Operating Instruction

D184B104U02

Electromagnetic Flowmeter FXT4000 (COPA-XT) in a 2-Wire Design with Pulsed DC Magnetic Field

Valid for Software Versions from A.1X

HART® FIELD COMMUNICATIONS PROTOCOL

ABB

Product Designation
FXT4000

Operating Instruction

Part No. D184B104U02

Issue date: 07.05
Revision: 03

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Specifications

Electromagnetic Flowmeter in a 2-Wire Design with Pulsed DC Magnetic Field Technology in a Compact Design FXT4000 see Data Sheet Part No. D184S043U02

1 Safety Information

1.1 Basic Safety Requirements

1.1.1 Safety Standards for the Instrument

- This instrument satisfies the safety requirements defined in the Pressure Vessel Directive and is designed using the latest state of the art technology. It was tested at the factory based on the safety requirements and was shipped in proper working order. In order to maintain this condition over the expected life of the instrument the requirements described in this Operation Manual must be observed and followed.
- The instrument satisfies the EMC-Requirements in EN61326 / NAMUR NE21.
- All instrument parameters are securely stored in an NVRAM when the power is turned off. The instrument is immediately operational once the power is turned on again.

1.1.2 Regulated Usage

This instrument is designed to

measure during the transport of electrically conductive liquids, slurries and sludges the:

- the actual volume flowrate
- the mass flowrate (at constant pressure / temperature) when the mass units parameter is selected

Included in the Regulate Usage requirements are:

- installation compatible with the specified technical limits
- observing and following the instructions in the Operation Manual
- observing and following the information in the accompanying documents (Specification Sheet, Diagrams, Dimension Drawings)

The following uses of the instrument are prohibited:

- installation as an elastic compensation piece in a pipeline, e.g. to compensate for pipeline misalignment, pipeline vibrations, pipeline expansions, etc.
- use as a step ladder, e.g. for assembly purposes
- use as a support for external loads, e.g. as a bracket for pipeline etc.
- addition of materials or parts by painting over the Factory Plate, welding or soldering
- removal of material, e.g. drilling into housing
- repairs, modifications and additions and the use of replacement parts is only permitted using the procedures described in this Operation Manual. Additional tasks must be approved by ABB. **Excepted are repairs made in facilities authorized by us.** We accept no liability for unauthorized tasks.

The operation, service and maintenance requirements in this Operation Manual must be observed. The manufacturer assumes no responsibility for damages resulting from improper or prohibited use.

1.1.3 Specification Limits

The instrument is designed exclusively for use within the specifications listed on the Type Plate and in the Operation Manual. The following limits must be observed:

- the allowable pressure (PS) and the allowable fluid temperature (TS) may not exceed the pressure/temperature values (p/T-Ratings) listed in the Operation Manual.
- the maximum operating temperature per the instrument Specifications may not be exceeded.
- the allowable ambient temperature per the instrument Specifications may not be exceeded.
- housing Protection Class IP67 per EN60529
- graphite may not be used on the gaskets because, under certain circumstances, it may cause an electrically conductive layer to form on the inside of the flowmeter.

- the flowmeter primary may not be operated in the vicinity of strong electromagnetic fields, e.g., motors, pumps, transformers, etc. A minimum spacing of approx. 100 cm should be maintained. For installation on or to steel parts (e.g. steel brackets) a minimum spacing of approx. 100 cm should be maintained. (Values were established using IEC801-2 or IEC TC 77B (SEC 101) as a guide).

1.1.4 Allowable Fluids

- Only such fluids (liquids) may be metered for which assurance is available, either from technical information or operational experience of the user, that the chemical and physical properties of the fluid wetted parts in the flowmeter, signal and or grounding electrodes, liner materials, connection fittings and grounding plates if used, will not be adversely affected during the **expected life** of the flowmeter.
- Fluids (liquids) with unknown or abrasive properties may only be metered if the user performs periodic inspections to assure that the safety parameters of the flowmeter have not been compromised.
- The specifications on the Factory Plate are to be observed.

1.1.5 Safety Marks, Symbols, Type and Factory Tags and CE-Mark

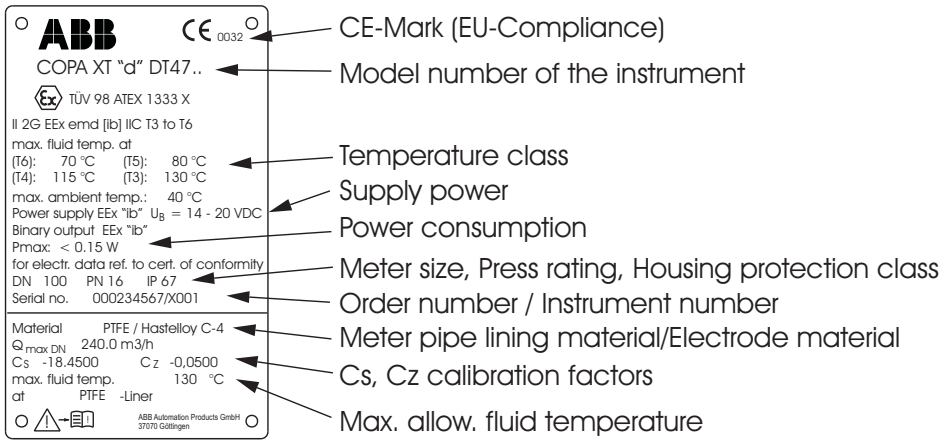
All safety marks, symbols and the factory and type tags should be maintained in a readable state and protected from damage or loss. Note the following generalized information:

	**Warning!**	Warning indicates attention must be given because of possible hazards to personnel, which may result in serious injury or even death.
	**Caution!**	Attention indicates a possible damaging situation. If it is not avoided, the product or something in its environment could be damaged.
	**Important!**	The symbol „Important“ indicates user tips or other particularly important information which, if ignored, may result in loss of operating ease or lead to improper functioning of the instrument.
	**CE-Mark**	The CE-Mark symbolizes the compliance of the instrument with the following guidelines and the fulfillment of the their basic safety requirements: • CE-Mark on the Type Plate (on the converter) – Compliance with the EMC-Guideline 89/336/EWG – Compliance with the Low Voltage Guideline 73/23/EWG • CE-Mark on Factory Plate (on the flowmeter primary) – Compliance with the **P**ressure **E**quipment **D**irective (PED/DGRL) 97/23/EU Pressure instruments do not have a CE-Mark on the Factory Plate if: – the max. allowable pressure (PS) is less than 0.5 bar. – due to minimum pressure risks (meter sizes ≤ DN 25 [1"]) a certification procedure is not required.
	**Ex-Protection**	This symbol indicates instruments with Ex-Protection. For installations in Ex-Areas observe the applicable requirements in the Chapter „Ex-Protection“.

1.1.6 Type and Factory Tags

1.1.6.1 Type Tag Specifications

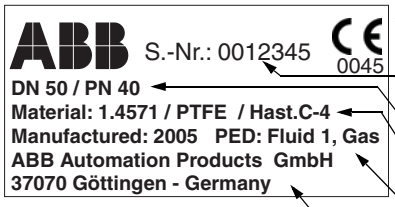
The type tag is located on the converter housing.



1.1.6.2 Factory Tag Specifications

The Factory Plate is mounted on the housing of the flowmeter primary. If the pressure vessel (instrument) is within the applicability range of PED/DGRL (see also Art. 3 Sect. 3 PED/DGRL 97/23/EU) a different Factory Plate is used than if it is outside of this range:

a) Pressure Equipment within the Applicability Range of PED/DGRL



The factory tag contains the following specifications:

- CE-Mark (with the number identifying the testing agency) to certify compliance of the instrument with the requirements of the Pressure Equipment Directive 97/23/EU.
- Serial number provided by the manufacturer to identify the pressure equipment.
- Meter size and pressure rating of the pressure equipment
- Flange, liner and electrode materials (fluid wetted).
- Year of manufacture of the pressure equipment and specification of the Fluid Group per PED/DGRL (**P**ressure **E**quipment **D**irective) Fluid Group 1 = hazardous liquids, gases
- Manufacturer of the pressure equipment.

b) Pressure Equipment not within the Applicability Range of PED/DGRL

The factory tag includes essentially the same specifications as the one described in a) above with the following differences:

- There is no CE-Mark for the pressure equipment per Sect. 3 Par. 3 of the PED/DGRL because the pressure equipment is not within the applicability range of the Pressure Equipment Directive 97/23/EU.
- In the PED the basis for the exception is given in Sect. 3 Par. 3 of the PED/DGRL. The pressure equipment is categorized under the section SEP (=**S**ound **E**ngineering **P**ractice).

1.1.7 Qualification of the Personnel

- The electrical installation, start-up and maintenance of the instrument should only be carried out by trained personnel authorized by the system operator. The personnel must read and understand the Operation Manual and follow its instructions.

1.1.8 Responsibilities of the Operator

- Before metering corrosive or abrasive fluids the operator must evaluate the resistance of the fluid wetted parts. ABB will gladly provide assistance in their selection, but cannot assume any liability.
- Observe the national standards in your country applicable to testing the operation, repair and maintenance of electrical instruments.

1.1.9 Possible Dangers When Transporting the Instruments

Note when transporting the instrument to the installation site:

- the center of gravity may be off-center.
- the protection plates or caps mounted on the process connections for PTFE/PFA lined meters should only be removed just prior to installing the instrument in the pipeline.
- care must be exercised to assure that the liner is not cut off or damaged during installation to avoid leaks.

1.1.10 Possible Dangers During Installation

Before installing assure that:

- the flow direction corresponds with the arrow on the instrument, if present.
- the maximum torque vales are observed for all flange bolts.
- the instrument is installed in a stress free manner (torsion, bending), flanged and wafer design instruments are installed with axisymmetric, parallel mating flanges and gaskets are used that are suitable for the anticipated operating conditions.

1.1.11 Possible Dangers During Electrical Installation

The electrical installation is to be completed only by authorized trained personnel in accordance with the Interconnection Diagrams.

- In particular observe the information regarding the electrical connections in this Operation Manual, otherwise the electrical protection type may be adversely affected.
- Ground the flowmeter system.

Caution!

When the housing cover is removed the Ex-, EMC- and personnel contact protections are voided.

- Within the instrument there are circuits which are dangerous to touch. Therefore, before opening the housing cover the power should be turned off and not opened for at least 2 minutes.
- Installation and maintenance tasks should only be carried out by trained personnel.
- In the Ex-Areas special requirements apply for connecting the supply power, signals, outputs and ground. Follow these special requirements for Ex-Protection.

1.1.12 Possible Dangers During Normal Operation

- When metering hot fluids, touching the flowmeter primary surface could result in burns
- Aggressive or corrosive fluids can cause damage to the liner or electrodes. Fluids under pressure could leak.
- Fatigue of the flange connection gaskets may result in fluid leakage when the system is pressurized.
- The internal flat gaskets in Model DE27 can become brittle due to CIP/SIP processes.

1.1.13 Possible Dangers During Inspection and Maintenance

- Prior to removing the instrument from the pipeline, assure that the instrument and the pipeline or reservoir are depressurized.
- Before opening the instrument, ascertain whether hazardous material had been present in the flowmeter. Hazardous residues may still be present in the flowmeter and exit when it is opened.
- It is recommended that the flange bolts and nuts be secured when pipeline vibrations are present.
- Within the framework user responsibilities a periodic inspection should conducted to check:
  - the pressure retaining walls/liners of the pressure vessel (instrument)
  - its mechanical operation
  - its seals
  - for wear (corrosion)

1.1.14 Returns

- If it is necessary to return the instrument for repair or recalibration to the ABB factory in Goettingen, Germany, use the original packaging material or a suitably protective packing material. Please indicate the reason for the return.

Information! EU-Hazardous Material Directives

The owner of special wastes is responsible for its decontamination and must satisfy the following requirements before shipping the materials:

- All flowmeter primaries and/or flowmeter converters which are returned to ABB for repair are to be free of any hazardous materials (acids, bases, solvents, etc.). This includes flushing and decontaminating the hazardous materials which may be present in the cavities in the primaries between the meter pipe and the housing. Written confirmation that these measures have been carried out should accompany the flowmeter.
- If the user cannot completely remove the hazardous materials, then appropriate documents should accompany the shipment acknowledging this condition. Any costs incurred by ABB to remove and decontaminate the hazardous materials during the repair will be billed to the owner of the instrument.

2 Principle of Operation, Flowmeter Primary and Converter Coordination

2.1 Principle of Operation

The ABB Automation Products electromagnetic flowmeters are the ideal instruments for metering the flowrate of liquids, slurries and sludges with a specific minimum electrical conductivity. These flowmeters measure accurately, produce no additional pressure drop, contain no moving or protruding parts, are wear and corrosion resistant. They can be installed in any existing installation without difficulty.

The ABB Automation Products “EMF” has proven itself over many years and is the preferred flowmeter in the chemical industry, the pharmaceutical and cosmetic industries, municipal water and waste water treatment facilities and in the food and paper industries.

2.2 Measurement Principle

Faraday’s Laws of Induction form the basis for the electromagnetic flowmeter. A voltage is generated in a conductor when it moves through a magnetic field.

This principle is applied to a conductive fluid which flows through the metering tube perpendicular to the direction of the magnetic field, see schematic.

$$U_E \sim B \cdot D \cdot v$$

The voltage induced in the fluid is measured by two electrodes located diametrically opposite to each other. This flow signal voltage $\mathbf{U_E}$ is proportional to the magnetic induction **B**, the electrode spacing **D** and the average flow velocity **v**. Noting that the magnetic induction **B** and the electrode spacing **D** are constant values indicates that a proportionality exists between the flow signal voltage $\mathbf{U_E}$ and the average flow velocity **v**. From the equation for calculating the volume flow rate *) it follows that $\mathbf{U_E} \sim \mathbf{q_v}$, that is, the flow signal voltage $\mathbf{U_E}$ is linear and proportional to the volumetric flow rate.

