mode'. The simulation value can be set here. The output values correspond to the simulated flowrate entered. The 'Configuration' information is displayed in the lower line of the display. Only one measured value / output can be selected for simulation. After power-up / restart of the device, the simulation is switched off.
Off	
Qm Massflow [unit]	
Qm Massflow [%]	
Qv Volumeflow [unit]	
Qv Volumeflow [%]	
Curr.Out 31/32	
Dig.Out 41/42 State	
Dig.Out 41/42 Freq.	
Dig.Out 41/42 Pulse	
Dig.Out 51/52 State	
Dig.Out 51/52 Pulse	
Hart Frequency	

Menu / parameter	Description
Diagnostics / **...Output Readings**	
Curr.Out 31/32	Display the current values and statuses of the listed inputs and outputs.
Dig.Out 41/42 Freq.	
Dig.Out 41/42 State	
Dig.Out 51/52 State	

Menu / parameter	Description
Diagnostics / **...Alarm Simulation**	
Manual simulation of alarms / error messages. The simulated alarm is selected by setting the parameter to the corresponding error. See also chapter **Diagnosis / error messages** on page 126. The following error messages can be simulated: Mass flowrate exceeds limits, Volume flowrate exceeds limits , Simulation on, Flowrate to zero, Maintenance interval is reached , All totalizer stopp, Reset of one or more Totalizers, Display value is <1600h at Qmax, Device not calibrated, NV chips defect on FEB, NV data defect, No Frontend Board detected, FEB communication error, Incompatible FEB, NV chips defect on MB, Pulse output is cutted off. , Current output 31/32 is saturated, An alarm is simulated., Communication card not responding, Reserved, Coil regulation error (wrong coil current), Coil wiring Detection, Electrode short circiut detection, Electrode open circiut detection, DC Feedback Regulation Error, Monitoring communcation ADC and RX210, TFE alarm, EPD alarm, ADC Signal overrange, Inhouse temeprature exceeds limits	

… 7 Operation

… Parameter descriptions

Menu: Totalizer

Menu / parameter	Description
Totalizer	
…Reset Totalizer	Selection of submenu '**…Reset Totalizer**' using .
…Preset Totalizer	Selection of submenu '**…Preset Totalizer**' using .

Totalizer / **…Reset Totalizer**	
All Totalizer	Resets all totalizers to zero.
Massflow Fwd	Resets individual counters.
Massflow Rev	
Volumeflow Fwd	
Volumeflow Rev	

Totalizer / **…Preset Totalizer**	
Massflow Fwd	Allows editing / presetting of counter values (e.g. when replacing the transmitter).
Massflow Rev	
Volumeflow Fwd	
Volumeflow Rev	

Menu: Sensor Setup

NOTICE

Damage to components!
Damage to the flowmeter sensor due to incorrect setting of the excitation current possible.

Note
Menu only available if function 'Backwards Comp.' has been ordered and activated (see menu 'Device Setup/...Transmitter/... Feature Settings').
If the function Backwards Comp. is activated, the transmitter can also be used with older transducers.
Setting the parameters in accordance with the specification on the name plate of the older sensor.

Menu / parameter	Description
Sensor Setup	
Sensor Type	Select the sensor type: • Standard QmaxDN: For ProcessMaster, HygienicMaster.
Meter Size	Setting the nominal diameter in accordance with the value provided on the name plate of the flowmeter sensor. Value range: DN1 to 2400
Se Span	Setting the span in accordance with the value provided on the name plate of the flowmeter sensor.
Se Zero	Setting the zero point in accordance with the value provided on the name plate of the flowmeter sensor.
Line Freq	Selection of the mains frequency of the power supply (50Hz or 60Hz)
Excitation Freq.	Setting the excitation frequency in accordance with the value provided on the name plate of the flowmeter sensor. Range: 30 & 25Hz, 15 & 12.5Hz, 7.5 & 6.25Hz, 3.75 & 3.125Hz
Set Point Curr.	Adjustment of the excitation current of the sensor coils. Setting parameter to 200 mA only for models FEP321, FEP521, FEH321, FEH521. For all other sensors contact ABB Service.
Pre. Amp	Selection whether a preamplifier exists in the flowmeter sensor or not Older transducers with sensor sizes smaller than DN 10 or signal cables longer than 50 m (164 ft) have a preamplifier.
Calibration flag	Set to '1' as soon as all parameters have been set in the setup menu of the sensor.
Sensor TFE Function	This activates or deactivates full pipe detection (TFE = complete fill electrode).

Software history

In accordance with NAMUR recommendation NE53, ABB offers a transparent and traceable software history.

Device software package FEx630 (device firmware package)				
Design	**Issue date**	**Type of change**	**Description**	**Ordering number**
00.04.00	2/3/2017	First publication	–	3KXF002044U0100_00.04.00
00.04.01	6/27/2017	Bug fixing	Piston pumps filter	3KXF002044U0100_00.04.01
00.05.00	1/12/2018	Bug fixing	Integrated Polish language	3KXF002044U0100_00.05.00
01.07.00	1/7/2018	Bug fixing	PROFIBUS DP® and Modbus® integrated. New bootloader	3KXF002044U0100_01.07.00
01.08.00	12/2020	New Feature added	HART Variables configurable, Fingerprint Improved	3KXF002044U0100_01.08.00
01.09.00	5/2021	New Feature added	Ethernet IP and Modbus TCP communication protocol added	3KXF002044U0100_01.09.00
01.10.00	9/2021	New Feature added	DC Offset Filter added, Peak Filter added	3KXF002044U0100_01.10.00
01.11.00	12/2022	New Feature added	Profibus PA communication protocol added	3KXF002044U0100_01.11.00
01.12.00	4/2023	New Feature added	PROFINET communication protocol added	3KXF002044U0100_01.12.00
01.13.00	5/2023	New Feature added	Sensor sizes up to DN 3000, Electrode Diagnosis Menu	3KXF002044U0100_01.13.00
01.14.00	1/2025	More Units added	kilo US gallons (kugal), Mega liter (Ml)	3KXF002044U0100_01.14.00

… 7 Operation

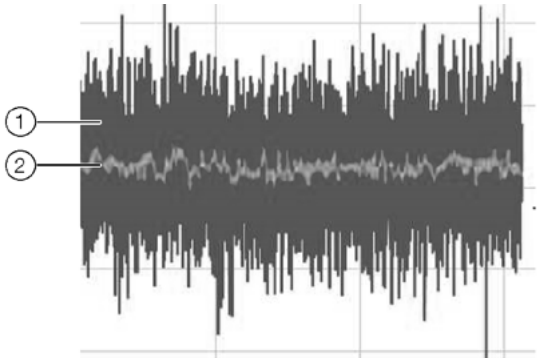
Noise filtering

There are 3 different filter modes available:

- Noise Reduction
- Peak Filter
- DC Offset Filter

Note
Use only one of these four filter modes at a time, because they affect each other.

Noise Reduction



1 Flow signal without noise reduction (blue)

2 Flow signal with noise reduction (red)

Figure 42 Flow signal noise reduction

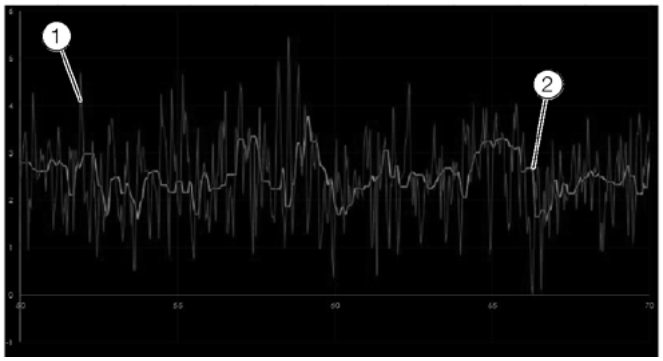
Noise Reduction could help improving the stability of the 4 to 20 mA flow signal. With a filter setting such as “Filter 15”, the flowrate is calculated from 15 flowrate reading samples. Response-time increases with higher filter settings, such as “Filter 60”.

Menu / parameter	Description
Device Setup / **…Transmitter**	
Noise Reduction	Off, Filter 15, Filter 30, Filter 60 Default setting: Off

Recommendation for noisy readings:

- Set parameter ‘Device Setup / …Transmitter / **Damping**’ to 0,2 sec and set Parameter ‘Noise Reduction’ to ‘Filter 30’.
- Increase Filter setting for higher filtering-effect.

Peak filter



1 Flow signal without peak filter (red)

2 Flow signal with peak filter (green)

Figure 43 Peak filter

Menu / parameter	Description
Device Setup / **...Peak Filter**	
Filter On/Off	Enables the peak filter function.
Filter Thresh.	Indicates the bandwidth for acceptable flow-rate changes from the previous to the next flowrate reading. Default setting: 2m/s band-width.
Discarded Values	Indicate the number of measurement samples exceeding the “Filter Thresh.» bandwidth. Value is shown in %.

The parameter ‘Filter Thresh.’ limits the rate of change from previous to the next flowrate reading.
With the next flowrate reading not exceeding the threshold, the measured flowrate is considered for Flowrate calculation.

With the next flowrate reading exceeding the threshold, the measured flowrate is not considered for Flow calculation and replaced by the last ‘good’ value.

With very noisy fluids (such as high content of pulp stock, sludge with a high content of solids, hydraulic transport in mining applications) this can result lots of flowrate readings disregarded for final flowrate calculation. If 80 % of the readings within the Filter is disregarded, the Filter flags an error message.

The parameter ‘Discarded Values’ allows for trimming of the parameter ’Filter Thresh.’. ‘Discarded Values’ indicates the % of disregarded flowrate readings within the Filter.

Recommendation:

- Set ‘Filter Thresh.’ resulting in ‘Discarded Values’ not exceed 30 to 40 %.

Note
Use only one Filtering Mode (either ‘Noise Reduction’ or ‘PeakFilter’ or ‘DC Offset Filter’) at the same time. They affect each other.

DC Offset Filter

Changing the fluid to be measured or adding chemicals into the fluid can result in offsetting the flowrate reading or in galvanic voltages. The ‘DC Offset Filter’ helps reducing this effect.

Menu / parameter	Description
Device Setup / **...DC Offset Filter**	
Filter On/Off	Enables the DC offset filter function.

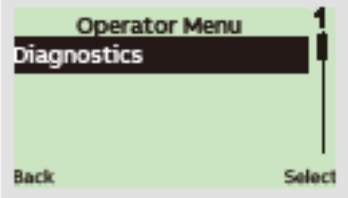
8 Diagnosis / error messages

Calling up the error description

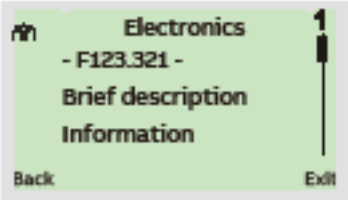
Additional details about the error that has occurred can be called up on the information level.