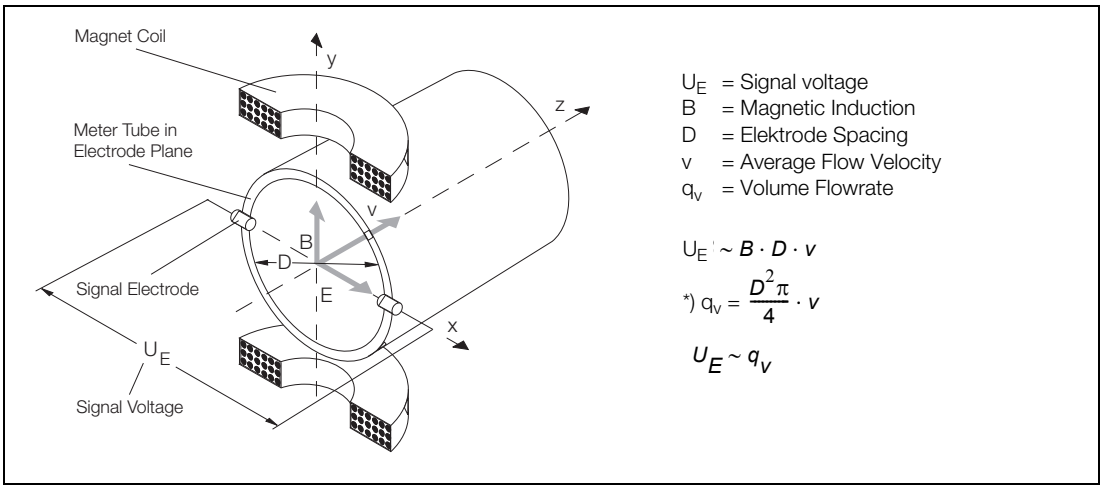


Fig. 1: Electromagnetic Flowmeter Schematic

2.3 Design

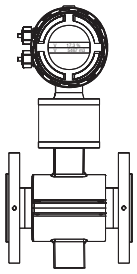
An electromagnetic flowmeter system always consists of a flowmeter primary and a converter. In the Compact Design the flowmeter primary and the converter constitute a single entity. This feature coupled with the 2-Wire technology in which the supply power and the outputs are carried on the same cable results in appreciably lower installation expenses than for the conventional instruments.

2.4 Flowmeter Primary and Converter Coordination

Compact-Design FXT4000 (COPA-XT)

The μP-converter and the flowmeter primary constitute a single mechanical entity.

Model:
Metering System DT47F



Flange

Ex-Area Zone 1

2.5 Data Security

All data is stored in a FRAM when the power is turned off or a power interruption occurs. The parameter settings, process information and flowmeter primary specific calibration data are stored in a serial EEPROM as well as in an external EEPROM. Therefore, when an electronic module and its data module are exchanged all the stored data can be uploaded upon demand.

Important Start-Up Information!

Data Storage Module (external EEPROM)

The converter is shipped with its appropriate EEPROM installed in the socket on the converter display plate. Please check that the correct coordination is maintained between the flowmeter primary and the converter. The converters are identified by the end numbers, X001, X002 etc. listed on the converter Instrument Tag and in addition, the Order Number is noted on the memory module.

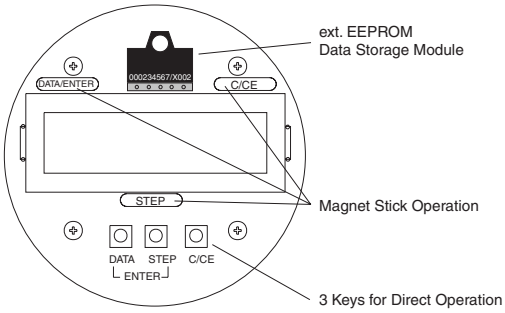


Fig. 2: Converter Keypad and Display

Notice!
Information for opening the housing

The following steps must be followed when the housing of the converter is to be opened:

- All connections leads must be potential free.
- When the housing is open the EMC-, the personnel contact- and the Ex-Protections are voided.
- Wait at least 2 minutes after to supply power is turned off before opening the housing.
- Before the housing is opened the security closures are to be loosened.

2.5.1 Display Rotation

Unscrew the cover. The display board is mounted using 4 Phillips head screws.

After the screws have been removed the display can be removed. The rotated display is to be carefully plugged into its new location and the 4 screws reinstalled. Replace the housing cover and carefully tighten and re-engage the security closures. Check that the gaskets are properly seated. Only then will the Protection Class be maintained.

Ex-Design and Identification

When connecting an Ex-Design converter to a Transmitter Power Suppy with Intrinsically Safe (ground free) or Non-Intrinsically Safe circuits,its applicability can be determied by the following identifying attributes.

Instrument Tag

The identification on the Instrument Tag is a function of the design: Ex-Specification EEx “ib” or “e”.

Cable Connectors

The cable connector is blue for EEx “ib” or black for EEx “e”.

Identification of the Converter

An Instruction Tag is located on the converter indicating whether the converter is designed for EEx “ib” or for EEx “e”. In addition, a sticker on the converter indicates the software revision level, see Fig. 31 (9.2).

2.6 Accuracy

Reference Conditions per EN 29104:
Fluid temperature

20 °C ± 2K

Ambient temperature

20 °C ± 2K

Supply Power

Nominal voltage 24 V ± 1 % and
Frequency f ± 1 %

Installation Requirements

Upstream > 10 x DN straight pipe section,
Downstream > 5 x DN straight pipe section
DN = flowmeter primary size

Warm Up Time

30 min

Standard Calibration (Current output)
$Q > 0{,}2\ Q_{max\ DN} \pm 1$ % of rate
$Q < 0{,}2\ Q_{max\ DN} \pm 0{,}001\ Q_{max\ DN}$

$Q_{max\ DN}$ = maximum flowrate for the meter size at 10 m/s

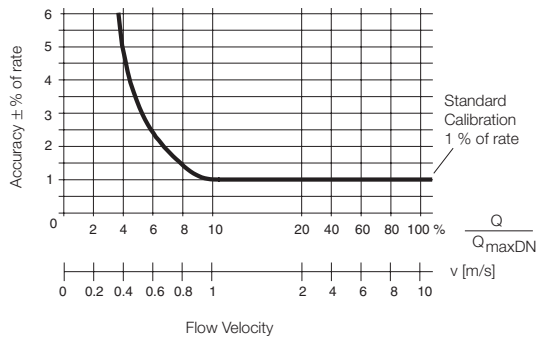


Fig. 3: Flowmeter System Accuracy FXT4000

3 Assembly and Installation

3.1 Inspection

Before installing the electromagnetic flowmeter system, check for mechanical damage due to possible mishandling during shipment. All claims for damage are to be made promptly to the shipper before installing the flowmeter.

3.2 Transport General

Beachten Sie beim Transport des Gerätes zur Messstelle:

- that the center of gravity may be off-center.
- the protection plates or caps mounted on the process connections for PTFE/PFA lined flowmeters should only be removed immediately prior to installation.
- care must be exercised to assure that the liner on the flanges is not cut or damaged in order to prevent possible leaks.
- flanged flowmeters may not be lifted by the converter housing or the connection box.
- when transporting flanged flowmeters ≤ DN 100 [4"], use a sling around the exposed meter pipe at both ends (Fig. 4). Chains should be avoided, they could damage the instrument.

Warning!

The center of gravity of the complete instrument may be higher than the lifting straps. Possible injury may result if the instrument slips or rotates! Care should be exercised to assure that the instrument cannot rotate or slip during transport.

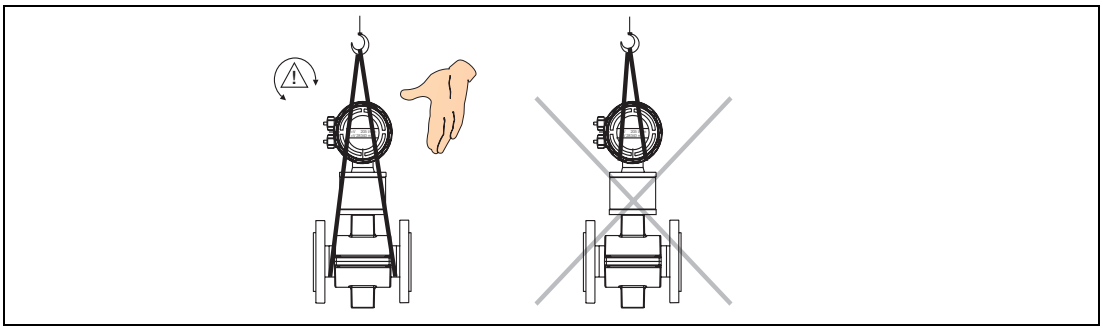


Fig. 4: Transport of Flanged Flowmeters ≤ DN 100 [4"]

3.2.1 Recommended Installation Conditions

The flowmeter primary should not be installed in the vicinity of strong electromagnetic fields.

The electromagnetic flowmeter primary must be installed so that the metering tube is always filled with fluid. Valves or other shut off devices should be installed downstream from the EMF so that the flowmeter primary cannot drain. A slight upward slope of approx. 3 % is desirable to prevent gas build up in the flowmeter (Fig. 5).

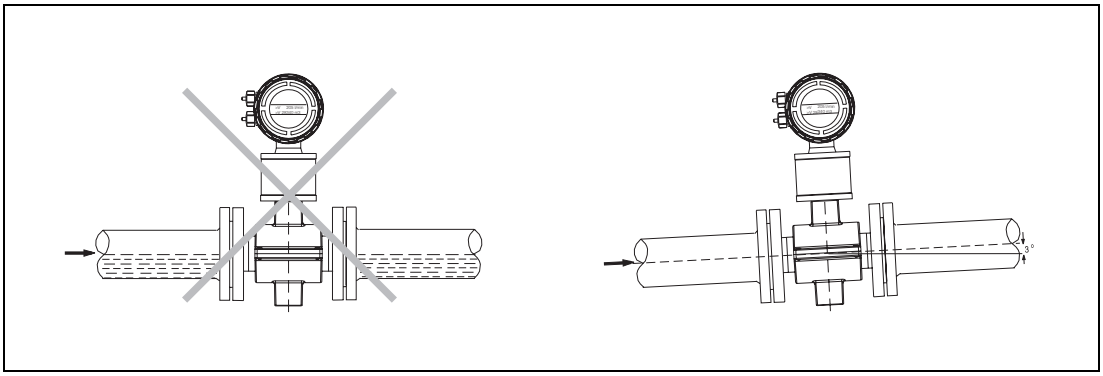


Fig. 5:

Vertical installations are ideal when the fluid flows in an upward direction. Installations in drop lines, i.e. the fluid flows from the top to the bottom are to be avoided because experience has shown that it is not possible to guarantee that the pipeline will always remain full and that an equilibrium condition between the upward flowing gas and the downward flowing liquid will not occur (Fig. 6).

The flowmeter primary should normally be installed so that the electrical connectors (Pg) point downward (Fig. 6 &. Fig. 8).

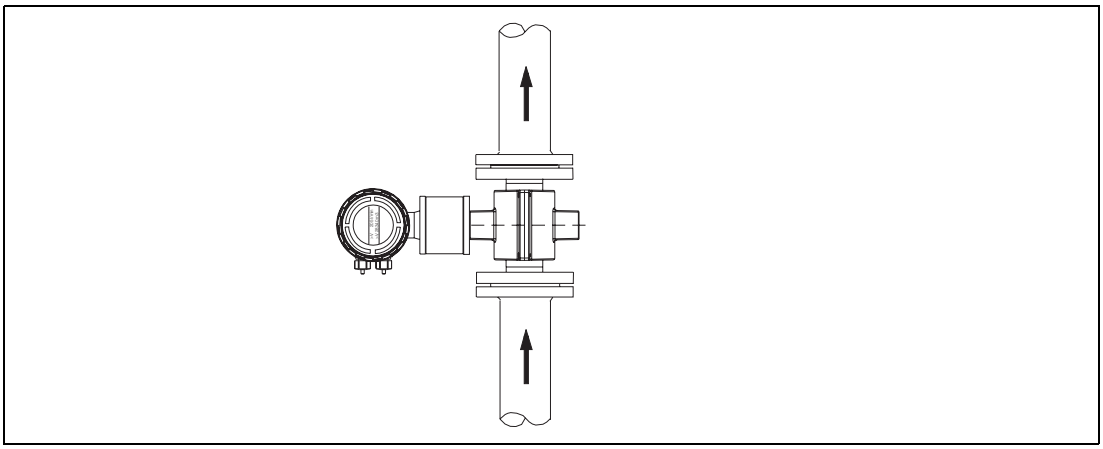


Fig. 6:

In horizontal installations the imaginary line connecting the electrodes should be horizontal so that air or gas bubbles cannot influence the signal voltage that is measured at the electrodes. The electrode orientation is shown in Fig. 7.

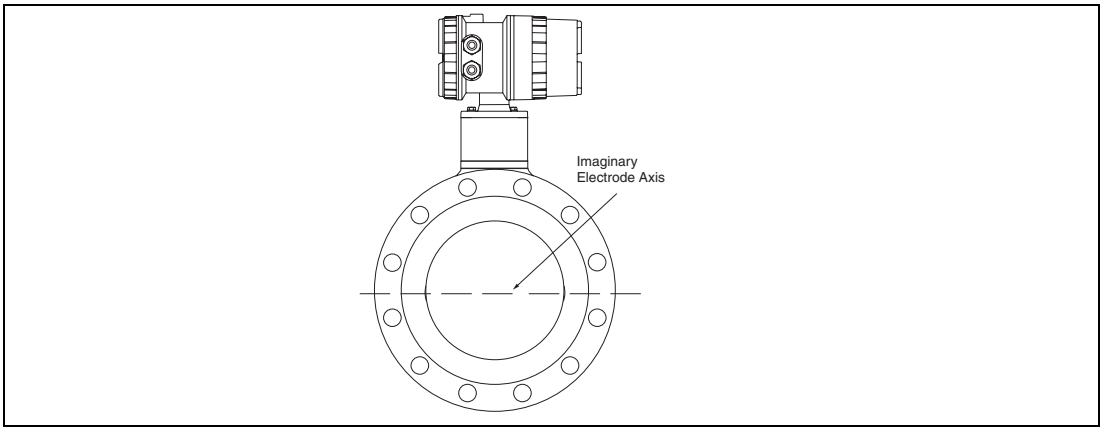


Fig. 7:

For a free flow in- or outlet an invert should be installed to assure that the flowmeter primary is always filled with fluid (Fig. 8).

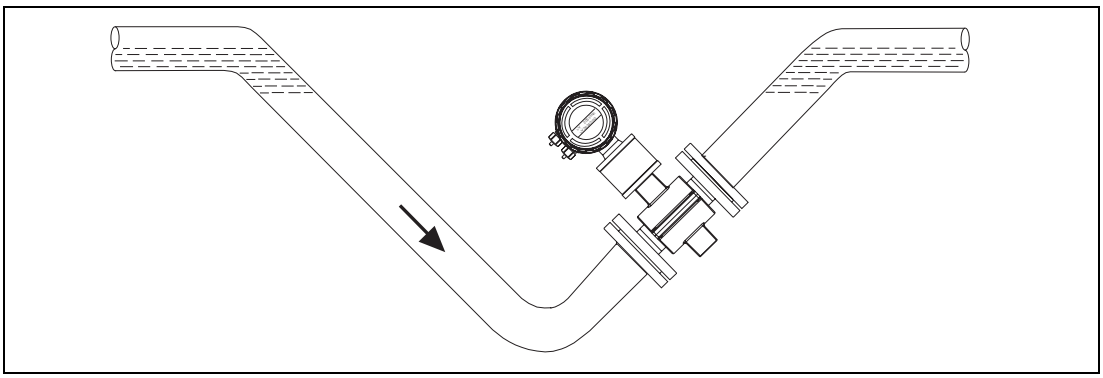


Fig. 8:

In a free flow outlet (drop line) the flowmeter primary should be not be installed in the highest point the or in the discharge of the pipeline (metering tube could drain, air bubbles, Fig. 9).

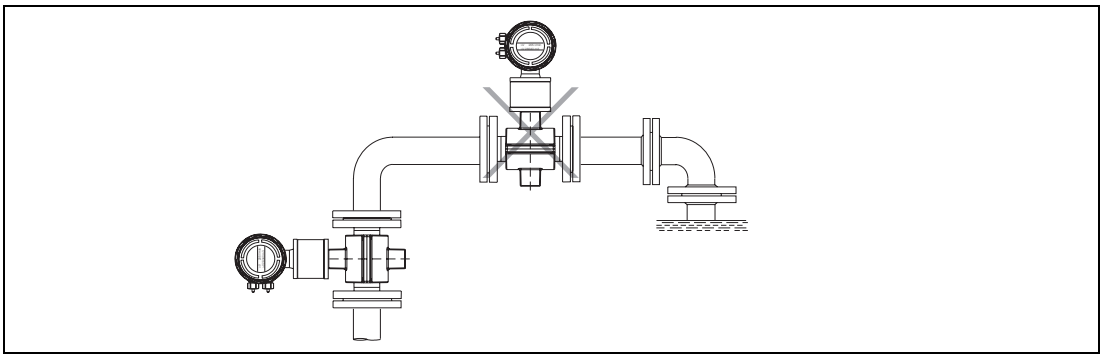


Fig. 9:

3.2.2 In- and Outlet Straight Sections

The measurement principle is independent of flow profile as long as standing eddies do not extend into the measurement region (e.g. after double elbows, tangential inflows or half open valves upstream of the flowmeter primary). In such situations measures to condition the flow profile should be employed. Experience indicates that in most cases a straight upstream section with a length of 3 x DN and a downstream section of 2 x DN are sufficient (DN = flowmeter primary size) Fig. 10. In calibration stands the reference conditions of EN 29104 require straight lengths of 10 x DN upstream and 5 x DN downstream.

Wafer valves are to be installed in such a manner that the wafer when open does not extend into the flowmeter. Valves or other shut off devices should be installed downstream.

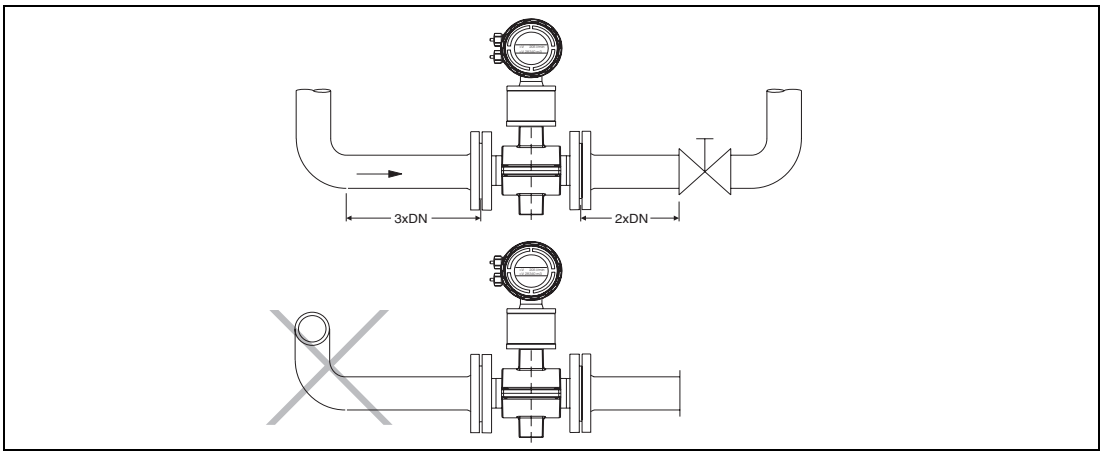


Fig. 10:

For heavily contaminated fluids a bypass line as shown in Fig. 11 is recommended so that when mechanical cleaning is required operation can continue uninterrupted.

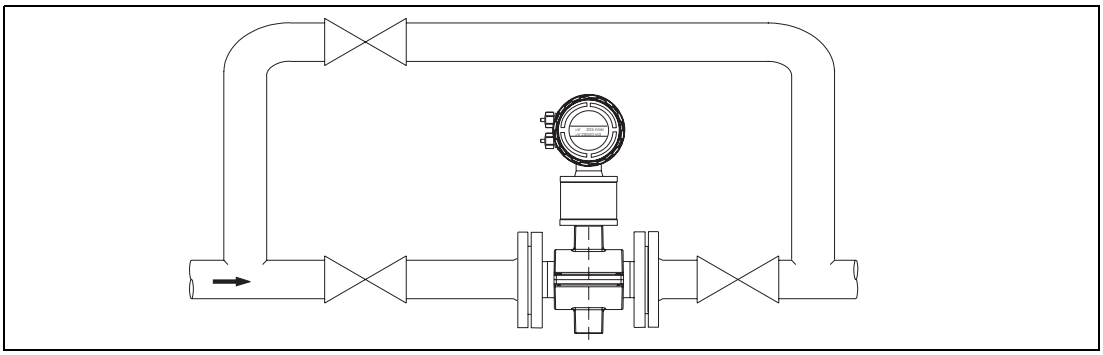


Fig. 11:

For flowmeter primaries which are to be installed in the vicinity of pumps or other vibration generating equipment, the utilization of mechanical dampers is advantageous (Fig. 12).

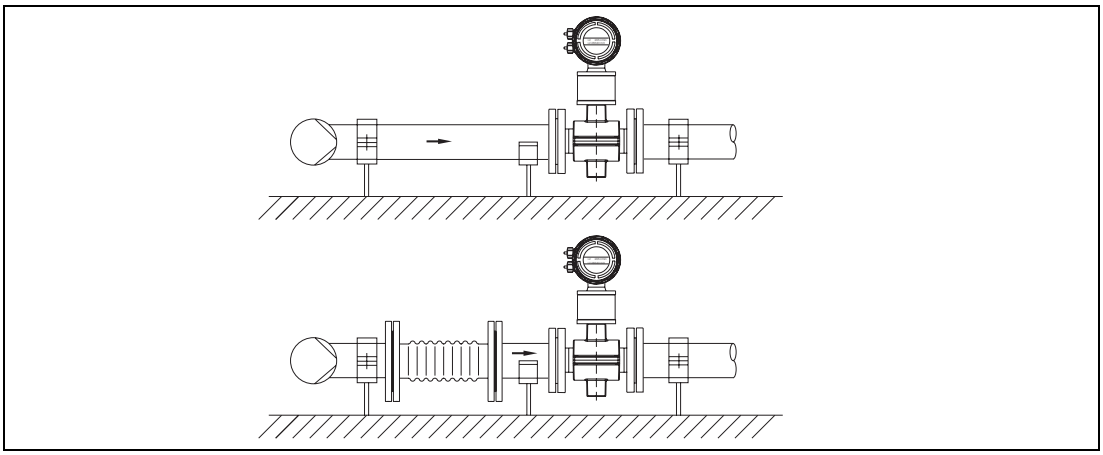


Fig. 12:

3.2.3 Flowmeter Primary Installation

The electromagnetic flowmeter can be installed at any arbitrary location in the pipeline as long as the installation requirements (see 3.2.1) are satisfied.

When selecting the installation site consideration should be given to assure that moisture cannot enter into the electrical connection or converter areas. Make certain to carefully seat the gaskets and secure the covers after installation and start-up have been completed.

Notice!

Graphite should not be used for the flange or process connection gaskets, because under certain conditions it may cause an electrically conductive coating to form on the inside of the metering spool. Vacuum shocks in the pipeline should be avoided to prevent damage to the liners.

Gasket Surfaces on the Mating Flanges

In all installations parallel mating flange surfaces should be provided and gaskets made from materials suitable for the fluid and the temperature should be installed. Only then can leaks be avoided. The flange gaskets for the flowmeter primary must be installed concentrically to achieve optimum measurement results.

Protection Plates

Protection plates are installed to prevent damage to the flowmeter primary liner during transport. Remove the protection plates only when ready to install the flowmeter in the pipe line. Be careful not to cut or otherwise damage the liner in order to prevent leakage.

3.2.4 Installation of the Flowmeter in Thermally Insulated Pipelines

Important!

Observe the Installation information listed in Sect. 3.

Important!

It is essential to observe the temperature specifications listed in the EC-Type Excamination Certificate, see Sect. 11.

The insulation for the pipeline and flowmeter primary is to be installed as shown in Fig. 13. The insulation should not extend beyond the bottom side of the isolation plate.

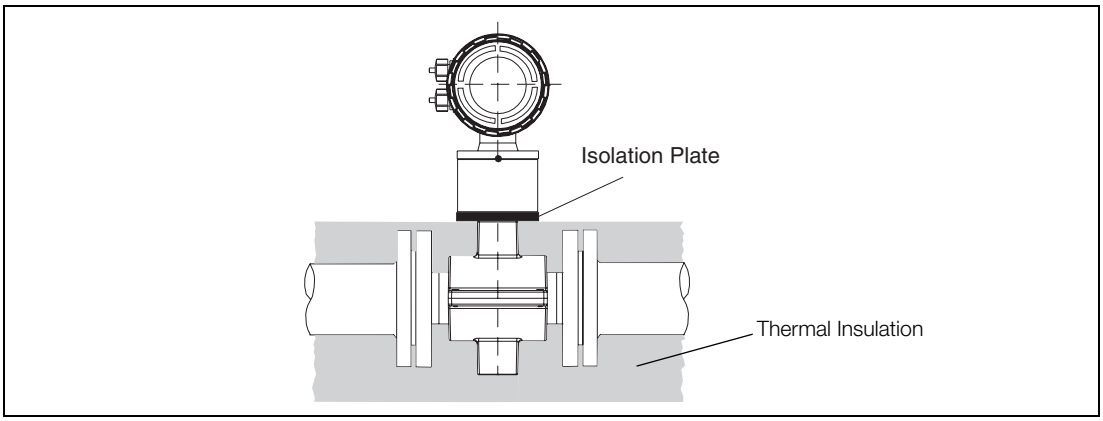


Fig. 13: Thermally Insulated Pipelines

3.2.5 Torque Specification

The mounting bolts are to be tightened equally in the usual manner without excessive one-sided tightening. We recommend that the bolts be greased prior to tightening and that they be tightened in a criss-cross pattern as shown in Fig. 14. Tighten the bolts during the first pass to approx. 50 %, during the second pass to approx. 80 % and only during the third pass to 100 % of the max. torque value. The max. torque values should not be exceeded, see the following table.

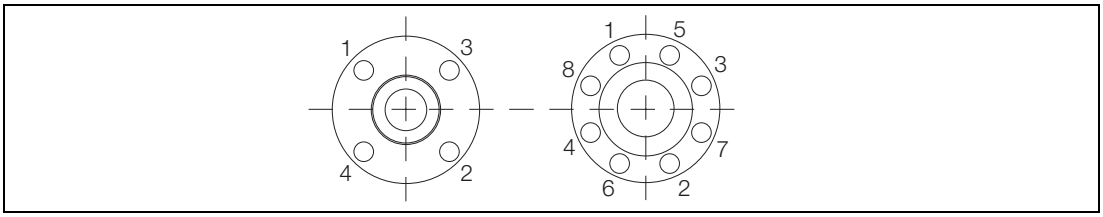


Fig. 14:

Torque Specifications for Flanged Flowmeters

Liner	Meter Size		Process Connections	Bolts	Torque max. Nm	PN bar
	DN mm	inches				
PFA/PTFE/	10	3/8“	Flange	4 x M12	8	40
Hard rubber	15	1/2“		4 x M12	10	40
≥ DN 15 [1/2“]	20	3/4“		4 x M12	16	40
	25	1		4 x M12	21	40
	32	1 1/4		4 x M16	34	40
	40	1 1/2“		4 x M16	43	40
	50	2		4 x M16	56	40
	65	2 1/2“		8 x M16	39	40
	80	3“		8 x M16	49	40
	100	4“		8 x M16	47	16

Tabelle 1

3.2.6 Installations in Larger Size Pipelines

The flowmeter can readily be installed in larger size pipe lines through the use of flanged transition sections (e.g. Flanged Reducers). The pressure drop resulting from the reduction can be determined from the Nomograph Fig. 15. The pressure drop can be determined using the following procedure:

1. Calculate the diameter ratio d/D.
2. Calculate the flow velocity as a function of the meter size and the flow rate:
   The flow velocity can also be determined from a Flow Rate Nomograph, see Data Sheet.
3. The pressure drop can be read on the -Y- axis at the intersection of the “Flow Velocity” curve and the "Diameter Ratio d/D" value on -X- axis in Fig. 15.