1. Use ◥ to switch to the information level (Operator Menu).



2. Use ▲ / ▼ to select the submenu ‘Diagnostics’.
3. Confirm the selection with ◤.

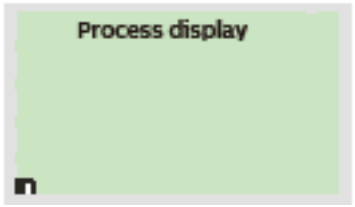


The error message is shown on the display according to priority.
The first line shows the area in which the error has occurred.
The second line shows the unique error number. It is made up of the priority (Fxxx) and the error position (.xxx)
The next lines show a brief description of the error and information on how to remedy it.
You absolutely need to scroll the display further to read the error message in more detail.

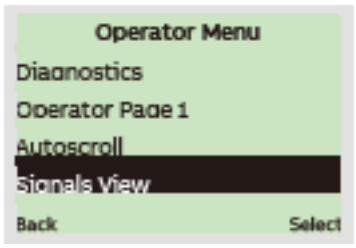
Note
For a detailed description of the error messages and information on troubleshooting, see the following pages.

Signal view

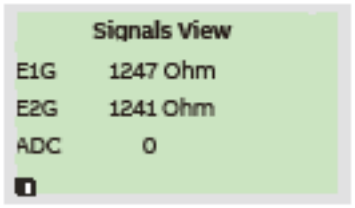
Signals View allows for an overview of flowmeter internal data for service purposes. It is a powerful aid in diagnosing faults and errors. Look carefully at the values here to establish if they are within normal operating limits. **Available diagnostic signals** on page 127 shows a table of values listed in Signals View and the acceptable range of values for ‘normal’ operation.
These values give a quick overview of the status of the meter. Drifts outside normal limits for parameters will normally trigger an alarm. The alarm can then be identified by checking the Diagnostics menu.



1. Open the Operator Menu. using ◥.



2. Select the desired submenu using ▲ / ▼.
3. Confirm the selection with ◤.



Menu	Description
... / Operator Menu	
Diagnostics	Selection of sub-menu ‘Diagnostics’; see also **Error messages on the LCD display** on page 75.
Operator Page 1 to n	Selection of operator page to be displayed.
Autoscroll	When ‘Autoscroll‘ is activated, automatic switching of the operator pages is initiated on the process screen.
Signals View	Selection of submenu ‘Signals View’ (only for service purposes). Refer to **Available diagnostic signals** on page 127.

Signals View

Signal	Relates to	Example	Description	Visible with Standard diagnostics
Qv	Operating conditions	31.84 l/s	Current flowrate.	Yes
Io1	Operating conditions	12.49 mA	Current 4 to 20 mA Output.	Yes
CCR	Coil	446	The CCR reading relates to the Digital-Anolog-Converter (DAC) and indicates the Value of the Coil current Regulation (0 to 1023). The Reading depends on the coil current set point (100 / 200 mA) and the coil resistance (10 to 80 Ω). Reading increases with higher Coil resistance, because Coil-drive circuit needs to keep 100 / 200 mA a constant Coil-current.	Yes
HBB		0.19 mA	The HBB reading indicates the difference of the current within each half of the coil-drive H-Bridge in mA. Difference should be less than 1mA. It's an Indication of the Symmetry of the H-Bridge.	Yes
TRA		−81.8 µA	The TRA reading indicates the stability of the magnetic filed at the time the Flowreading signal is picked. The ideal Status is TRA=0. A normal Status is TRA < 250 µA. Higher TRA values can be an Indication of a faulty coil drive circuit or a faulty sensor.	Yes
FeB	Tx Electrode signal Input	526	The FeB reading relates to Frontendboard (0 to 1023). Reading should be around 500 (in the middle). Big Variations is an Indication of Process-noise present.	Yes
Reg		2.80 %	The Reg reading relates to the Analog-Digital-Converter. Readings should be within −50 % to +50 %. With Reg exceeding − 100 % or +100 %. the Transmitter flags an 'ADC Overrange' Error. Big Variations is an Indication of Process-noise present	Yes
TEM	Tx Diagnostic	32.2 °C	TEM = Transmitter inner temperature	Yes
Ico	Coil	199.8 mA	Coil Drive Current measured. Should be within 199 to 201 mA	Yes
E1G		1302.6 Ω	Electrode Impedance E1 to Ground. Difference of E1G to E2G should be less than 15 %. Very low values indicate either a shortcut (Leakage) of the electrode or conductive coating or a shortcut of the signal cable wiring. High values indicate either insulating coating or non continouty of the electrode wiring. E1G is indicated as '0' in case of Electrode Diagnostics not enabled	Yes
E2G		1302.6 Ω	Electrode Impedance E2 to Ground Difference of E1G to E2G should be less than 15 %. Very low values indicate either a shortcut (Leakage) of the electrode or conductive coating or a shortcut of the signal cable wiring. High values indicate either insulating coating or non continouty of the electrode wiring. E2G is indicated as '0' in case of Electrode Diagnostics not enabled	Yes
ADC	Tx Electrode signal Input	2	The ADC reading indicates the amount of ADC Errors	Yes
CDR	Coil Resistance	30.2 Ohm	Sensor Coil Resistance	

... 8 Diagnosis / error messages

Error messages

The error messages are divided into four groups in accordance with the NAMUR classification scheme.

Errors

Error no. / Range	Text on the LCD display	Cause	Remedy
F099.042 / electronics	ADC overrange alarm. Noise too high. Check applicati. Call service.	Electrode signal overranges max. ADC limits. No flow measurement possible.	If the tube is empty, make sure the empty tube detection is activated. Make sure that the actual flow rate does not up-scaled the configured flow rate. Check for correct grounding. Contact the service department
F097.029 / Electronics	Coil regulation error. Check wiring of sensor coils. Call service	Incorrect coil wiring (M1 / M2 terminals) or cable break / short-circuit or defective coil fuse or moisture in terminal compartment.	Check for incorrect coil wiring (M1 / M2 terminals) or cable break / short-circuit or defective coil fuse or humidity in the terminal compartment.
F093.032 / Electronics	Electrode short cuircit. Check wiring of sensor electrode. Call service.	Wrong wiring or electrode leakage or short-circuit of the electrode signal line and shield or flowmeter flooded.	Check for incorrect wiring or electrode leakage or short-circuit of the electrode signal line and the shield or flooded sensor.
F092.033 / Electronics	Electrode open cuircit. Check wiring of sensor electrode. Call service.	Wrong electrode wiring or break in electrode signal line.	Check for incorrect electrode wiring or break in electrode signal line.
F091.030 / Electronics	Coil wiring error. Check wiring of sensor coils. Call service.	Incorrect coil wiring (M1 / M2 terminals) or cable break / short circuit or defective coil fuse or moisture in terminal compartment.	Check for incorrect coil wiring (M1 / M2 terminals) or cable break / short-circuit or defective coil fuse or humidity in the terminal compartment.
F090.035 / Electronics	ADC RX210 com. error. Call service.	Bad EMC environment or defective component.	Replace the electronics unit or contact ABB Service.

Error no. / Range	Text on the LCD display	Cause	Remedy
F086.018 / Electronics	Curr.Out 31 / 32 com error. Defective Board. EMC disturbance. Call Service.	Broken motherboard hardware. EMC interference	Please contact the service department.
F084.010 / electronics	NV data defect. Data storage irreparable. Call Service.	Data in SensorMemory corrupt.	Please contact the service department.

Function check

Error no. / Range	Text on the LCD display	Cause	Remedy
C078.003 / Config.	Flowrate to zero. Check digital in terminals.	The Digital Input option card is configured to trigger the 'set flowrate to zero' option and this event.	Check terminals of digital input and configuration.
C076.005 / Config.	All totalizer stopp. Check digital in terminals.	The Digital Input option card is configured to trigger the 'All Totalizer stop' option and this event.	Check terminals of digital input and configuration.
C074.006 / Config.	Totalizer reset. Reset of one or more Totalizers.	The Digital Input option card is configured to trigger the Reset Totalizer option and this event.	Check terminals of digital input and configuration.
C072.002 / Config.	Simulation is on. Simulated values. Switch off Simulation Mode.	The simulation of a process value or an output is active.	Switch off simulation mode.
C070.026 / Config.	An alarm is simulated. Switch off alarm simulation.	The simulation of an alarm is active.	Set alarm simulation to 'Off'.

Operation outside of specifications (Out Of Spec.)

Error no. / Range	Text on the LCD display	Cause	Remedy
S065.044 / operation	Inhouse temp. alarm. Reduce ambient temperature.	Measuring medium or ambient temperature is outside the spec.	Check process conditions, reduce temperature.
S064.041 / operation	EPD alarm. Secure pipe is completely filled.	Sensor not filled.	Check if pipe is empty. Make sure that the sensor is completely filled.
S063.040 / operation	TFE alarm. Secure pipe is completely filled.	Alarm of the complete filling electrode, but incorrect, because the sensor is not completely filled.	Check installation and process conditions.
S052.016 / operation	Curr.Out 31 / 32 is saturated. CO process value out of range. Adapt Qmax.	The selected process value of the current output 31/32 is outside the measuring range.	Adjust measuring range.
S047.015 / operation	Pulse output is cut off. Wrong config. Check pulse out configuration.	The calculated output pulse or the calculated output frequency is above the configured cutoff frequency.	Check configuration for the output pulse.
S046.000 / operation	Mass flowrate exceeds limits. Check flowrate and alarm limits.	The mass flow is below or above the configured limit values 'Qm Massflow Min' and 'Qm Massflow Max'.	Check the parameterization in menu 'Process Alarm / ...Alarm Limits' and adjust as needed. Check volume flow rate.
S044.001 / operation	Volume flowrate exceeds limits. Check flowrate and alarm limits.	The volume flow rate is below or above the configured limit values 'Qv Volumeflow Min' and 'Qv Volumeflow Max'.	Check the parameterization in menu 'Process Alarm / ...Alarm Limits' and adjust as needed. Check volume flow rate.

Error no. / Range	Text on the LCD display	Cause	Remedy
S041.034 / electronics	DC feedback regulation. Check conditions of application. Call service.	Multi-phase measuring media that produce a very high level of noise. Stones or solids that produce a very high level of noise. Galvanic voltages at the measuring electrodes. Conductivity of the measuring medium is not evenly distributed (e.g. directly after the injection points).	Please contact the service department.