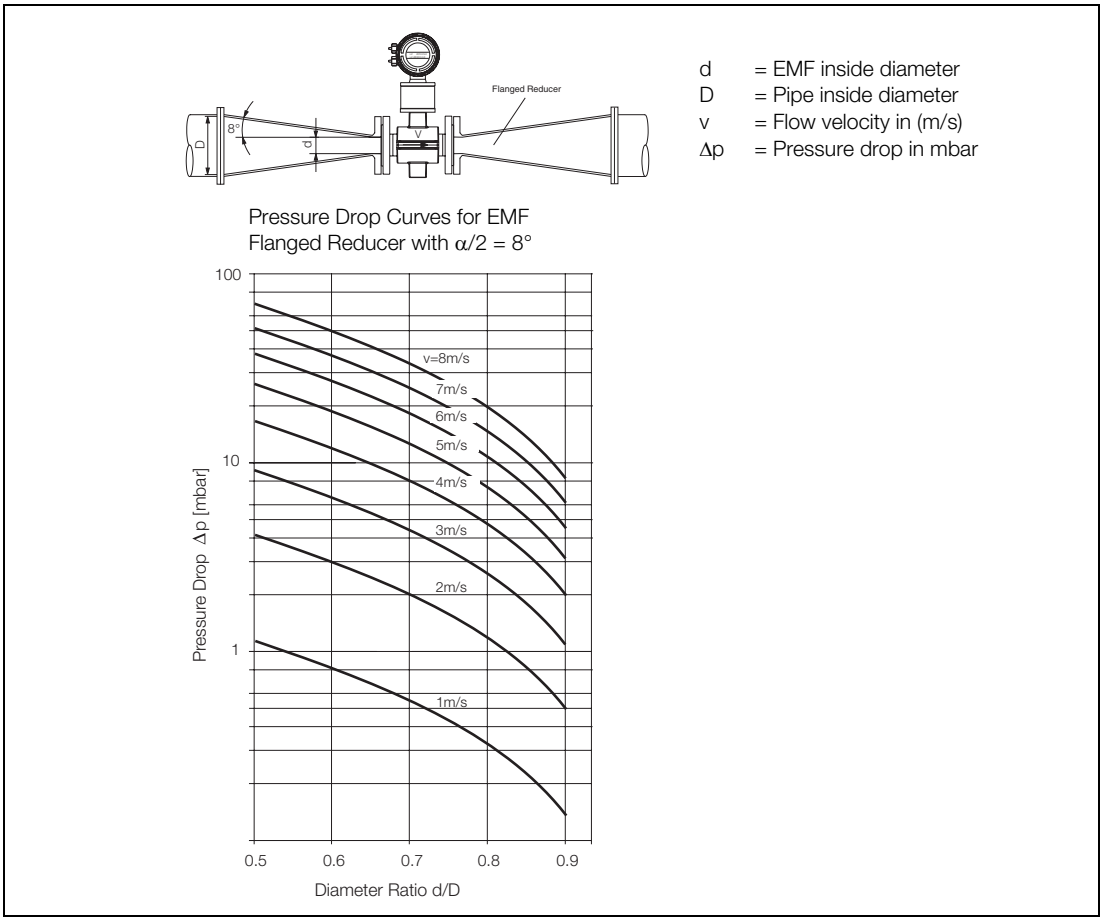


Fig. 15: Nomograph for Pressure Drop Determinations

3.2.7 Meter Sizes, Pressure Ratings, Flow Ranges and Flowrate Nomograph

Meter Size DN	Meter Size Inch	Std. Press. Rating PN	min. Flow Range Flow Velocity (0 to 0.5) m/s	max. Flow Range Flow Velocity. (0 to 10) m/s
10	3/8“	40	0 to 2.25 l/min	0 to 45 l/min
15	1/2“	40	0 to 5 l/min	0 to 100 l/min
20	3/4“	40	0 to 7.5 l/min	0 to 150 l/min
25	1	40	0 to 10 l/min	0 to 200 l/min
32	1 1/4“	40	0 to 20 l/min	0 to 400 l/min
40	1 1/2“	40	0 to 30 l/min	0 to 600 l/min
50	2“	40	0 to 3 m^3/h	0 to 60 m^3/h
65	2 1/2“	40	0 to 6 m^3/h	0 to 120 m^3/h
80	3“	40	0 to 9 m^3/h	0 to 180 m^3/h
100	4“	16	0 to 12 m^3/h	0 to 240 m^3/h

Flowrate Nomograph

The volume flowrate is a function of both the flow velocity and the flowmeter size. The Flowrate Nomograph shows the flow range applicable to each flowmeter size as well as the flowmeter sizes suitable for a specific flowrate.

Example:

Flowrate = 7 m^3/h (maximum value = flow range end value). Suitable are flowmeter sizes DN 20 to DN 65 [3/4” to 2-1/2”] for a flow velocity from 0.5 to 10 m/s.

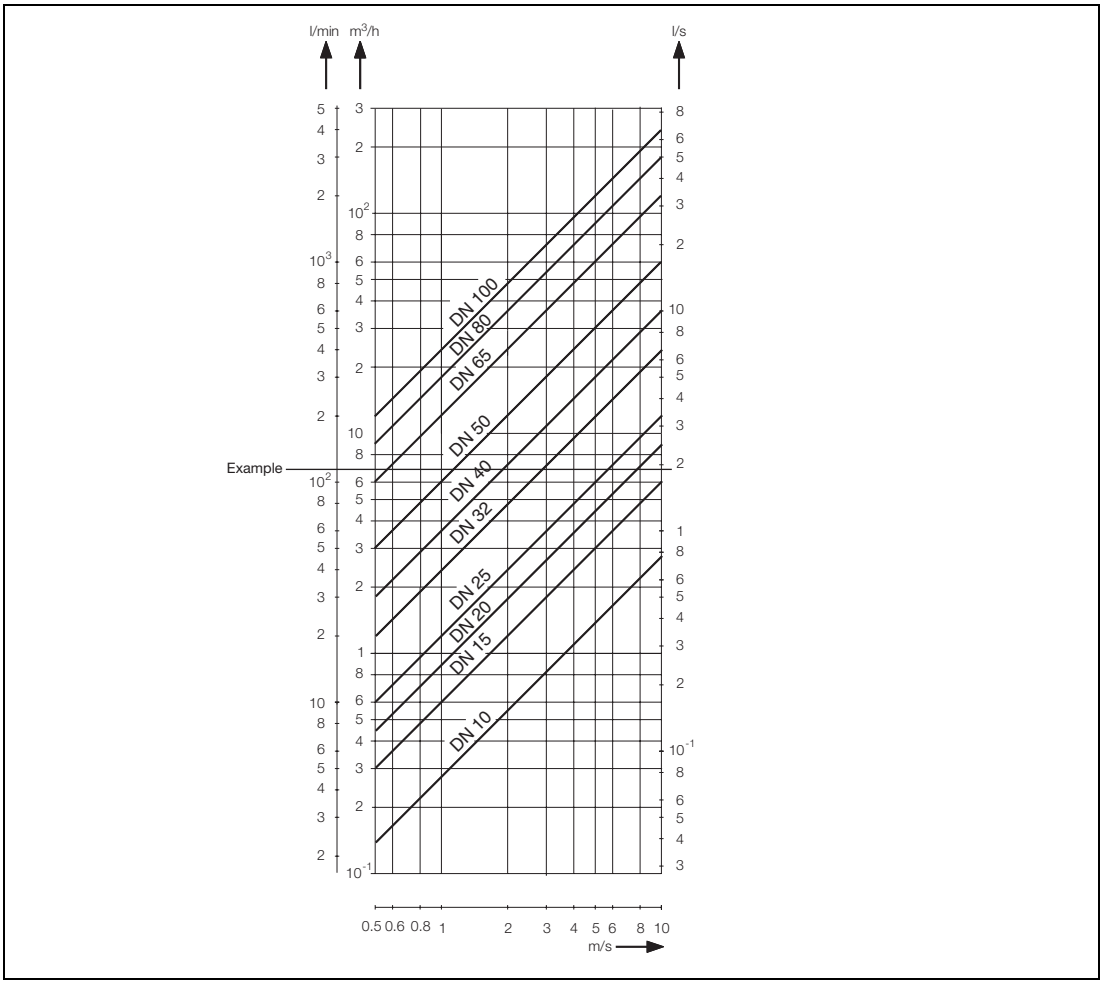


Fig. 16: Flowrate Nomograph DN 10 to DN 100 [3/8“ to 4“]

4 Grounds, Electrical Connections

In this chapter information is presented for grounding the flowmeter primary together with the designs and routing of the signal cable followed by the electrical Interconnection Diagrams.

4.1 Grounding the Flowmeter System

The grounding procedure describe is to be followed. In accordance with EN 60079-14 Part 1, DIN VDE 0165 the ground screw on the flowmeter primary (on the flange and on the converter housing) is to be connected with earth using at least a 4 mm^2 Cu-wire. In order to maintain the EMC-Compatibility/Low Voltage Guideline not only the meter tube in the flowmeter primary must be grounded but also the connection box or COPA-housing. The green/yellow cable included with the shipment should be used for this connection. The Potential Equalization lead is to be connected to the corresponding PA-Terminal. See figures below and also the Interconnection Diagrams Chapters 4.5.

Warning!

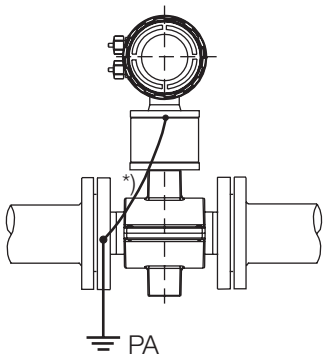
The housing is to be connected to the Potential Equalization PA. The operator must assure when the Protection Earth PE is connected that, even during a fault condition, no potential difference can exist between the Protection Earth PE and the Potential Equalization PA.

For plastic or insulated lined pipelines the fluid is grounded by grounding electrodes or by installing grounding plates. When there are stray potentials present in the pipeline a grounding plate is recommended at both ends of the flowmeter primary.

Three grounding configurations are described below. In cases a) and b) the fluid is in direct electrical contact with pipeline. In case c) it is isolated from the pipeline.

a) Metal pipe with fixed flanges

1. Drill blind holes into the flanges on the pipeline (18 mm deep)
2. Thread hole, (M6, 12 mm deep).
3. Using a screw (M6), spring washer and flat washer attach the ground strap and connect to the ground connection on the flowmeter primary.
4. Use a 4 mm^2 CU-wire for the earth connection between the flowmeter primary and the Potential Equalization PA.

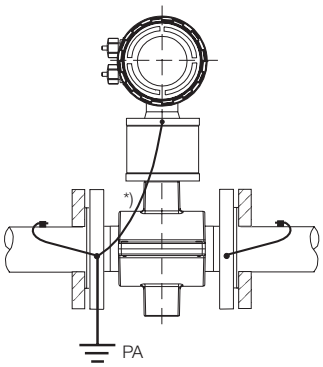


*) Use the green/yellow cable included with the shipment for these connections.

Fig. 17: Flowmeter Primary DN 10 to 100 [3/8“ to 4“]

b) Metal Pipeline with Loose Flanges

1. In order to assure a good earth connection to the fluid and the flowmeter primary when loose flanges are used, 6 mm threaded stubs should be welded to the pipeline on each side.
2. Using a nut, spring washer and flat washer attach ground straps to the weld stubs and connect to the ground connections on the flowmeter primary.
3. Use a 4 mm^2 CU-wire for the earth connection between the flowmeter primary and the Potential Equalization PA.



*) Use the green/yellow cable included with the shipment for these connections.

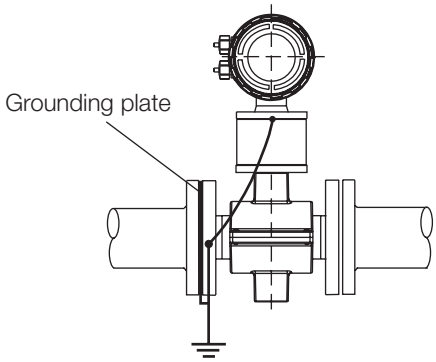
Fig. 18: Fixed Flange Flowmeter Primary DN 10 to 100 [3/8“ to 4“]

c) Plastic, concrete or insulated lined pipes

1. Install EMF in pipeline with grounding plates.
2. Connect the ground strap between ground tab on the grounding plate and the ground connection on the flowmeter primary.
3. Use a 4 mm^2 CU-wire for the earth connection between the flowmeter primary and the Potential Equalization PA.

For plastic pipes or pipes with insulation liners the earth connections to the fluid are made by the grounding plate as shown in Fig. 19 or by grounding electrodes integrated in the flowmeter primary (option). If grounding electrodes are used, then the grounding plates shown in Fig. 19 are not required.

If there are stray potentials in the pipeline and grounding plates are used, it is recommended that a grounding plate be installed at each end of the instrument.



*) Use the green/yellow cable included with the shipment for these connections.

Fig. 19: Flowmeter Primary DN 10 to DN 100 [3/8“ to 4“]

4.2 Grounding of instruments with protection plates

Fig. 20: Protection Plates/Ground Plate

Protection plates are used to protect the edges of the liner in the meter pipe, e.g. when metering abrasive fluids. They simultaneously provide the same grounding function as a grounding plate in plastic or insulated lined pipes.

Grounding with conductive PTFE-grounding plate

As an option in the meter size range DN 10 -100 [3/8" - 4"], grounding plates made of conductive PTFE are available. They are installed as shown in Fig. 21.

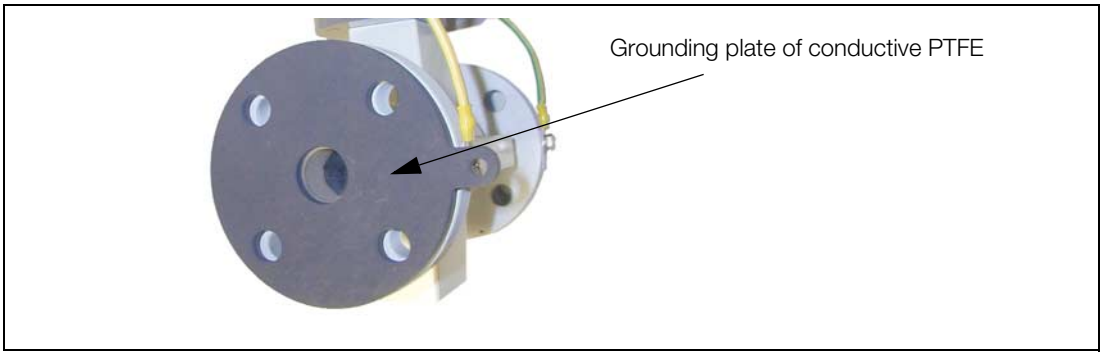


Fig. 21: PTFE Protection Plates/Ground Plate

4.3 Safety Information for Connecting the Converter

Warning!