Maintenance

Error no. / Range	Text on the LCD display	Cause	Remedy
M038.009 / electronics	Sensor memory defective. Mem. or connect. defective. Replace memory.	Defective NV memory module. NV memory module not inserted.	Check if NV memory module is inserted. Please contact the service department.
M032.022 / Config.	Curr.Out 31 / 32 not calibrated. Call Service.	Current output 31 / 32, Uco not calibrated.	Please contact the service department.
M028.007 / Config.	Display value is < 1600 h at Qmax. Change mass Unit or vol. Unit for Totalizer.	Counter unit too small.	Change mass or volume totalizer unit.
M026.004 / Config.	Maintenance interval is reached. Perform maintenance.	Set 'Preset Maint. cycle' to zero to disable the maintenance timer.	Perform maintenance work. Start new cycle.
M024.008 / Config.	Device not calibrated. Call Service.	Device is not calibrated.	Please contact the service department.

... 8 Diagnosis / error messages

Overview

Errors encountered are itemized in tabular form on the following pages. The response of the transmitter on error detection is described therein.
The table lists all possible errors together with a description of their impact on the value of measurement variables, the properties of current outputs and the alarm output.

Error no. / Range	Error text	Current output	Digital output	Pulse output	LCD display	Error maskable?
F099.042 / electronics	ADC overrange alarm. Noise too high. Check applicati. Call service.	High Alarm or Low Alarm, depending on parameter 'Curr.Out at Alarm'.	General Alarm if DO as 'Logic / Alarm Signal' is configured	0 Hz	0 %	No
F097.029 / Electronics	Coil regulation error. Check wiring of sensor coils. Call service			0 Hz	0 %	No
F093.032 / Electronics	Electrode short cuircit. Check wiring of sensor electrode. Call service.			0 Hz	0 %	No
F092.033 / Electronics	Electrode open cuircit. Check wiring of sensor electrode. Call service.			0 Hz	0 %	No
F091.030 / Electronics	Coil wiring error. Check wiring of sensor coils. Call service.			0 Hz	0 %	No

Error no. / Range	Error text	Current output	Digital output	Pulse output	LCD display	Error maskable?
F090.035 / Electronics	ADC RX210 com. error. Call service.			0 Hz	0 %	No
F086.018 / Electronics	Curr.Out 31 / 32 com error. Defective Board. EMC disturbance. Call Service.			Current value - no change.	Current value - no change.	No
F084.010 / electronics	NV data defect. Data storage irreparable. Call Service.			0 Hz	0 %	No
C078.003 / Config.	Flowrate to zero. Check digital in terminals.	4 mA (0 % flow)	Current value - no change.	0 Hz	0 %	Menu '...Group Masking'.
C076.005 / Config.	All totalizer stopp. Check digital in terminals.	Current value - no change.	Current value - no change.	Current value - no change.	Current value - no change.	
C074.006 / Config.	Totalizer reset. Reset of one or more Totalizers.	Current value - no change.	Current value - no change.	Current value - no change.	Current value - no change.	Menu '...Group Masking'.
C072.002 / Config.	Simulation is on. Simulated values. Switch off Simulation Mode.	Current value - no change.	Current value - no change.	Current value - no change.	Current value - no change.	
C070.026 / Config.	An alarm is simulated. Switch off alarm simulation.	Current value - no change.	Current value - no change.	Current value - no change.	Current value - no change.	

Error no. / Range	Error text	Current output	Digital output	Pulse output	LCD display	Error maskable?
S065.044 / operation	Inhouse temp. alarm. Reduce ambient temperature.	Current value - no change.	No Answer	No Answer	Current value - no change.	
S064.041 / operation	EPD alarm. Secure pipe is completely filled.	Alarm - configured as in menu 'Curr. at EPD Alarm'.	Alarm, if DO as 'Logic / Alarm Signal / EPD Alarm' is configured	0 Hz	0 %	Menu '...Group Masking'.
S063.040 / operation	TFE alarm. Secure pipe is completely filled.	Alarm - configured as in menu 'Curr. at TFE Alarm'.	Alarm, if DO as 'Logic / Alarm Signal / TFE Alarm' is configured	Current value - no change.	Current value - no change.	Menu '...Group Masking'.
S052.016 / operation	Curr.Out 31 / 32 is saturated. CO process value out of range. Adapt Qmax.	Alarm - configured as in menu '„Curr. Out > 20.5mA'.	Current value - no change.	Current value - no change.	Current value - no change.	Menu '...Group Masking'.

Error no. / Range	Error text	Current output	Digital output	Pulse output	LCD display	Error maskable?
S047.015 / operation	Pulse output is cut off. Wrong config. Check pulse out configuration.	Current value - no change.	Current value - no change.	Largest possible pulse rate	Current value - no change.	Menu '...Group Masking'.
S046.000 / operation	Mass flowrate exceeds limits. Check flowrate and alarm limits.	Current value - no change.	Alarm, if DO as 'Qm Massflow Max' Or 'Qm Massflow Min' is configured.	Current value - no change.	Current value - no change.	Menu '...Group Masking'.
S044.001 / operation	Volume flowrate exceeds limits. Check flowrate and alarm limits.	Current value - no change.	Alarm, if DO as 'Qv Volumeflow Max' Or 'Qv Volumeflow Min' is configured.	Current value - no change.	Current value - no change.	Menu '...Group Masking'.
S041.034 / electronics	DC feedback regulation. Check conditions of application. Call service.	4 mA (0 % flow)	No Answer.	0 Hz	0 %	Menu '...Group Masking'.
M038.009 / electronics	Sensor memory defective. Mem. or connect. defective. Replace memory.	Current value - no change.	No Answer.	Current value - no change.	Current value - no change.	Menu '...Group Masking'.
M032.022 / Config.	Curr.Out 31 / 32 not calibrated. Call Service.					
M028.007 / Config.	Display value is < 1600 h at Qmax. Change mass Unit or vol. Unit for Totalizer.	Current value - no change.	No Answer.	Current value - no change.	Current value - no change.	Menu '...Group Masking'.
M026.004 / Config.	Maintenance interval is reached. Perform maintenance.					
M024.008 / Config.	Device not calibrated. Call Service.	High Alarm or Low Alarm, depending on parameter 'Curr.Out at Alarm'.	Current value - no change.	Current value - no change.	Current value - no change.	Menu '...Group Masking'.

... 8 Diagnosis / Diagnostic functions

diagnostic functions

Overview

Note

- To facilitate initial commissioning, the individual diagnosis options of the diagnostic functions are deactivated (factory default).
- Each diagnostic function (e.g. Empty Pipe or TFE electrode or Electrode Diagnostics) can be individually activated. Once activated, the empty pipe diagnostic function and partial filling function must be adjusted to the conditions on site, running an automatic adjustment.

Diagnostic Functions	
Standard	Empty pipe detection (EPD)
	Partial filling detection (TFE).
	Noise / grounding check
	Fingerprint verification
	Diagnosis Interval
	Transmitter Temperature

Detection of Empty Pipe

A completely filled meter tube is essential for an accurate measurement. The 'Empty Tube Detection' function detects an empty meter tube. In case of an alarm, the current output records the determined status in the menu 'Input/Output / ...Curr.Out 31/31 / Curr. at EPD Alarm' and the pulse output is stopped.

Pre-requisites using the functionality:

- Nominal diameter: > DN 10
- Conductivity of the measuring medium: > 20 µS/cm
- No pre-amplifier

Menu / parameter	**Description**
Diagnostics / ...Diagnosis Control / **...Empty Pipe Detector**	
Empty Pipe Detector On/Off	Activate the function.
Adjust EP	Automatic adjustment of the Empty Pipe function. Prior to starting, make sure that: • There is no flow • Sensor is completely filled
Manual Adjust EP.F	Manual adjustment of the Empty Pipe function.
Threshold	Manual fine trimming of the threshold.
Detector EP Value	Display of the current Empty Pipe Detector value. Above the Threshold, an alarm occurs, if configured.

Detection of partial filling

A partially filled sensor affects the flowmeter reading and the measuring accuracy.

If the flowmeter sensor is ordered with a full pipe detection electrode (named TFE Electrode), which is located at the Top of the sensor, the Transmitter's, Diagnosis TFE function enables for an alarm in case the sensor tube starts to become partially filled.

Pre-requisites using the functionality:

- Nominal diameter: > DN 50 (> 2")
- Integral Flowmeter
- Conductivity of the measuring medium: 20 to 20000 µS/cm

Installation conditions:

- The flowmeter sensor must be installed horizontally with the Transmitter head pointing upwards.

Setup

The detector must be adjusted to the measuring medium on site.

Menu / parameter	**Description**
Diagnostics / ...Diagnosis Control / **...Diagnosis TFE**	
TFE On/Off	Activate the function.
Start TFE Adjust	Automatic adjustment of the TFE function. Prior to starting, make sure that: • There is no flow • Sensor is completely filled
Manual TFE Adjust	Manual adjustment of the TFE function.
TFE Threshold	Manual fine adjustment of the switching threshold.
Actual TFE Value	Display of the current TFE value. Above the TFE threshold, an alarm occurs, if configured.

... 8 Diagnosis / Diagnostic functions

diagnostic functions

Monitoring the electrode status
Electrode diagnosis is a continuous monitoring of the measuring electrodes for short circuit or open electrodes. The electrode Impedance versus Ground is measured. This ensures total control of the measuring electrodes integrity.

Pre-requisites using the functionality:

- Nominal diameter: > DN 10
- Conductivity of the measuring medium:
  DN10-25 50µS/cm
  >DN25 20µS/cm

Menu / parameter	Description
Diagnostics / ...Diagnosis Control / **...Diagnosis Electrode**	
Electrode On/Off	Activate the Electrode diagnostic function. Default setting: Off.
Electrode Status	Indicates the Status of the Electrode. - Electrode short circuit or - Electrode open circuit (If fluid-conductivity is too low, this might trigger an 'Electrode open circuit' alarm)
Elec. Imp. E1-GND	Current impedance between electrode E1 and GND (ground potential).
Elec. Imp. E2-GND	Current impedance between electrode E2 and GND (ground potential).

Grounding/Noise Check
The function checks for noise in the measuring signal and the electrical grounding of the device. While the check is in progress, no flow measurement can take place.
The noise / grounding check is started manually and delivers a 'successful / failed' result.
The measurements (Power Spectrum, Amplitude 1 to 4 and Frequency 1 to 4) will help if the noise / grounding check fails.

Requirements for use:

- The sensor must be filled completely with measuring medium.
- There is no flow through the sensor (close all valves, shutoff devices etc.)
- The sensor must be grounded (see).
- There may not be any deposits on the measuring electrodes.

Menu / parameter	Description
Diagnostics / ...Diagnosis Control / **...Noise Check**	
Start Noise Check	Start of test
Result Noise Check	Test result
Power Spectrum	Current power spectrum.
Amplitude 1 Value ... 4	Display of the four strongest amplitudes of the frequency spectrum in µV with the associated frequency.
Frequency 1 ... 4	

Transmitter temperature monitoring
Monitoring the temperature of the electronic unit in the transmitter triggers an alarm via the digital output, if configured.
In the '...Diagnosis Values', the current temperature as well as the smallest and largest previously measured temperature is displayed.