There are circuits in the flowmeter primary and converter that are dangerous to touch. Therefore before opening the housing, turn off the supply power then wait at least 2 minutes before opening the housing. Assure that no explosion hazards exist. Work on the instrument with the housing opened should only be performed by trained personnel.

- Converter and flowmeter primary are to be connected to the Potential Equalization according to the applicable National Standards.
- The line connection must be sized for the current of the flowmeter system. The leads must correspond to IEC227 and IEC245.
- In installations inside buildings, the supply power line to the flowmeter system is to be routed through a switch or circuit breaker located in the vicinity of the flowmeter and appropriately marked.
- For safe operation of the instrument, the installation must follow the instructions in the Operation Manual.

Warning!
Information for connecting peripheral instruments

With the exception of the supply power, the voltages in the remaining circuits do not represent a personnel contact hazard. Only instruments whose circuit voltages are not hazardous to contact and do not exceed U_M = 60 V may be connected.

4.4 Flowmeter Primary Instrument Tag Specifications

Examples of the Instrument Tags on the flowmeters are shown in Fig. 22. There are two sections on the tags. The upper section includes the Ex-Specifications, the lower the flowmeter operating specifications.

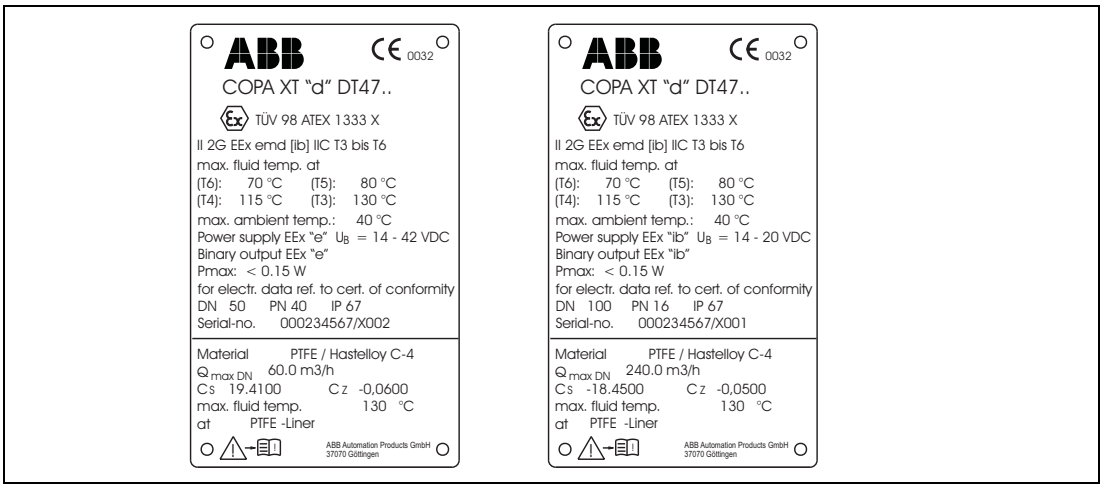


Fig. 22: Typical Flowmeter Instrument Tags for Increased Safety "e' or Intrinsically Safe (ib) Areas

4.5 Supply Power Connections

The FXT4000 (COPA-XT) flowmeter system is designed in 2-Wire technology, i.e., the supply power and the output signal (4-20 mA w/wo HART-Protocol) both utilize the same connection leads and can be connected to a Transmitter Power Supply designed for Intrinsically Safe (ground free) or Non-Intrinsically Safe operation. A binary output is also available (function user configurable as a system monitoring contact or as a scaled pulse output) using a Switching Amplifier.

When making the connections the clearance and creepage requirements are to be observed (for "ib" see EN 50020 and for "e" see EN 50019)

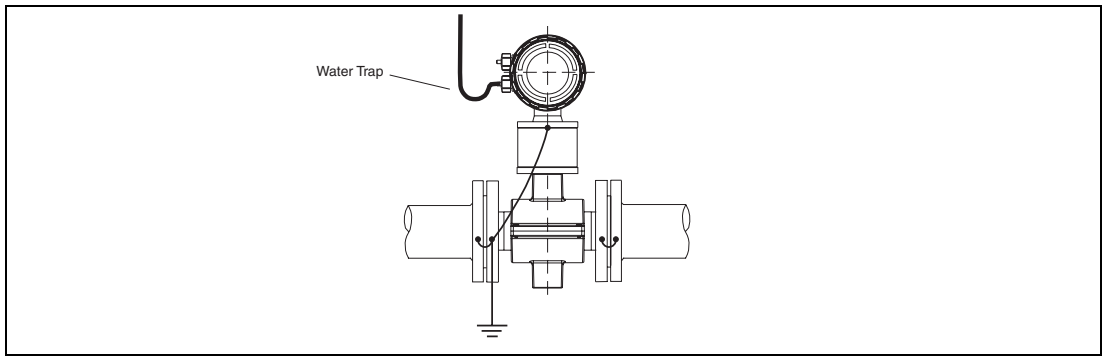
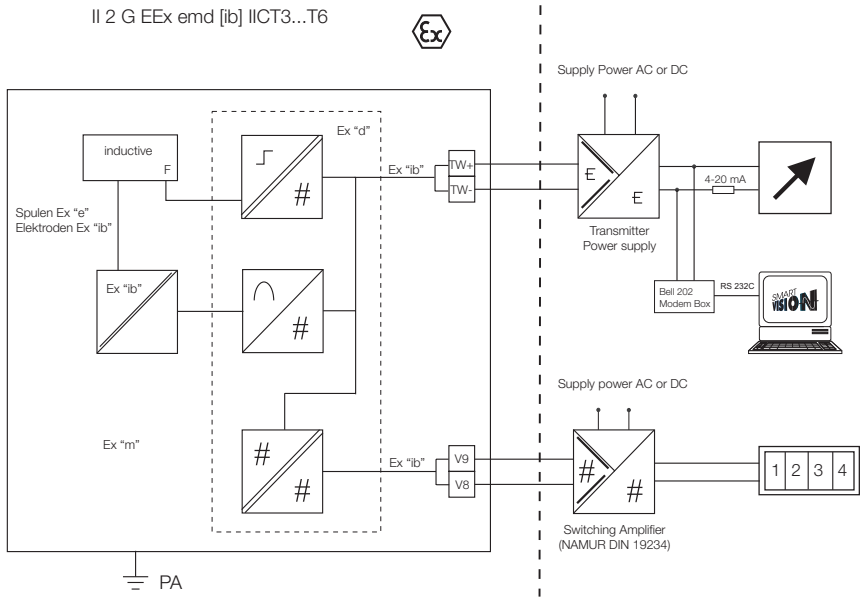


Fig. 23: Supply Power and Binary Output Cable Routing Using a Water Trap

Important

A water trap should be utilized for the cable at the flowmeter primary.

4.5.1 Interconnection Diagram, Supply Power from Transmitter Power Supply „Intrinsically Safe“



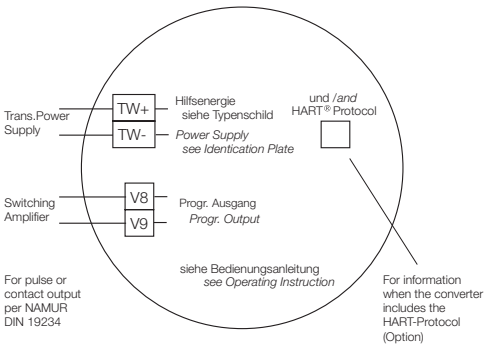
Ex-Approval Specifications	
Ambient Temperature	-20 °C ... +60 °C
Fluid Temperature	-25 °C ... + See Temperature Class and Liner
Electrical Specifications	
Supply Power Circuit	EEx ib IIC / IIB U_B = 14–20 V DC U_i = 30 V I_i = 100 mA P_i = 760 mW C_i = 13 nF Terminal TW- is connected internally to PA
Cable connector	blue
Recommended Transmitter Power Supplies	
ABB	TZN 128-Ex, electronic current limiting, Contrans I V 17151-62
Digitable	CS3/420, CS5/420
Apparatebau Hundsbach	AH 90270, AH 77270
MTL	MTL 3046B, 3047, E 02009
Pepperl + Fuchs	KHD3-IST/Ex1, KFD2-STC1-Ex, KSD2-CI-S-Ex
Recommended Transmitter Power Supplies (HART-Capable)	
ABB	TZN 128-Ex
Digitable	CS3/420, CS5/420
MTL	MTL E 02009 - 203_ _ 1/203_ _ 1S
Binary Output (NAMUR per DIN 19234)	EEx ib IIC / IIB U_i = 20 V I_i = 30 mA P_i = 150 mW C_i = 2,4 nF L_i = 67 µH Terminal V8 is connected internally PA
Recommended Switching Amplifiers	
ABB	V17131-51...53, V17131-54...56
Digitable	ci 1/941, ci 1/942
Apparatebau Hundsbach	AH TS 920, AH 90 924
Pepperl + Fuchs	Various types

The listed Transmitter Power Supplies or supply power sources are to be installed so that the voltage at the converter terminals is $U_{TW-/TW+} \geq 14$ V. The voltage drop and the loads on the leads must be considered.
Voltage drop in the leads:

$$\Delta U_{max} = \frac{22,8mA \cdot (2 \cdot L)}{56m/\Omega mm^2 \cdot A}$$

Lead length L [m]
Lead cross-section A [mm^2]

Ex “ib” Interconnection Diagram



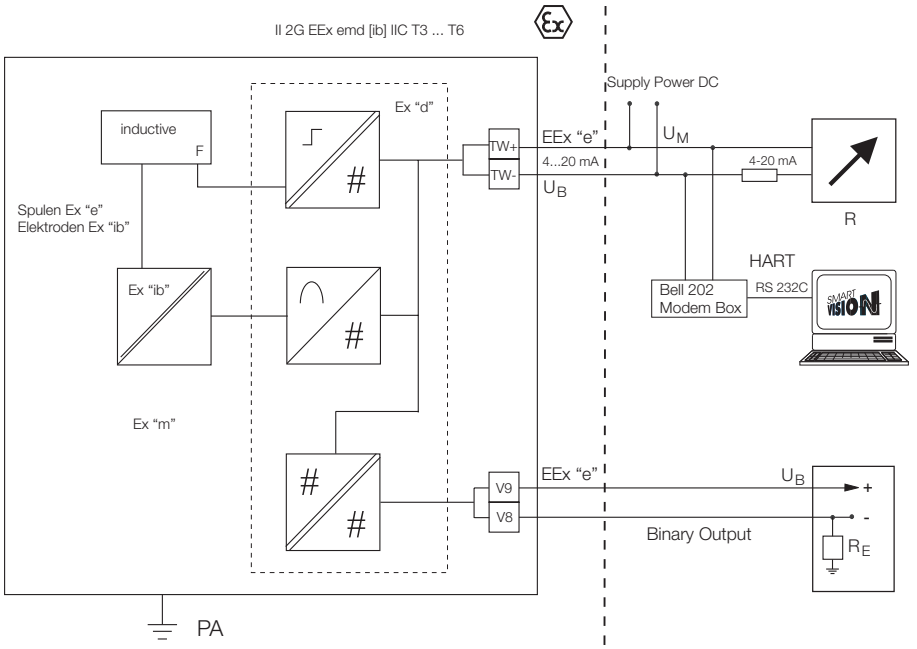
Use care when replacing and tightening the housing cover screws. Check that the gasket is properly seated. Only then is Protection Class IP 67 assured.

Important:

Terminals TW- and V8 are internally connected to PA. PA is to maintained along the entire intrinsically safe circuit.

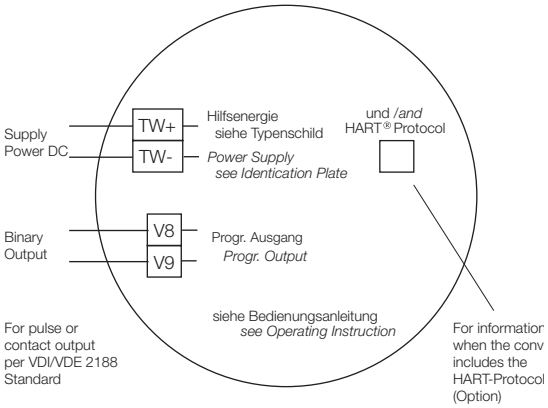
Fig. 24: Interconnection Diagram, Supply Power from Transmitter Power Supply „Intrinsically Safe“

4.5.2 Interconnection Diagram, Supply Power from Central Power Supply „Non-Intrinsically Safe“



Ex-Approval Specifications	
Ambient Temperature	-20 °C ... +60 °C
Fluid Temperature	-25 °C ... + siehe Temperature Class and Liner
Electrical Specifications:	
Supply Power Circuit	U_M = 60 V 14 V ≤ U_B ≤ 55 V 3,8 mA ≤ I_B ≤ 22 mA
Binary output	U_M = 60 V 19 V ≤ U_B ≤ 33 V 2 mA ≤ I_B ≤ 110 mA
Cable connector	black

Ex “e” Interconnection Diagram



Use care when replacing and tightening the housing cover screws. Check that the gasket is properly seated. Only then is Protection Class IP 67 assured.