Verification

Fingerprint database
The sensor and transmitter fingerprint stored in the SensorMemory allows you to compare the state of the device at the time of manufacture at the factory with the current state of the device at the customer site.

The check is started manually and returns a 'successful / failed' result.

If the verification is unsuccessful, troubleshooting information is shown on the display (parameter 'Rslt FP Verification').

A software tool (ABB Ability SRV500) is available for documentation and trend analysis.

Setup

Menu / parameter	Description
Diagnostics / ...Diagnosis Control / **...Fingerprints**	
Strt FP Verification	Start of test
Rslt FP Verification	Test result

9 Maintenance

Safety instructions

⚠ WARNING

Risk of injury due to live parts!
When the housing is open, contact protection is not provided and EMC protection is limited.
- Before opening the housing, switch off the power supply.

⚠ WARNING

Loss of Ex-approval!
Loss of Ex approval due to replacement of components in devices for use in potentially explosive atmospheres.
- Devices for use in potentially explosive atmospheres may be serviced and repaired by qualified ABB personnel only.
- For measuring devices for potentially explosive atmospheres, observe the relevant operator guidelines.

⚠ CAUTION

Risk of burns due to hot measuring media
The device surface temperature may exceed 70 °C (158 °F), depending on the measuring medium temperature!
- Before starting work on the device, make sure that it has cooled sufficiently.

NOTICE

Damage to components!
The electronic components of the printed circuit board can be damaged by static electricity (observe ESD guidelines).
- Make sure that the static electricity in your body is discharged before touching electronic components.

Corrective maintenance work may only be performed by trained personnel.
- Before removing the device, depressurize it along with any adjacent lines or vessels.
- Check whether hazardous materials have been used as measuring medium before opening the device. Residual amounts of hazardous material may still be present in the device and could escape when it is opened.

Within the scope of operator responsibility, check the following as part of a regular inspection:
- pressure-carrying walls / pressure equipment liner
- the measurement-related function
- the leak tightness
- the wear (corrosion)

Sensor

The flowmeter sensor is largely maintenance-free.
The following items should be checked annually:
- Ambient conditions (air circulation, humidity).
- Tightness of the process connections.
- Cable entries, cover gaskets and cover screws.
- Operational reliability of power supply, lightning protection and grounding.

The sensor electrodes must be cleaned when the flow rate information on the transmitter changes while recording the identical flow rate volume.
If the display shows a higher flowrate, the contamination is insulating. If a lower flowrate is displayed, the contamination results in a short-circuit.
For repairs to the liner, electrodes or magnet coil, the flowmeter must be returned to the manufacturer.
See **Returning devices** on page 149.

Cleaning

When cleaning the exterior of meters, make sure that the cleaning agent used does not corrode the housing surface and the seals.
To avoid static charge, a damp cloth must be used for cleaning.

10 Repair

Safety instructions

⚠ DANGER

Danger of explosion if the device is operated with the transmitter housing or terminal box open!
While using the device in potentially explosive atmospheres before opening the transmitter housing or the terminal box, note the following points:

- A valid fire permit must be present.
- Make sure that no flammable or hazardous atmospheres are present.

⚠ WARNING

Risk of injury due to live parts!
When the housing is open, contact protection is not provided and EMC protection is limited.

- Before opening the housing, switch off the power supply.

⚠ WARNING

Loss of Ex-approval!
Loss of Ex approval due to replacement of components in devices for use in potentially explosive atmospheres.

- Devices for use in potentially explosive atmospheres may be serviced and repaired by qualified ABB personnel only.
- For measuring devices for potentially explosive atmospheres, observe the relevant operator guidelines.

⚠ CAUTION

Risk of burns due to hot measuring media
The device surface temperature may exceed 70 °C (158 °F), depending on the measuring medium temperature!

- Before starting work on the device, make sure that it has cooled sufficiently.

NOTICE

Damage to components!
The electronic components of the printed circuit board can be damaged by static electricity (observe ESD guidelines).

- Make sure that the static electricity in your body is discharged before touching electronic components.

Spare parts

Repair and maintenance activities may only be performed by authorized customer service personnel.
When replacing or repairing individual components, use original spare parts.

Note

Spare parts can be ordered from ABB Service.
www.abb.com/contacts

...10 Repair

Replacing the sensor

⚠ WARNING

Risk of injury due to process conditions.
The process conditions, for example high pressures and temperatures, toxic and aggressive measuring media, can give rise to hazards when working on the device.

- Before working on the device, make sure that the process conditions do not pose any hazards.
- If necessary, wear suited personal protective equipment when working on the device.
- Depressurize and empty the device / piping, allow to cool and purge if necessary.

NOTICE

If the O-ring gasket is seated incorrectly or damaged, this may have an adverse effect on the housing protection class. Follow the instructions in **Opening and closing the housing** on page 21 to open and close the housing safely.

Note
The calibration and system data of the sensor is stored in the SensorMemory.
After powering-up the power supply, the transmitter automatically replicates the system data from the SensorMemory.

Replace the sensor as described below:

1. Switch off the power supply.
2. Unscrew / remove the cover.
3. Disconnect the signal cable (if necessary, remove the potting compound).
4. Install the new sensor in accordance with **Installation** on page 13.
5. Complete the electrical connection in accordance with **Electrical connections** on page 28.
6. Unscrew / set down the cover once again
7. After powering-up the power supply, the transmitter automatically replicates the system data from the SensorMemory.

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.
Fill out the return form (see **Return form** on page 160) and include this with the device.
In accordance with 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.).

Address for returns

Please contact Customer Center Service acc. to page 6 for nearest service location.

11 Recycling and disposal

Dismounting

⚠ WARNING

Risk of injury due to process conditions.
The process conditions, for example high pressures and temperatures, toxic and aggressive measuring media, can give rise to hazards when dismantling the device.

- If necessary, wear suited personal protective equipment during disassembly.
- Before disassembly, make sure that the process conditions do not pose any safety risks.
- Depressurize and empty the device / piping, allow to cool and purge if necessary.

Bear the following points in mind when dismantling the device:

- Switch off the power supply.
- Disconnect electrical connections.
- Allow the device / piping to cool and depressurize and empty. Collect any escaping medium and dispose of it in accordance with environmental guidelines.
- Use suited tools to disassemble the device, taking the weight of the device into consideration.
- If the device is to be used at another location, the device should preferably be packaged in its original packing so that it cannot be damaged.
- Observe the notices in **Returning devices** on page 149.

Disposal

Note



Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).
They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following points in mind when disposing of them:

- As of 8/15/2018, this product will be under the open scope of the WEEE Directive 2012/19/EU and relevant national laws (for example, ElektroG - Electrical Equipment Act - in Germany).
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, our Service can take care of its pick-up and disposal for a fee.

12 Specifications

FCC STATEMENT

Standard(s)
FCC CFR Title 47, Part 15,Subpart B
ANSI C63.4-2014
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note
The detailed device data sheet is available in the download area at www.abb.com/flow.

12.1 Permitted pipe vibration

In accordance with EN 60068-2-6.

Applicable to sensors in remote mount design and sensors in integral mount design.

- Maximum deflection: 0.15 mm (0.006 inch) in the 10 ... 58 Hz range
- Maximum acceleration: 2 g, in the 58 to 150 Hz range

12.2 Temperature data

Storage temperature range
-40 … 70 ° C (-40 … 158 ° F)

The temperature range offered by the device is dependent on a number of different factors.

These factors include the measuring medium temperature T_{medium}, the ambient temperature T_{amb}, the operating pressure P_{medium}, the liner material and the approvals for the explosion protection.

12.2.1 FEW620/FEP620Ambient temperature as a function of measuring mediumtemperature

Integral mount design

Liner material	Flange material	Ambient temperature range ($T_{amb.}$) Minimum	Ambient temperature range ($T_{amb.}$) Maximum	Measuring medium temperature range (T_{medium}) Minimum	Measuring medium temperature range (T_{medium}) Maximum
Rubber	Steel	–10 °C (14 °F)	60 °C (140 °F)	–5 °C (23 °F)[1)]	80 °C (176 °F)[1)]
Rubber	Stainless steel	–15 °C (5 °F)	60 °C (140 °F)	–5 °C (23 °F)[1)]	80 °C (176 °F)[1)]
PTFE	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	85 °C (185 °F)
		–10 °C (14 °F)	30 °C (86 °F)	–10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–25 °C (–13 °F)	85 °C (185 °F)
		–20 °C (–4 °F)	30 °C (86 °F)	–25 °C (–13 °F)	130 °C (266 °F)
PFA	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	85 °C (185 °F)
		–10 °C (14 °F)	30 °C (86 °F)	–10 °C (14 °F)	130 °C (266 °F)
PFA	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–25 °C (–13 °F)	85 °C (185 °F)
		–20 °C (–4 °F)	30 °C (86 °F)	–25 °C (–13 °F)	130 °C (266 °F)
ETFE	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	85 °C (185 °F)
		–10 °C (14 °F)	30 °C (86 °F)	–10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–25 °C (–13 °F)	85 °C (185 °F)
		–20 °C (–4 °F)	30 °C (86 °F)	–25 °C (–13 °F)	130 °C (266 °F)
Linatex*	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	70°C (158 °F)
Linatex*	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–20 °C (–4 °F)	70 °C (158 °F)

* Only for China production site

Remote mount design

Liner material	Flange material	Ambient temperature range (Tamb.) Minimum	Ambient temperature range (Tamb.) Maximum	Measuring medium temperature range (Tmedium) Minimum	Measuring medium temperature range (Tmedium) Maximum
Rubber	Steel	–10 °C (14 °F)	60 °C (140 °F)	–5 °C (23 °F)	80 °C (176 °F)
Rubber	Stainless steel	–15 °C (5 °F)	60 °C (140 °F)	–5 °C (23 °F)	80 °C (176 °F)
PTFE	Steel	–10 °C (14°F)	60 °C (140 °F)	–10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	–25 °C (–13 °F)	60 °C (140 °F)	–25 °C (–13 °F)	130 °C (266 °F)
PFA	Steel	–10 °C (14°F)	60 °C (140 °F)	–10 °C (14 °F)	130 °C (266 °F)
PFA	Stainless steel	–25 °C (–13 °F)	60 °C (140 °F)	–25 °C (–13 °F)	130 °C (266 °F)
ETFE	Steel	–10 °C (14°F)	60 °C (140 °F)	–10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	–25 °C (–13 °F)	60 °C (140 °F)	–25 °C (–13 °F)	130 °C (266 °F)
Linatex*	Steel	–10 °C (14 °F)	60 °C (140 °F)	–10 °C (14 °F)	70°C (158 °F)
Linatex*	Stainless steel	–20 °C (–4 °F)	60 °C (140 °F)	–20 °C (–4 °F)	70 °C (158 °F)

* Only for China production site

12.2.2 LVD information

Indoor or outdoor use	Outdoor
Altitude	Up to 2000m.
Temperature	-20°C to 60°C
Relative humidity	0% ~ 95%
MAINS supply voltage fluctuations	Up to ±10 % of the nominal voltage.
OVERVOLTAGE CATEGORY	II
WET LOCATION	Yes
POLLUTION DEGREE of the intended environment	2

...Flow sensor

Material load for ProcessMaster FEP620 process fittings

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

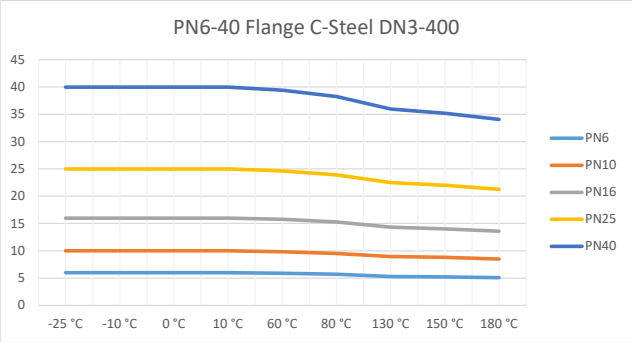
For further details on Material load, refer to the Product Datasheet DS_FEP620 for Processmaster FEP620 models or to Datasheet DS_FEW620 for ProcessMaster FEW620 models.

Minimum permissible operating pressure

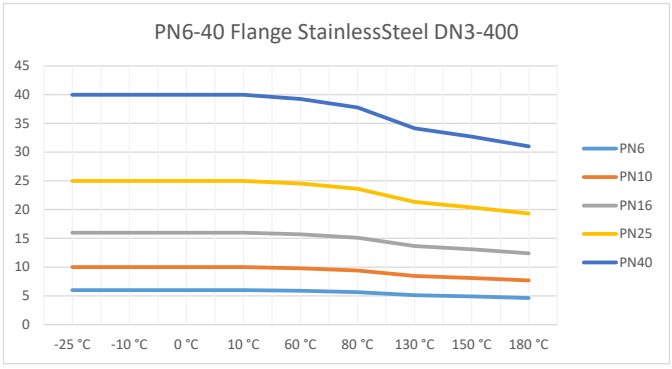
The following tables show the minimum permissible operating pressure (P_{medium}) depending on measuring medium temperature (T_{medium}) and the liner material.

Sensor

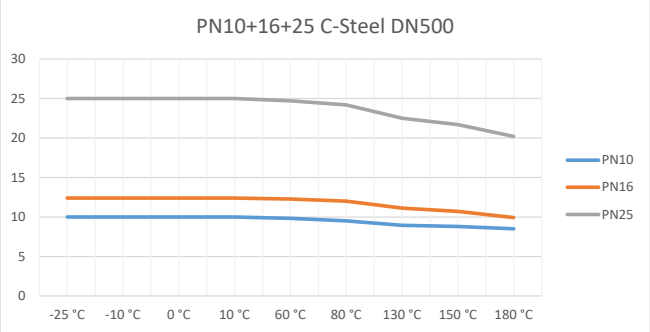
Liner material	Nominal diameter	Pmedium [mbar abs]	Tmedium 1)
Rubber	DN 15 …2000 (½ ...80 in)	0	< 80 °C (176 °F)2)
PTFE	DN 10 … 600 (⅜ … 24 in)	270 400 500	< 20 °C (68 °F) < 100 °C (212 °F) < 130 °C (266 °F)
PFA	DN 3 … 200 (1⁄10 … 8 in)	0	< 130 °C (266 °F)
ETFE	DN 25 … 600 (1 … 24 in)	100	< 130 °C (266 °F)
Linatex	DN 50 … 600 (6 … 24 in)	0	< 70 °C (158 °F)



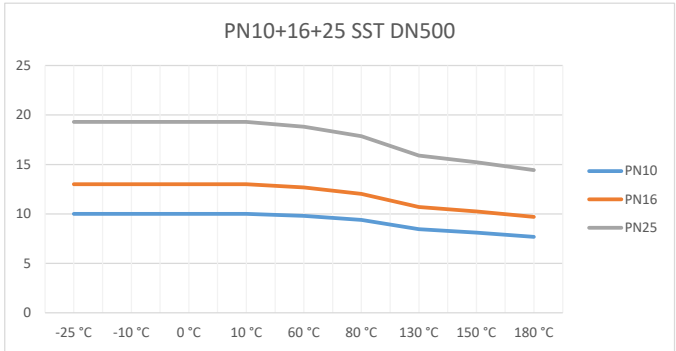
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)
Flange-Size: DN3-400 PN6-40
Sensor-Size:DN3-400



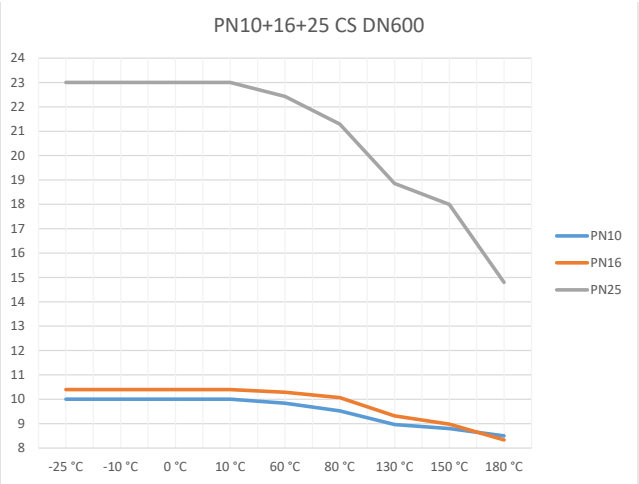
Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)
Flange-Size: DN3-400 PN6-40
Sensor-Size:DN3-400



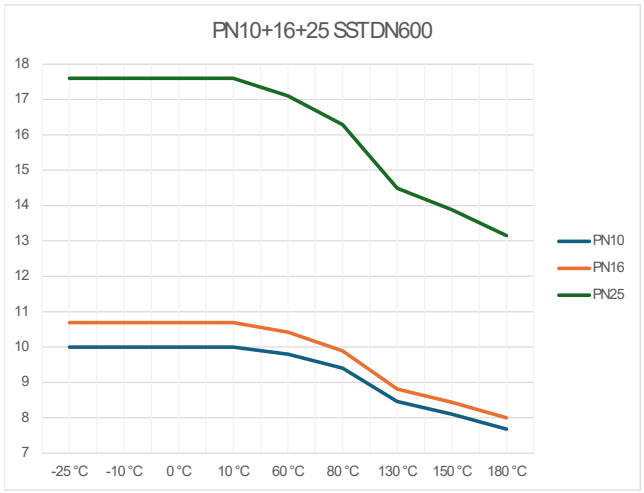
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)
Flange material: Carbon Steel Flange-Size: DN500



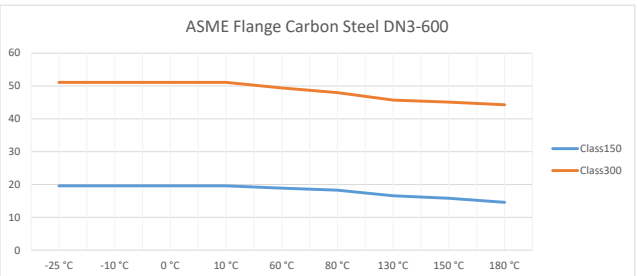
Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)
Flange material: Stainless Steel Flange-Size: DN500



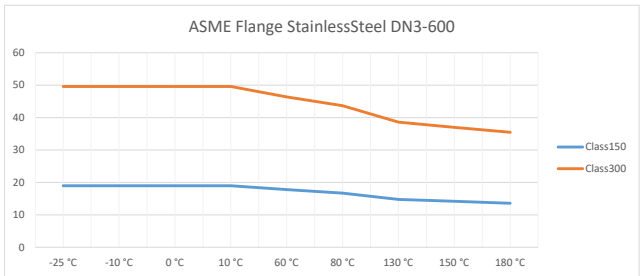
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)
Flange material: Carbon Steel Flange-Size: DN600



Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)
Flange material: Stainless Steel Flange-Size: DN600

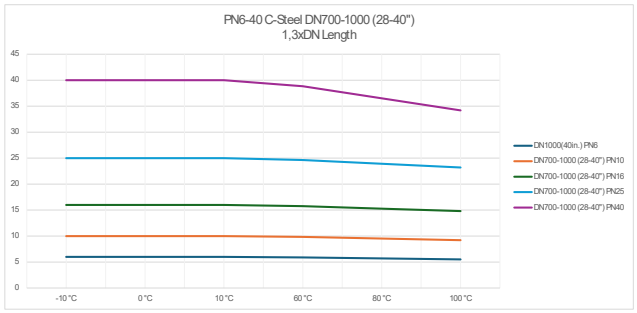


Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)
Flange-Size: 1/2"....24" ASME B16.5
Sensor-Size:DN3-600

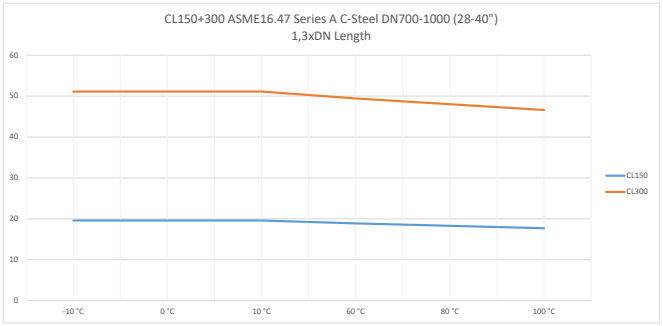


Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)
Flange-Size: 1/2"....24" ASME B16.5
Sensor-Size:DN3-600