Fig. 25: Interconnection Diagram, Supply Power from Central Power Supply „Non-Intrinsically Safe“

4.5.3 Installation of the Binary Output and Connections

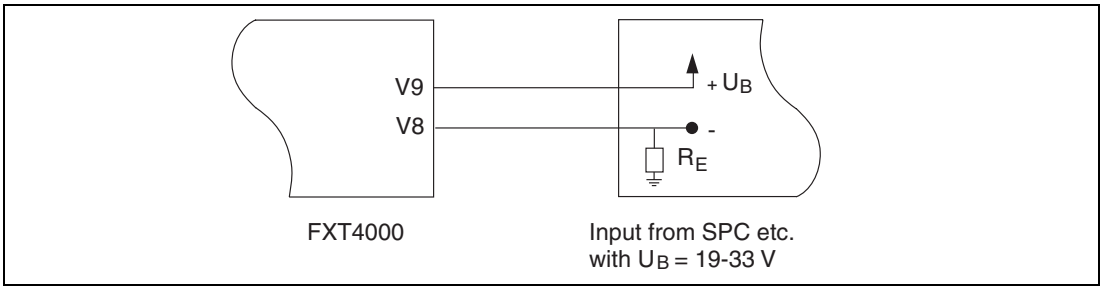


Fig. 26: Installation of the Binary Output EEx „e“

The Load R_E is calculated for the desired category as a function of the available supply voltage U_B, the lead resistance R_L and the selected current output as follows:

$$R_E = \frac{(U_B - 3V)}{I_B} - R_L \text{ with } R_L = \frac{(2 \cdot l)}{56 m/\Omega mm^2 \cdot A}$$

Lead length l [m]
Lead cross-section A [mm^2]

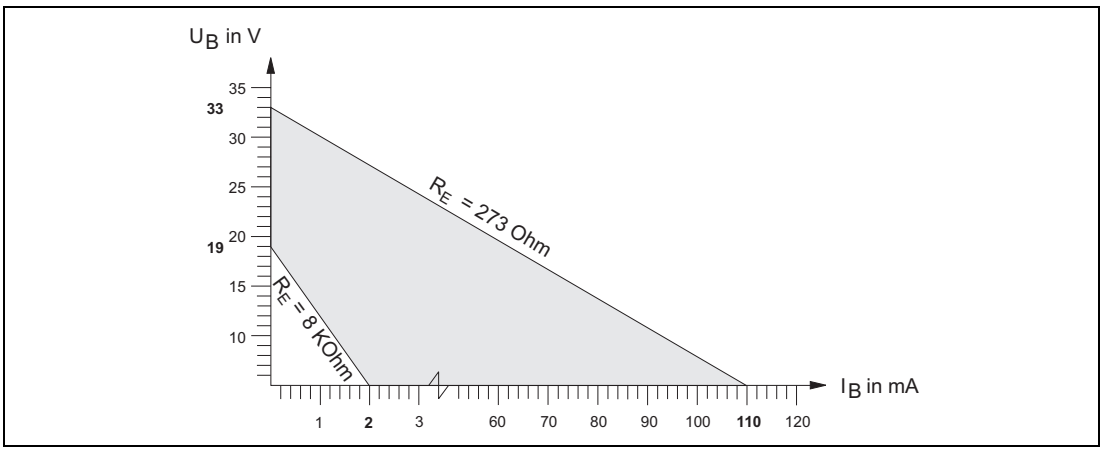


Fig. 27: Load Resistance as a Function of the Current and Voltage (see Equation)

The binary output can be configured as a pulse output or system alarm output. The output complies with the standard VDI/VDE 2188.

4.5.4 Scaled Pulse Output (Terminals V8, V9)

Scaled pulse output, max. 100 Hz. The value indicated in the display can be multiplied by a pulse factor with a value selected between 0.001 and 1000 (1 pulse/m^3 · 1000). The pulse width can be set between 0.1 ms and 2000 ms.

4.5.5 Contact Output (Terminals V8, V9)

The following functions can be assigned to the output in the software:
System Monitor: Open or closed contact
Forward/Reverse: Closed for the forward flow direction
Max.-Alarm, Min.-Alarm: Open or closed contact

4.5.6 HART®-Protocol

The HART®-Protocol provides for communication between a process control system, handheld terminal and the EMF field instrument. The digital communication occurs through an alternating current signal superimposed on the current output which does not affect any other instruments connected to the output. The SMART VISION ® program can be used to configure and operate the system.

SMART VISION ® is a universal communication software program for intelligent field instruments, which utilizes a variety of communication means and thereby provides for data exchange to a complete palette of field instruments. The major uses are as a parameter display and for configuration, diagnostics and data management for all intelligent field instruments which themselves, satisfy the communication requirements.

SMART VISION ® is a universal and intuitive operator friendly graphic software for intelligent field instruments.

SMART VISION ® can communicate with all HART-capable instruments using the „universal“ and „common practice“ HART-Commands. For ABB-instruments the manufacturer specific HART-Commands are also supported so that complete functionality of the instruments is accessible with one DTM.

SMART VISION ® supports both HART- and PROFIBUS-DTMs as well as all other PROFIBUS-instruments utilizing Profile 2.0/3.0 specifications.

Transmission Mode

FSK-Modulation on the 4-20 mA current output per Bell 202 Standard. Max. Signal amplitude 1.2 mA_{pp}

Load (Current Output)

Min.: > 250 Ω

Cable

AWG 24 twisted, max. cable length 1500 m

Baudrate

1200 Baud
Log. 1: = 1200 Hz, Log. 0: = 2200 Hz

4.6 Max. allow. fluid temperature

The maximum allowable fluid temperatures [°C], which is a function of the Temperature Class, the maximum allowable ambient temperature, the flowmeter primary liner material and size are listed in the following table.

Max. Ambient temperature. [°C]	Liner Material	Meter size		Temperature Class	Max. allow. Fluid Temperature [°C]		Temperature Resistant Cable	
		DN	Inch		(Operating values)	(Meter insulated)	= 80 °C	(Meter insulated)
40 °C	PTFE/PFA	10 - 20	3/8-3/4	T3	130	(125)	130	(120)
	PTFE/PFA			T4	110	(110)	110	(110)
	HG/WG			T4	90	(90)	90	(90)
	all			T5	75	(75)	75	(75)
	all			T6	60	(60)	60	(60)
	PTFE/PFA	25 - 32	1-1¼	T3	125	(125)	125	(125)
	PTFE/PFA			T4	110	(110)	110	(110)
	HG/WG			T4	90	(90)	90	(90)
	all			T5	75	(75)	75	(75)
	all			T6	60	(60)	60	(60)
	PTFE/PFA	40 - 100	1½-4	T3	135	(135)	135	(135)
	PTFE/PFA			T4	115	(115)	115	(115)
	HG/WG			T4	90	(90)	90	(90)
	all			T5	80	(80)	80	(80)
	all			T6	70	(70)	70	(70)
50 °C	PTFE/PFA	10 - 20	3/8-3/4	T3	130	(125)	130	(120)
	PTFE/PFA			T4	110	(110)	110	(110)
	HG/WG			T4	90	(90)	90	(90)
	all			T5	75	(75)	75	(75)
	all			T6	60	(60)	60	(60)
	PTFE/PFA	25 - 32	1-1¼	T3	125	(125)	125	(125)
	PTFE/PFA			T4	110	(110)	110	(110)
	HG/WG			T4	90	(90)	90	(90)
	all			T5	75	(75)	75	(75)
	all			T6	60	(60)	60	(60)
	PTFE/PFA	40 - 100	1½-4	T3	125	(125	125	(125
	PTFE/PFA			T4	115	(115)	115	(115)
	HG/WG			T4	90	(90)	90	(90)
	all			T5	80	(80)	80	(80)
	all			T6	70	(70)	70	(70)
60 °C	PTFE/PFA	10 - 20	3/8-3/4	T3	-	(-)	130	(120)
	PTFE/PFA			T4	85	(85)	110	(110)
	HG/WG			T4	85	(85)	90	(90)
	all			T5	75	(75)	75	(75)
	all			T6	60	(60)	60	(60)
	PTFE/PFA	25 - 32	1-1¼	T3	-	(-)	120	(120)
	PTFE/PFA			T4	85	(85)	110	(110)
	HG/WG			T4	85	(85)	90	(90)
	all			T5	75	(75)	75	(75)
	all			T6	60	(60)	60	(60)
	PTFE/PFA	40 - 100	1½-4	T3	-	(-)	120	(120)
	PTFE/PFA			T4	-	(-)	115	(115)
	HG/WG			T4	-	(-)	90	(90)
	all			T5	80	(80)	80	(80)
	all			T6	70	(70)	70	(70)

Important:

The higher Temperature Class always includes the lower classes. The minimum allowable fluid temperature is -25 °C.

5 Start-Up

5.1 Preliminary Checks of the Flowmeter System

Start-up and operation are to be in accord with ElexV, Ex VO (Regulations for electrical equipment in explosion hazardous areas) and DIN VDE 0165 (Installing Electrical Equipment in Explosion Hazardous Areas). The assembly, installation and maintainence in the Ex-Area may only be conducted by properly trained personnel.

5.1.1 Testing the FXT4000 (COPA-XT) Flowmeter

The start-up procedure described below is initiated only after the assembly and installation of the flowmeter have been completed.

The supply power is turned off.

- Check the grounds.
- Compare connections against the Interconnection Diagram.
- Assure that the supply power agrees with the specifications on the Instrument Tag.
- Check that the EEPROM has been installed on the display plate in the converter (see Fig. 32, Page 42). The Order Number and the end characters are written on the tag attached to this EEPROM. The end characters must be identical to those listed on the Instrument Tag on the converter to be used.

The supply power should be turned on!

Caution:

When the housing is opened, the Ex, personnel contact and EMC protections are voided.

- After the power is turned on, the data for the flowmeter primary stored in the external EEPROM are compared to those in the internal memory. If the data is not identical, an automatic uploading of the data into the converter is initiated. The converter displays the message “Primary data are loaded”. The metering system is now ready for operation.
- The display should indicate the selected process information values (see Page 31).
- Only a few parameters must be entered in order to complete the start-up procedure. The flow range is automatically set to 10 m/s. Enter the desired flow range for Qmax with the appropriate engineering units.
  Hydraulically ideal are range end values of approx. 2-3 m/s. The current output range is 4-20 mA. If a pulse output is selected, the pusle factor (pulses per unit), pulse width and the settings in the totalizer submenu are to be entered.
- To complete the start-up procedure call the menu “Store Data in Ext. EEPROM” to store those settings which were changed during the start-up procedure. If a converter exchange is required at some later date, the EEPROM is removed from the old converter and installed in the new one (see 5.2). Check the flow direction. If the forward and reverse flow directions do not agree with the flow direction indicators in the display, change the parameter “Flow Direction” from “Normal” to “Inverse” in the converter.

Important!

Below 5 % of Qmax the display switched off (energy management) of HART-Communication enabled on. Instrument continues to work within its specified accuracy, the current output and HART-Communication aren´t influenced by it. In case you need a display information below 5 % of Qmax, the HART-Communication must be turned off (see under submenu data link).

5.2 Converter Exchange

All the parameter settings are stored in an external EEPROM installed on the display plate. When a converter is exchanged, all the parameter settings can be uploaded into the new converter by interchanging the external EEPROMs. Converter specific data are automatically updated.

Important!

After the configuration has been completed, all the parameter settings should be stored in the external EEPROM.

5.3 Memory Module Socket (external EEPROM)

The socket for the ext. EEPROM is located on the front of the display plate.

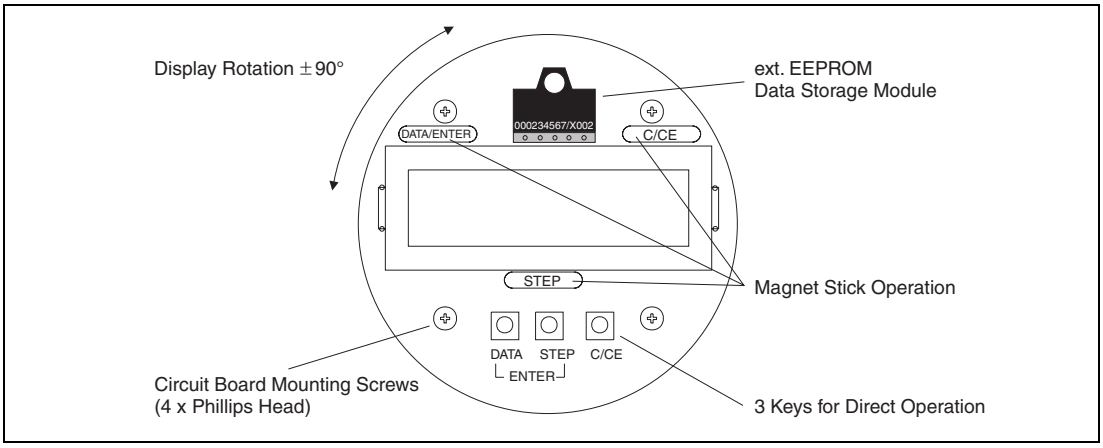


Fig. 28: Displayplatte

Attention!
Information for Opening the Housing

The following information must be observed when the housing for the converter is opened:

- All connections must be potential free.
- When the housing cover is removed, EMC and personnel protection are no longer provided.

5.4 Rotate Display / Rotate Housing

Warning!

Turn off the supply power!

Unscrew the housing cover. The display board is secured by 4 Phillips head screws.

After the screws are removed the display can be pulled off and rotated 90° to the left or 90° to the right. Carefully plug in the display again and reinstall the screws. Carefully reinstall the cover. Check that the gaskets are properly seated. Only then will Protection Class IP 67 be maintained.

The converter housing can be rotated 90° to the left after the two screws have been loosened.

Fig. 29:

6 Operation, Data Entry and Configuration

6.1 Available Display Formats

After the supply power is turned on, the model number of the converter is displayed in the 1st line and the software version number and its revision level in the 2nd line. Subsequently, the process information from the flowmeter is displayed.

The present flow direction is indicated in the first line of the display (→F for forward or ←R for reverse) together with the instantaneous flow rate value in percent or in direct reading engineering units. The totalizer value, with max. seven digits, for the present flow direction is displayed in the second line followed by the units.

Independent of the pulse factor, the totalizer value always indicates the actual measure flow quantity with its corresponding units. This display configuration is defined as process information in the following text.

The totalizer value for the other flow direction can be displayed by pressing the STEP or DATA key.

→F	98.14 l/s
→**F**	12.0000 m3

1st Line Instantaneous forward flow rate
2nd Line Forward totalizer value

→F	98.14 l/s
←**R**	516.0000 m3

1st Line Instantaneous forward flow rate
2nd Line Reverse totalizer value (multiplex operation)

→F	70.01 l/s
→**F**	10230 **m3**

1st Line Instantaneous forward flow rate
2nd Line Totalizer overflow. →F and m^3 blink.

A totalizer overflow occurs whenever the totalizer value reaches 9,999,999 units. When the totalizer value in one flow direction exceeds 9,999,999 units, the flow direction symbol (→F or ←R) and the units (e.g. m^3) blink in the 2nd line. The totalizer can register a max. of 250 overflows software wise. The overflow indication can be reset separately for each flow direction by pressing ENTER.