1,3 x D Length, Carbon Steel Flange, DN700-1000

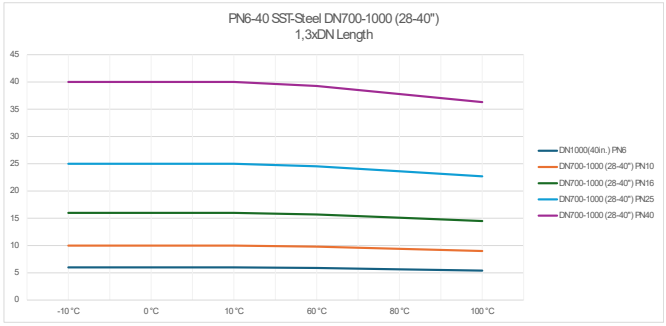


Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

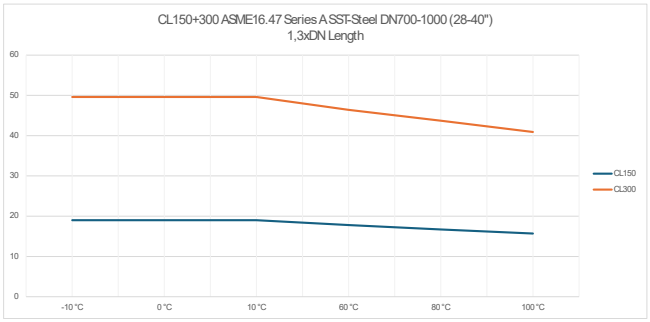


Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

1,3 x DN, Stainless Steel Flange, DN700-1000

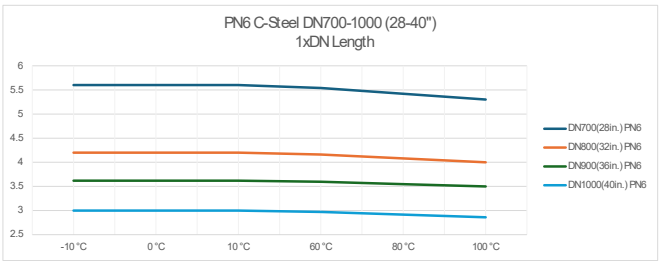


Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

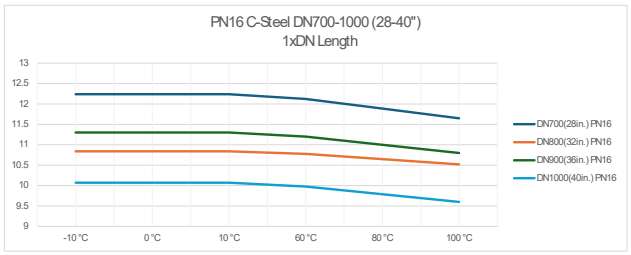


Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

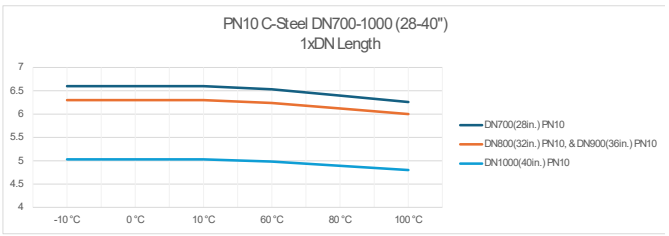
1 x D Length, Carbon Steel Flange, DN700-1000



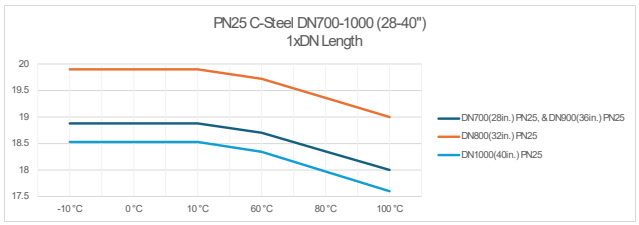
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)



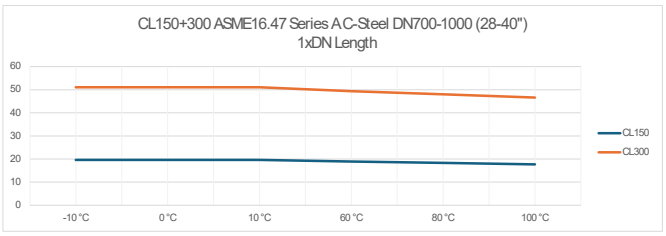
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)



Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

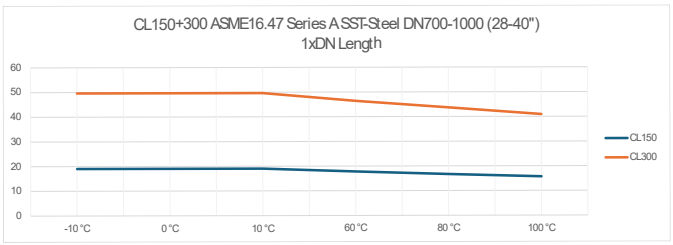


Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)



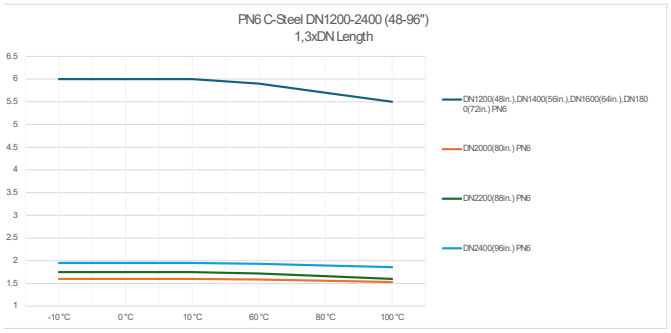
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

1 x D Length, Stainless Steel Flange, DN700-1000

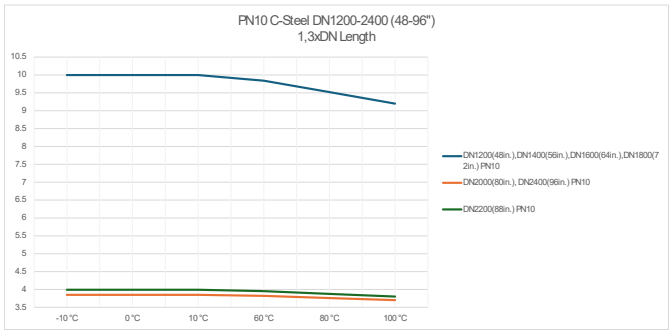


Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

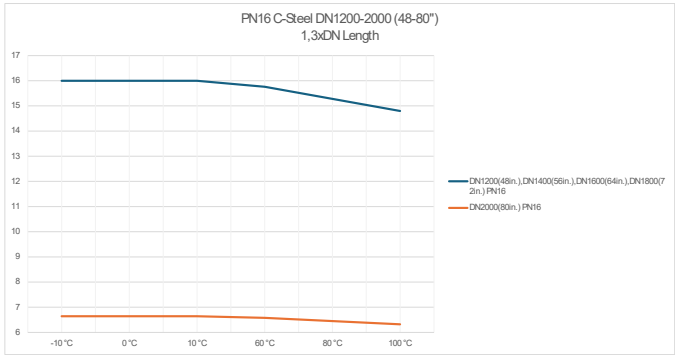
1,3 x D Length, Carbon Steel Flange, DN1200-2400 (48-96")



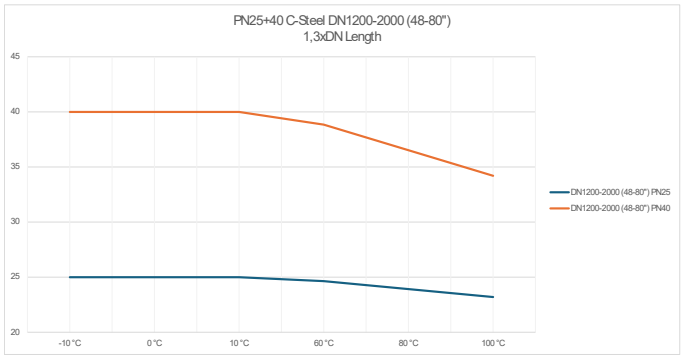
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)



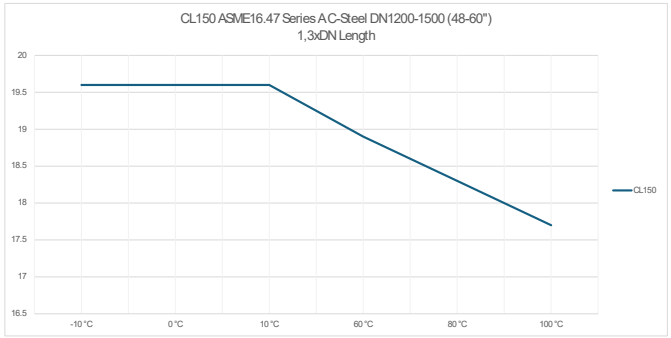
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)



Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

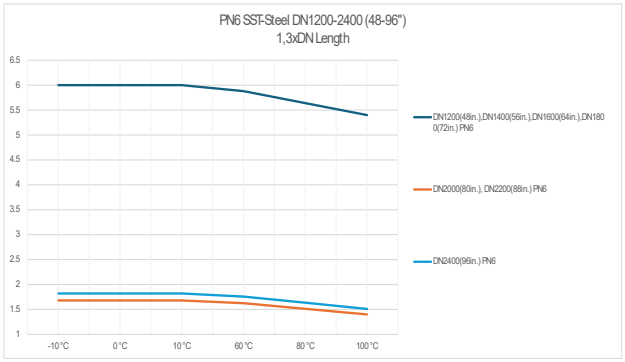


Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

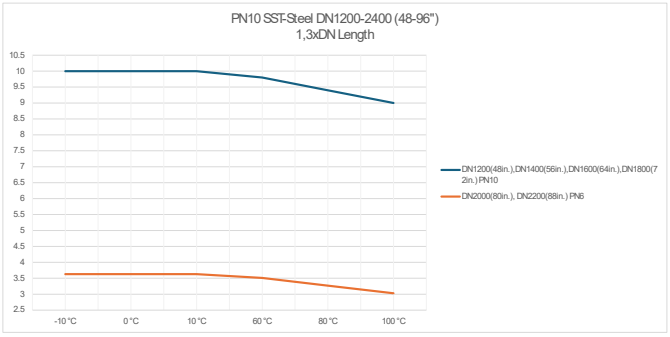


Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

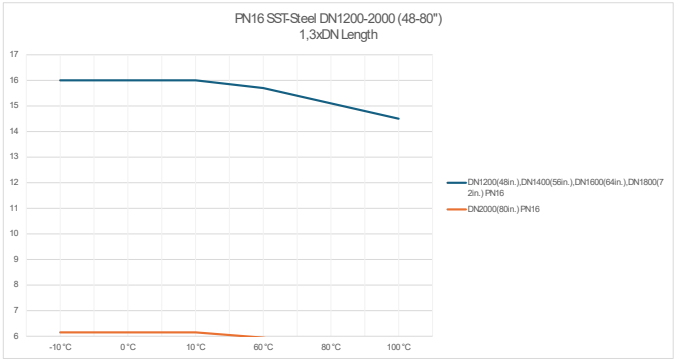
1,3 x D Length, Stainless Steel Flange, DN1200-2400 (48-96")



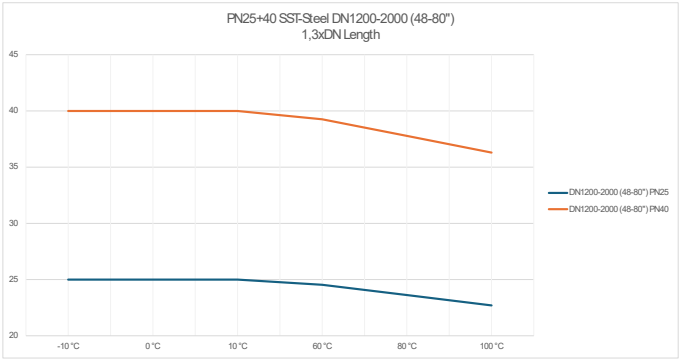
Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)



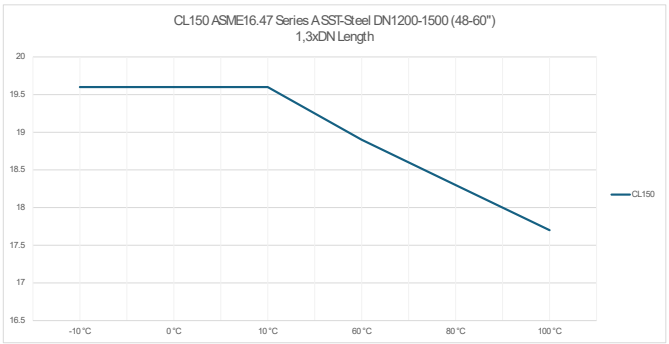
Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)



Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

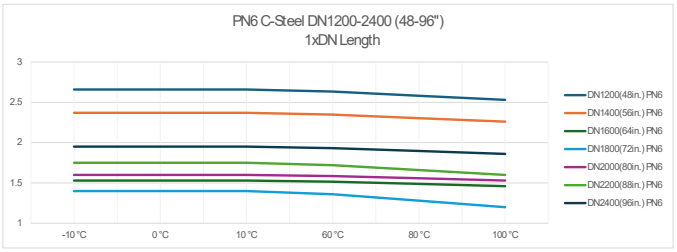


Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

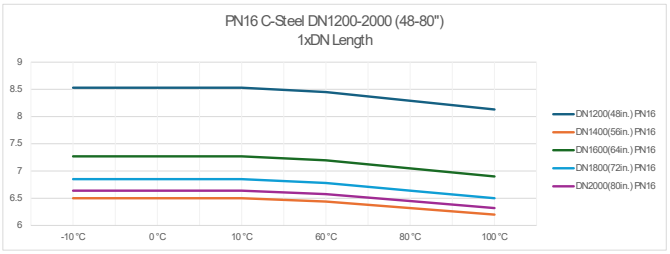


Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

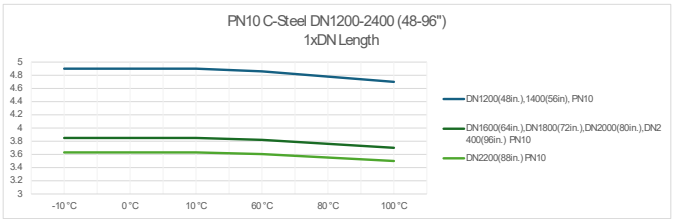
1 x D Length, Carbon Steel Flange, DN1200-2400



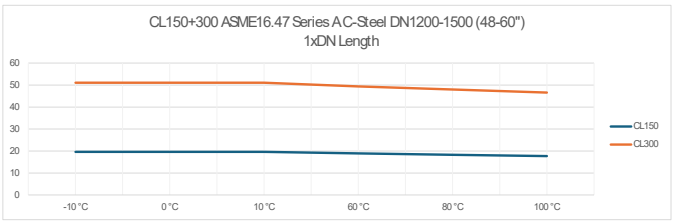
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)



Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

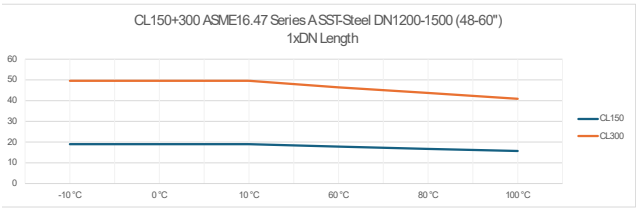


Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)



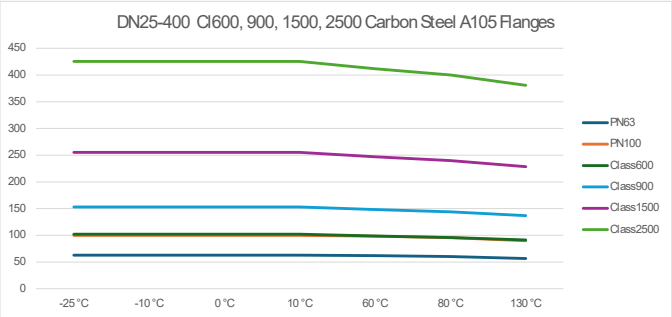
Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

1 x D Length, Stainless Steel Flange, DN1200-2400



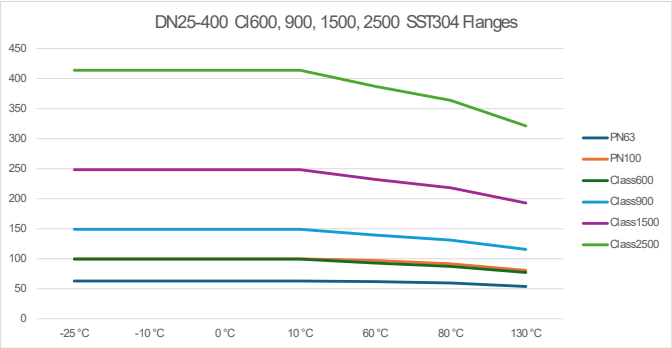
Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

DN25-400 Cl600, 900, 1500, 2500, PN63, PN100 Carbon Steel Flanges



Tube material: 1.4301 (304), Flange material: Carbon Steel 1.0460 (A105)

DN25-400 Cl600, 900, 1500, 2500, PN63, PN100 Stainless Steel Flanges



Tube material: 1.4301 (304), Flange material: Stainless Steel 1.4301 (304)

Flange-Size: DN25-400 Cl600, 900, 1500, 2500, PN63, PN100

Torque information

Note

The specified torques are valid only for greased threads and piping that is not subject to tensile stress.

The specified torque values are dependent on variables (temperature, bolt material, gasket material, lubricants, etc.) which are not within the control of the manufacturer.

Therefore the values should be regarded as indicative only.

ProcessMaster in flange design

Nominal diameter [mm (in)]	**Pressure rating**	**Maximum tightening torque [Nm]**					
		Hard / soft rubber		PTFE, PFA, ETFE		Ceramic carbide	
		**	***	**	***	**	***
DN 3 to 10* (1/10 to 3/8 in)*	PN40	–	–	12.43	12.43	–	–
	PN63/100	–	–	12.43	12.43	–	–
	CL150	–	–	12.98	12.98	–	–
	CL300	–	–	17.38	17.38	–	–
	JIS 10K	–	–	12.43	12.43	–	–
DN 15 (½ in)	PN40	6.74	4.29	14.68	14.68	–	–
	PN63/100	13.19	11.2	22.75	22.75	–	–
	CL150	3.65	3.65	12.98	12.98	–	–
	CL300	4.94	3.86	17.38	17.38	–	–
	CL600	9.73	9.73	–	–	–	–
	JIS 10K	2.84	1.37	14.68	14.68	–	–
DN 20 (¾ in)	PN40	9.78	7.27	20.75	20.75	–	–
	PN63/100	24.57	20.42	42.15	42.15	–	–
	CL150	5.29	5.29	18.49	18.49	–	–
	CL300	9.77	9.77	33.28	33.28	–	–
	CL600	15.99	15.99	–	–	–	–
	JIS 10K	4.1	1.88	20.75	20.75	–	–
DN 25 (1 in)	PN40	13.32	8.6	13.32	8.6	13.32	8.6
	PN63/100	32.09	31.42	53.85	53.85	53.85	53.85
	CL150	5.04	2.84	23.98	23.98	23.98	23.98
	CL300	17.31	16.42	65.98	38.91	65.98	38.91
	CL600	22.11	22.11	–	–	–	–
	JIS 10K	8.46	5.56	26.94	26.94	26.94	26.94
DN 32 (1 ¼ in)	PN40	27.5	15.01	45.08	12.43	45.08	45.08
	PN63/100	42.85	41.45	74.19	12.43	74.19	70.07
	CL150	4.59	1.98	29.44	12.98	29.44	29.44
	CL300	25.61	14.22	45.52	17.38	45.52	45.52
	CL600	34.09	34.09	–	–	–	–
	JIS 10K	9.62	4.9	12.43	12.43	45.08	45.08

* Connection flange DIN/EN 1092-1 = DN 10 (3/8 in), connection flange ASME = DN 15 (½ in)
** Flange material: steel.
*** Flange material: stainless steel.

...Torque information

Nominal diameter [mm (in)]	Pressure rating	Maximum tightening torque [Nm]					
		Hard / soft rubber		PTFE, PFA, ETFE		Ceramic carbide	
		**	***	**	***	**	***
DN 40 (1 ½ in)	PN40	30.44	23.71	56.06	56.06	56.06	56.06
	PN63/100	62.04	51.45	97.08	97.08	97.08	97.08
	CL150	5.82	2.88	36.12	36.12	36.12	36.12
	CL300	33.3	18.41	73.99	73.99	73.99	73.99
	CL600	23.08	23.08	–	–	–	–
	JIS 10K	12.49	6.85	56.06	56.06	56.06	56.06
DN 50 (1 ½ in)	PN40	41.26	27.24	71.45	71.45	71.45	71.45
	PN63	71.62	60.09	109.9	112.6	109.9	112.6
	CL150	22.33	22.33	66.22	62.22	66.22	62.22
	CL300	17.4	22.33	38.46	38.46	38.46	38.46
	CL600	35.03	35.03	–	–	–	–
	JIS 10K	17.27	10.47	71.45	71.45	71.45	71.45
DN 65 (2 ½ in)	PN16	14.94	8	37.02	39.1	37.02	39.1
	PN40	30.88	21.11	43.03	44.62	43.03	44.62
	PN63	57.89	51.5	81.66	75.72	81.66	75.72
	CL150	30.96	30.96	89.93	89.93	89.93	89.93
	CL300	38.38	27.04	61.21	61.21	61.21	61.21
	CL600	53.91	53.91	–	–	–	–
	JIS 10K	14.94	8	37.02	39.1	37.02	39.1
DN 80 (3 in)	PN40	38.3	26.04	51.9	53.59	51.9	53.59
	PN63	63.15	55.22	64.47	80.57	64.47	80.57
	CL150	19.46	19.46	104.6	104.6	104.6	104.6
	CL300	75.54	26.91	75.54	75.54	75.54	75.54
	CL600	84.63	84.63	–	–	–	–
	JIS 10K	16.26	9.65	45.07	47.16	45.07	47.16
DN 100 (4 in)	PN16	20.7	12.22	49.68	78.19	49.68	78.19
	PN40	67.77	47.12	78.24	78.19	78.24	78.19
	PN63	107.4	95.79	148.5	119.2	148.5	119.2
	CL150	17.41	7.82	76.2	76.2	76.2	76.2
	CL300	74.9	102.6	102.6	102.6	102.6	102.6
	CL600	147.1	147.1	–	–	–	–
	JIS 10K	20.7	12.22	49.68	78.19	49.68	78.19
DN 125 (5 in)	PN16	29.12	18.39	61.4	103.5	153.9	103.5
	PN40	108.5	75.81	123.7	224.8	312.1	224.8
	PN63	180.3	164.7	242.6	286	447.1	286
	CL150	24.96	11.05	98.08	230.4	237.3	230.4
	CL300	81.64	139.4	139.4	139.4	139.4	139.4
	CL600	244.1	244.1	–	–	–	–