An error message is displayed in the 1st line of the display when an error condition exists.

Flowrate	>105 %
→F	10.230 m3

This message is displayed alternately in clear text and then with the corresponding error number. Only the clear text message for the error with the highest priority is displayed, while all errors detected are indicated in the display by their error number.

Error Number	Clear Text	Cause
5	EEPROM	Data in internal EEPROM corrupted.
C	Primary data	Error in external EEPROM or not installed.
1	A/D saturated	A/D-Converter saturated
3	Flowrate > 105 %	Flowrate greater than 105 %.
6	Totalizer	Totalizer values corrupted.
9	Excitation	Contact ABB -Service
A	Max. Alarm	Max. alarm limit exceeded.
B	Min. Alarm	Min. alarm limit exceeded

Error Code Table by Priority

In addition to the display of the error messages, an alarm signal can be transmitted over the binary output and the current output can be set (does not apply to Errors 6, A, B and C).

Current output set 4 mA or 22 mA.

6.2 Data Entry

The data is entered using the three keys STEP ↓, DATA ↑ and C/CE located on the Operator Unit plugged into the converter.

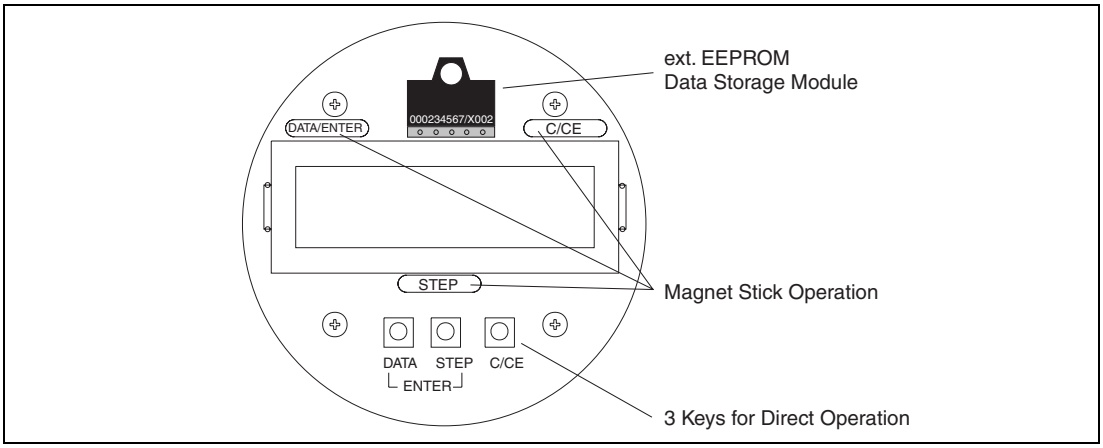


Fig. 30: Converter Keypad and Display

It is possible to configure the converter without removing the housing cover by utilizing the magnetic stick.

The converter remains on-line during data entry, i.e. the current and pulse outputs continue to represent the operating conditions. A description of the functions of the keys follows:

C/CE — The C/CE key is used to switch between the operating mode and the menus.

STEP ↓ — The STEP key, one of two arrow keys. The STEP key is used to scroll forward through the menus. All desired parameters can be accessed with the STEP key.

DATA ↑ — The STEP key, one of two arrow keys. The STEP key is used to scroll backward th-rough the menus. All desired parameters can be accessed with the STEP key.

ENTER — The ENTER function is initiated by simultaneously pressing the two arrow keys STEP and DATA. The program protection is turned on or off with ENTER. Access the parameter to be changed with ENTER and accept the new value or selection with EN-TER

The ENTER function is only active for approx. 10 seconds. If no entry is made during this time it must be pressed again.

The ENTER Function with Magnetic Stick Operation

The ENTER function is activated when the DATA/ENTER sensor is actuated for more than 3 seconds. The display blinks to indicate confirmation.

Data is entered by two different entry modes:

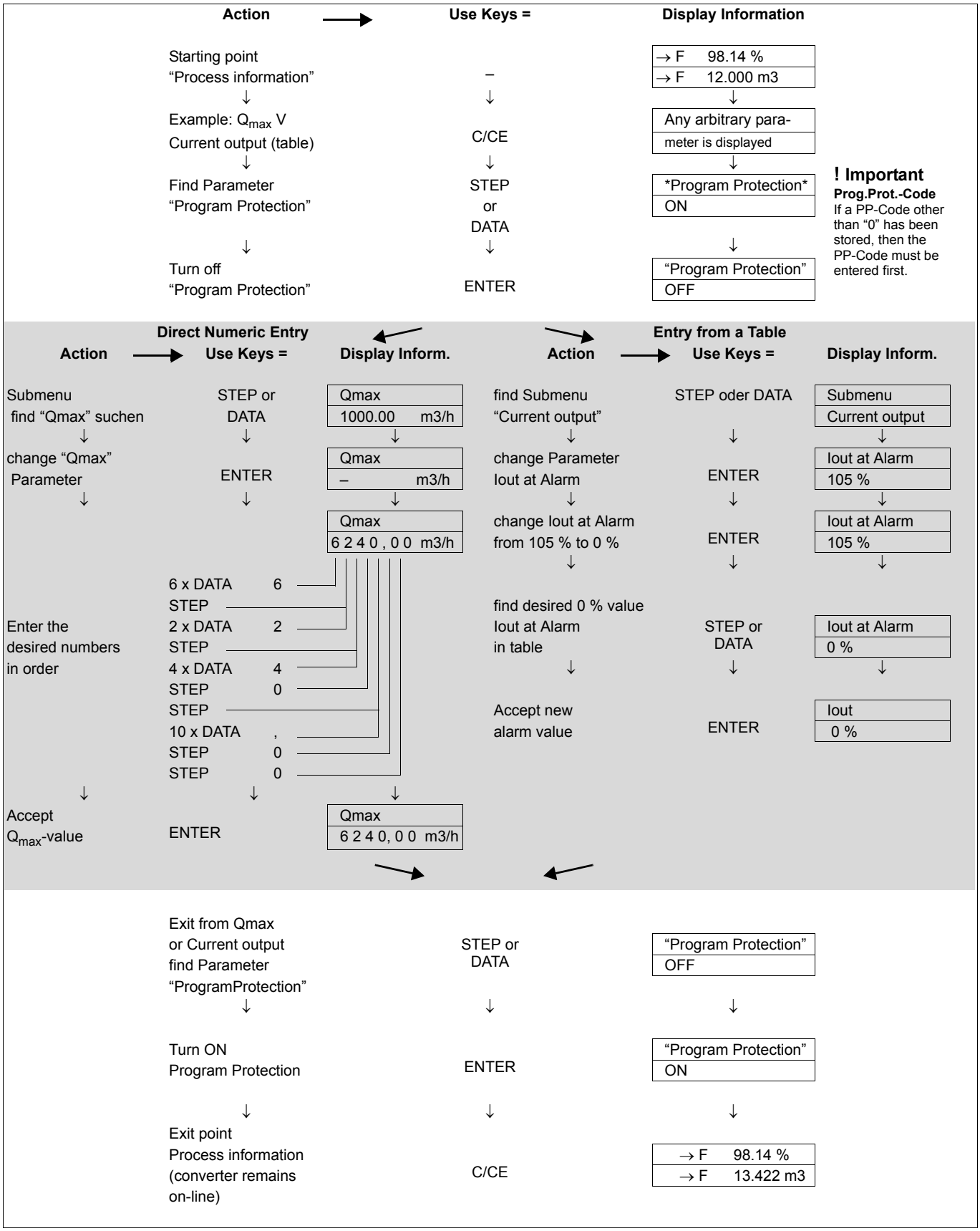
- Direct numerical entry
- Entry from a predefined table.

Important!

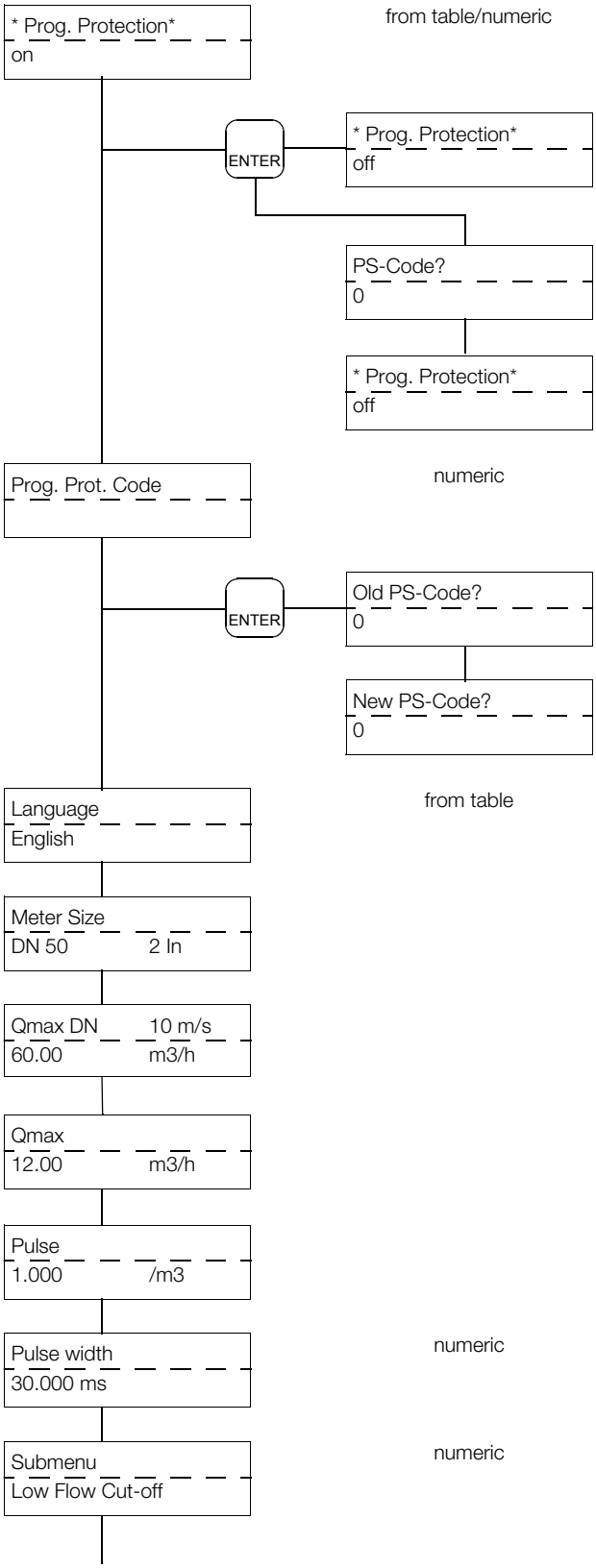
The values entered are checked for plausibility, and if necessary, are rejected with an appropriate message.

If no entries are made within a 10 second period. the converter displays the old value. After an additional 10 seconds, the process information display reappears.