** Flange material: steel.
*** Flange material: stainless steel.

Nominal diameter [mm (in)]	Pressure rating	Maximum tightening torque [Nm]					
		Hard / soft rubber		PTFE, PFA, ETFE		Ceramic carbide	
		**	***	**	***	**	***
DN 150 (6 in)	PN10	141.6	101.4	153.9	103.5	153.9	103.5
	PN16	319.7	245.4	312.1	224.8	312.1	224.8
	PN25	481.9	350.5	477.1	286	447.1	286
	CL150	212.5	116	237.3	230.4	237.3	230.4
	CL300	686.3	411.8	786.8	363.1	786.8	363.1
DN 200 (8 in)	PN10	224.7	164.8	238.7	149.1	238.7	149.1
	PN16	515.1	399.9	496.7	365.3	496.7	365.3
	PN25	826.2	600.3	750.7	539.2	750.7	539.2
	CL150	356.6	202.8	451.6	305.8	451.6	305.8
	CL300	1188	719	1376	587.4	1376	587.4
DN 700 (28 in)	PN10	267.7	204.9	On request	On request	267.7	587.4
	PN16	455.7	353.2	On request	On request	455.7	204.9
	PN25	905.9	709.2	On request	On request	905.9	353.2
	CL150	364.1	326.2	449.2	432.8	364.1	709.2
	CL300	1241	On request	On request	On request	1241	326.2
DN 750 (30 in)	CL150	423.8	380.9	493.3	442	423.8	On request
	CL300	1886	On request	On request	On request	1886	380.9
DN 800 (32 in)	PN10	391.7	304.2	On request	On request	391.7	On request
	PN16	646.4	511.8	On request	On request	646.4	304.2
	PN25	1358	1087	On request	On request	1358	511.8
	CL150	410.8	380.9	493.3	380.9	410.8	1087
	CL300	2187	On request	On request	On request	2187	380.9
DN 900 (36 in)	PN10	387.7	296.3	On request	On request	387.7	On request
	PN16	680.8	537.3	On request	On request	680.8	296.3
	PN25	1399	1119	On request	On request	1399	537.3
	CL150	336.2	394.6	511	458.5	336.2	1119
	CL300	1972	On request	On request	On request	1972	394.6
DN 1000 (40 in)	PN10	541.3	419.2	On request	On request	541.3	On request
	PN16	955.5	756.1	On request	On request	955.5	756.1
	PN25	2006	1612	On request	On request	2006	1612
	CL150	654.2	598.8	650.6	385.1	654.2	598.8
	CL300	2181	On request	On request	On request	2181	On request
DN 1100 (44 in)	CL150	749.1	682.6	741.3	345.9	-	-
	CL300	2607	On request	On request	On request	-	-
DN 1200 (48 in)	PN6	363.5	On request	-	-	-	-
	PN10	705.9	On request	-	-	-	-
	PN16	1464	On request	-	-	-	-
	CL150	815.3	731.6	-	-	-	-
	CL300	3300	On request	-	-	-	-

** FLANGE MATERIAL: STEEL.
*** FLANGE MATERIAL: STAINLESS STEEL.

...Torque information

Nominal diameter [mm (in)]	Pressure rating	Maximum tightening torque [Nm]					
		Hard / soft rubber		PTFE, PFA, ETFE		Ceramic carbide	
		**	***	**	***	**	***
DN 500 (20 in)	PN10	141.6	101.4	153.9	103.5	153.9	103.5
	PN16	319.7	245.4	312.1	224.8	312.1	224.8
	PN25	481.9	350.5	477.1	286	447.1	286
	CL150	212.5	116	237.3	230.4	237.3	230.4
	CL300	686.3	411.8	786.8	363.1	786.8	363.1
DN 600 (24 in)	PN10	224.7	164.8	238.7	149.1	238.7	149.1
	PN16	515.1	399.9	496.7	365.3	496.7	365.3
	PN25	826.2	600.3	750.7	539.2	750.7	539.2
	CL150	356.6	202.8	451.6	305.8	451.6	305.8
	CL300	1188	719	1376	587.4	1376	587.4
DN 700 (28 in)	PN10	267.7	204.9	On request	On request	267.7	587.4
	PN16	455.7	353.2	On request	On request	455.7	204.9
	PN25	905.9	709.2	On request	On request	905.9	353.2
	CL150	364.1	326.2	449.2	432.8	364.1	709.2
	CL300	1241	On request	On request	On request	1241	326.2
DN 750 (30 in)	CL150	423.8	380.9	493.3	442	423.8	On request
	CL300	1886	On request	On request	On request	1886	380.9
DN 800 (32 in)	PN10	391.7	304.2	On request	On request	391.7	On request
	PN16	646.4	511.8	On request	On request	646.4	304.2
	PN25	1358	1087	On request	On request	1358	511.8
	CL150	410.8	380.9	493.3	380.9	410.8	1087
	CL300	2187	On request	On request	On request	2187	380.9
DN 900 (36 in)	PN10	387.7	296.3	On request	On request	387.7	On request
	PN16	680.8	537.3	On request	On request	680.8	296.3
	PN25	1399	1119	On request	On request	1399	537.3
	CL150	336.2	394.6	511	458.5	336.2	1119
	CL300	1972	On request	On request	On request	1972	394.6
DN 1000 (40 in)	PN10	541.3	419.2	On request	On request	541.3	On request
	PN16	955.5	756.1	On request	On request	955.5	756.1
	PN25	2006	1612	On request	On request	2006	1612
	CL150	654.2	598.8	650.6	385.1	654.2	598.8
	CL300	2181	On request	On request	On request	2181	On request
DN 1100 (44 in)	CL150	749.1	682.6	741.3	345.9	-	-
	CL300	2607	On request	On request	On request	-	-
DN 1200 (48 in)	PN6	363.5	On request	-	-	-	-
	PN10	705.9	On request	-	-	-	-
	PN16	1464	On request	-	-	-	-
	CL150	815.3	731.6	-	-	-	-
	CL300	3300	On request	-	-	-	-

** FLANGE MATERIAL: STEEL.
*** FLANGE MATERIAL: STAINLESS STEEL.

Nominal diameter [mm (in)]	Pressure rating	Maximum tightening torque [Nm]					
		Hard / soft rubber		PTFE, PFA, ETFE		Ceramic carbide	
		**	***	**	***	**	***
DN 1350 (54 in)	CL150	1036	983.7	-	-	-	-
	CL300	5624	On request	-	-	-	-
DN 1400 (56 in)	PN6	515	On request	-	-	-	-
	PN10	956.3	On request	-	-	-	-
	PN16	1558	On request	-	-	-	-
DN 1500 (60 in)	CL150	1284	1166	-	-	-	-
	CL300	6139	On request	-	-	-	-
DN 1600 (64 in)	PN6	570.7	On request	-	-	-	-
	PN10	1215	On request	-	-	-	-
	PN16	2171	On request	-	-	-	-
DN 1800 (72 in)	PN6	708.2	On request	-	-	-	-
	PN10	1492	On request	-	-	-	-
	PN16	2398	On request	-	-	-	-
DN 2000 (80 in)	PN6	857.9	On request	-	-	-	-
	PN10	1840	On request	-	-	-	-
	PN16	2860	On request	-	-	-	-

** FLANGE MATERIAL: STEEL.
*** FLANGE MATERIAL: STAINLESS STEEL.

13 Additional documents

Note

- An additional document with Ex safety instructions is available for measuring systems that are used in potentially explosive atmospheres.
- Ex safety instructions are an integral part of this manual. As a result, it is crucial that the installation guidelines and connection values it lists are also observed.
  The icon on the name plate indicates the following:



- For further details on Sensor Material load, refer to the Product Datasheet DS_FEP620 for Processmaster FEP620 models or to Datasheet DS_FEW620 for ProcessMaster FEW620 models

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

Trademarks

HART is a registered trademark of FieldComm Group, Austin, Texas, USA
Hastelloy is a registered trademark of Haynes International, Inc.
Modbus is a registered trademark of Schneider Automation Inc.

14 Appendix

Return form

Statement on the contamination of devices and components

Repair and/or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.
Otherwise, the device/component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:	
Address:	
Contact person:	Telephone:
Fax:	Email:

Device details:

Type:	Serial no.:
Reason for the return/description of the defect:	

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items):

☐ biological	☐ corrosive / irritating	☐ combustible (highly / extremely combustible)
☐ toxic	☐ explosive	☐ other toxic substances
☐ radioactive		

Which substances have come into contact with the device?

1.

2.

3.

We hereby state that the devices/components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date	Signature and company stamp

Statement form for repair

Statement on the contamination of devices and components

Repair and/or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.

Otherwise, the device/component returned may be rejected. This statement form may only be completed and signed by specialist personnel authorized by the operator.

Customer details:

Company:

Address:

Contact person: Telephone:

Fax: E-Mail:

Device details:

Model: Serial no.:

Reason for the return/description of the defect:

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items)?

☐ Biological ☐ Corrosive / irritating ☐ Combustible (highly/extremely combustible)

☐ Toxic ☐ Explosive ☐ Other toxic substances

☐ Radioactive

Which substances have come into contact with the device?

1

2

3

We hereby state that the devices/components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date Signature and company stamp

Declarations of conformity

Note

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

Notes

ABB Measurement & Analytics

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

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

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

© 2026 ABB

3KXF242601R4201

OI/FEx620-EN REV. E 2026.03