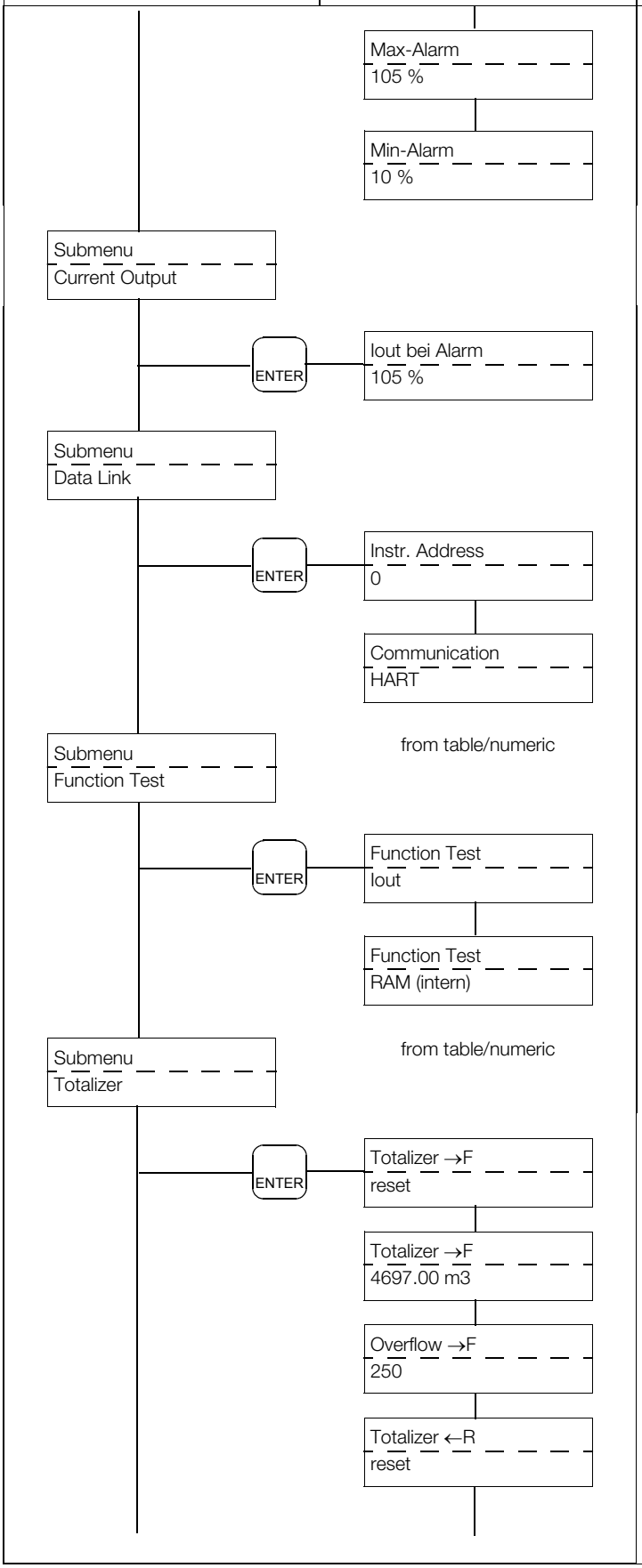
6.3 Data Entry in „Condensed Form“

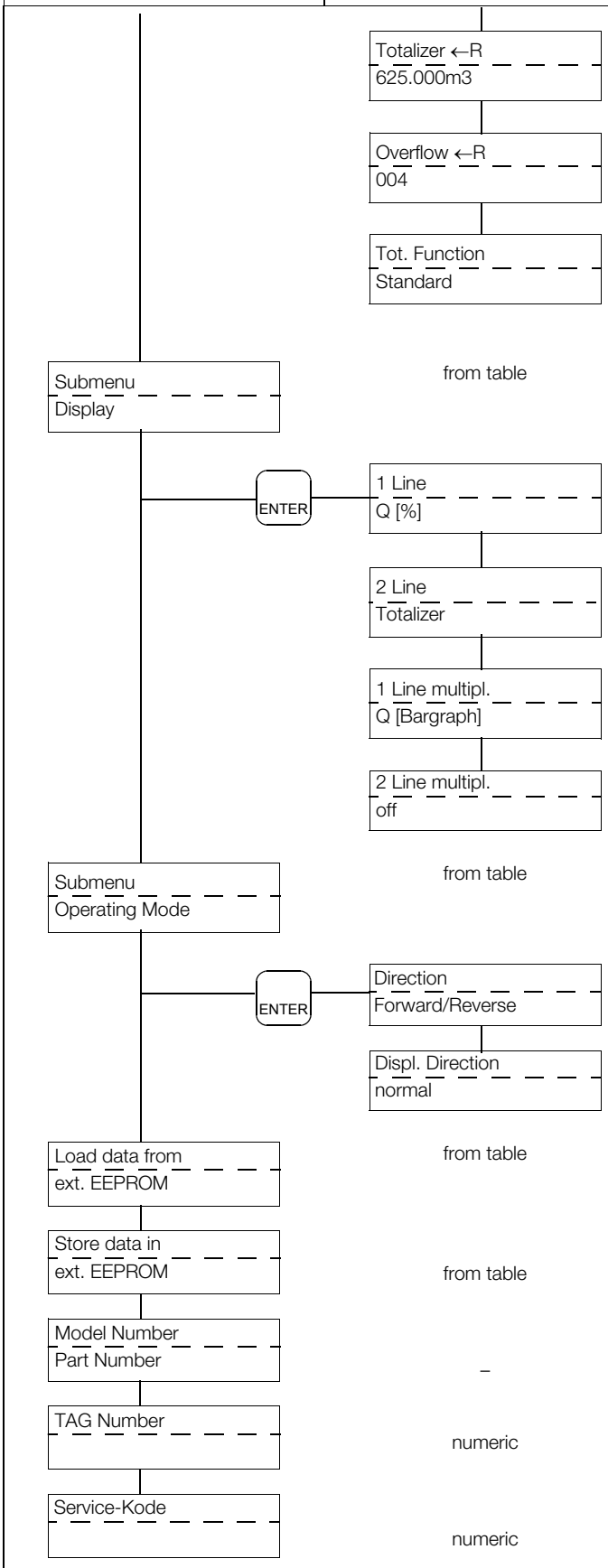


6.4 Parameter and Data Entry in "Condensed Form"

Submenu/Parameter	Entry Type	Comments
	from table/numeric numeric from table numeric numeric	Data can only be entered after the program protection has been turned off. on/off If a PP-Code other than "0" (factory setting) has been stored, then the program protection can only turned off after the appropriate PP-Code (1-255) has been entered. When the program protection is turned off, parameters can be changed. When the program protection is turned off, it is possible to enter a new PP-Code. Enter old PP-Code 0 = factory setting Enter new PP-Code (0-255) German, English The meter size of the flowmeter See Instrument Tag Automatic flow range end value setting determined form the meter size selection Flow range end value can be set from 0.05 $Q_{max\ DN}$ to 1 $Q_{max\ DN}$ Flow range for forward and reverse flow directions Min. flow range setting 0 - 0.5 m/s Max. flow range setting 0 - 10 m/s Flow range end value can be set between 0.5 and 10 m/s For int. and ext. flow totalization, range 0.001 - 1000 pulses per selected units, max. count Frequency 100 Hz. For external pulse output, Range 0.1 ms - 2000 ms C/CE Exit from Submenu

Submenu/Parameter	Entry Type	Comments
ENTER → Low Flow Cut-off 1.000 %		A low flow cut-off value from 0.5 to 10 % of amx can be set (applies to the current an pulse output). The minimum low flow cut-off value is calculated as follows: $\frac{Q_{maxDN}}{Q(\text{flow range setting})} \times 0,5\ \%$
Damping 10.0000 s	numeric	Range 2.0 - 100 s, Response time for 0 - 99 % of the flow change
Filter ein	numeric	On/off. Standard off, when output signals are noisy turn on the filter and set damping time to > 2.4 s.
Density 2.54300 g/cm3	numeric	Range 0.01 - 5 g/cm^3. For mass flowrate display indication and totalization in g, kg, t or pounds.
System_Zero 3.5 Hz		Zero check (only available at Software A.1X)
ENTER → Adjust manual		Manual entry, e.g. after a converter is exchanged 0 Hz must be set or automatic
Prog. Output Pulse Output	from table	Contact output terminals V8/V9 can be configured as: Max. alarm[1)], Min. alarm[1)], Max.-Min. alarm[1)], General alarm[1)], F/R direction signal[1)], Pulse output or no function [1)] Contact output can be configured to “open or close”.
Submenu Units	from table/numeric	C/CE → Exit from Submenu
ENTER → Units Qmax l/s		lbs/s, lbs/min, lbs/h, l/s, l/min, l/h, m^3/s, m^3/min, m^3/h, m^3/d, igps, igpm, igph, igpd, mgd, gpm, gph, bbl/s, bbl/min, bbl/h, bbl/d, kg/s, kg/min, kg/h, kg/d, t/min, t/h, t/d, g/s, g/min, g/h, kga/s, kga/min, kga/h
Totalizer Units m3		l, igal, gal, bbl, kg, t, g, lbs, kga, m^3
Units Factor 3785.41 Liter		User configurable flowrate units, based on liters; The value shown is for kgal (factory setting).
Unit name kga /s /min /h		Four character name for the user configurable units.
Prog. Units without Density		Programmable units for mass (with density) or volume (without density) flowrate units
Submenu Alarm	from table/numeric	C/CE → Exit from Submenu
ENTER → Error Register 0 . . . 3 . . .		All detected errors (Error 0-9, A, B, C) are stored. The error register can be cleared with ENTER.


Submenu/Parameter
Entry Type
Comments
Max-Alarm
105 %
Alarm limit, range 0 - 105 % of the flow range setting.
Min-Alarm
10 %
Alarm limit, range 0 - 105 % of the flow range setting.
Submenu
Current Output
C/CE
Exit from Submenu
ENTER
Iout bei Alarm
105 %
Current output during an alarm condition, can be set to 0 % or 105 %
Error 3 Flowrate > 105 %, always set to 22 mA %
Submenu
Data Link
C/CE
Exit from Submenu
ENTER
Instr. Address
0
Instrument address: 0-99
If multiple instruments are connected to a single bus, then each instrument must have a unique address.
Communication
HART
Activate the HART-Communication:
HART or off
Submenu
Function Test
from table/numeric
C/CE
Exit from Submenu
ENTER
Function Test
Iout
Function test of current output, enter value in mA
Function test of pulse output 1 Hz
For detailed information see Sect. 6.2
Function Test
RAM (intern)
Function test of the int. subassemblies, auto. tests, RAM (internal), EPROM (Progr.), lower EEPROM, upper EEPROM, Ext. EEPROM, Terminals V8/V9, Pulse Output (1 Hz), Display HART-Transmitter, HART-Command, Simulation and Test Mode.
Submenu
Totalizer
from table/numeric
C/CE
Exit from Submenu
ENTER
Totalizer →F
reset
The overflow counter can be reset with ENTER key.
If the overflow counter > 0, then the message Overflow >F reset is displayed.
Totalizer →F
4697.00 m3
Preset the totalizer (any totalizer value can be entered)
2nd line = present value
Overflow →F
250
Overflow counter max. 250, 1 overflow = pulse totalizer >9,999,999 units (displayed totalizer value is reset and one overflow is registered).
Totalizer ←R
reset
See forward direction totalizer


Submenu/Parameter
Entry Type
Comments
Totalizer ←R
625.000m3
See forward direction totalizer
Overflow ←R
004
See forward direction overflow counter
Tot. Function
Standard
Standard = separate forward and reverse flow totals each on its own totalizer.
Diff. totalizer = Forward and reverse flow totals are registered on a single totalizer and the difference displayed.
Submenu
Display
from table
C/CE
Exit from Submenu
ENTER
1 Line
Q [%]
Selections for the 1st line of the display: Flowrate in %, eng'g units, mA, bargraph, totalizer, forward totalizer, reverse totalizer, TAG-Number or blank line.
2 Line
Totalizer
See 1st Line
1 Line multipl.
Q [Bargraph]
In the multiplex mode it is possible to display an additional value in the 1st line:
Flowrate in %, Eng'g units, mA, bargraph, totalizer, forward totalizer, reverse totalizer, TAG-Number or blank line.
Display alternates every 10 seconds,
See 1st line multiplex
2 Line multipl.
off
Submenu
Operating Mode
from table
C/CE
Exit from Submenu
ENTER
Direction
Forward/Reverse
Select flow direction to be measured, both forward and reverse or forward only.
Displ. Direction
normal
Normal/Inverse
Reverse the flow direction indicators in the display
normal = flow direction same as arrow on flowmeter
inverse = flow direction opposite to arrow on flowmeter
Load data from
ext. EEPROM
from table
When a converter is exchanged, the data stored in the external EEPROM are automatically uploaded. It is also possible to upload the data stored in the external EEPROM by using this command.
Store data in
ext. EEPROM
from table
After the start-up has been completed, the meter location parameters stored in the converter can be downloaded into the external EEPROM.
Model Number
Part Number
–
Identification of the installed software version.
Date of issue and Revision level
TAG Number
numeric
An alphanumeric TAG-Number with a maximum of 16 characters, upper and lower case letters and/or numbers can be entered.
Service-Kode
numeric
Only for ABB Automation Products Service.

7 Parameter Entry

7.1 User Configurable Units

With this function it is possible to configure any desired engineering units.The following three parameters are available for this purpose:

a) **Units Factor**

b) **Unit Name**

c) **Programmable Units with/without Density**

Important:

Entries as described in a), b) and c) are only required if the desired unit is not listed in the table.

7.1.1 Units Factor / Numeric Entries

Units Factor
3785,41 Liter

In this parameter enter the factor which converts the new units to liters. The default entry is for kgal units: kgal = 3785.41 liters. **kga = Kilo gallons**

7.1.2 Unit Name / Entry from table

Unit Name
kgal /s /min /h

The selection is made using the STEP and DATA keys. Use DATA to scroll forward through the alphabet, first the lower case letters are displayed, then the upper case. The entry location can be shifted by pressing the STEP key. A max. of 4 characters can be entered.

The time units, /s, /min and /h can be assigned to the engineering units

7.1.3 Programmable Units / Entry from table

Prog. Units
without Density

This function is utilized to define whether the new units are gravimetric (with density) or volumetric (without density) flowrate units.

7.2 Submenu Function Test / Numeric Entries only for I_{out}

Submenu
Function Test

The Function Test menu includes 13 functions to test the instrument independent of the existing operating conditions.

When the Function Tests are active the converter is no longer on-line (current and pulse output values do not correspond to the present operating conditions). The individual test routines can be selected using the STEP and DATA keys.

I_{Out}, RAM (internal), EPROM (Program), lower EEPROM, upper EEPROM, external EEPROM, Terminals V8/V9, Display, Pulse output 1 Hz, Simulation and Test Mode.

The function tests can be terminated by pressing the C/CE key.

I_{Out} select, press ENTER and enter the desired value in mA. Measure the output value for agreement with the setting at the + and – connections with a digital voltmeter (mA range) or with the process instrumentation. Note: No automatic return to process measurements. Terminate by pressing the C/CE key

RAM (ASIC) select, press ENTER. The computer automatically tests the RAM and displays its diagnosis.

EPROM (Program) select, press ENTER. The computer automatically tests the EPROM and displays its diagnosis.

EEPROM select, press ENTER. The computer automatically tests the EEPROM and displays its diagnosis.

Klemme V8/V9 select, press ENTER. The STEP or DATA keys can be used to toggle the contact on or off. Use a test meter to monitor the status at the terminals V8/V9.

Pulse output[1] select, press ENTER. A signal with a frequency of 1 Hz is transmitted over the scaled pulse output with a pulse width of 500 ms.

Display select, press ENTER. The converter writes the numbers 0 to 9 and the letters A to F in the 1st and 2nd lines of the display. The operation of the dot matrix control can be visually checked.

****Simulation**** select, press ENTER. The simulation can be turned “on or off” using the STEP or DATA keys.

If the Simulation is turned on use C/CE to return to process measurements. Any desired flowrate value can be entered using the STEP (+) and DATA (-) keys in 1 % steps. The output values correspond the entered values. The message **Simulation** is displayed in the 2nd line for information alternately with the integrated totalizer value. The parameter **Simulation** should be turned off after the simulation routine has been completed.

Test Mode When the converter is to be checked with a Simulator[2], the parameter Test Mode **must** be switched to "**on**". **Note**: No automatic return to process measurements. Terminate using the C/CE key.

1) The selections in the parameter „Prog. Output“ can also be tested.
2) Simulator upon request

8 Error Messages and Tests

8.1 Error Messages of Data Entry

In the list below the Error Codes shown in the display are described. **Error Codes 0 to 9, A, B, C do not apply to data entry.**

Error Code	Detected System Errors	Corrective Measures
0	Not used	Not used
1	Not used	Not used
2	Not used	Not used
3	Flowrate greater than 105 %.	Reduce flowrate, change flow range
4	Not used	Not used
5	RAM corrupted 1. Error 5 is displayed 2. Error appears only in the Error Register	Program must be reinitiallized; Contact ABB Service department; Information: Corrupted data in RAM.
7	Not used	Not used
8	Not used	Not used
6	Error → F	Reset forward totalizer or enter new value in the preset totalizer.
	Error Totalizer ← R	Reset reverse totalizer or enter new value in the preset totalizer.
	Error Totalizer	Forward, reverse or difference totalizer defective, Reset forward/reverse totalizer.
9	Excitation defective	Contact ABB -Service department.
A	MAX-Alarm limit value	Reduce flowrate
B	MIN-Alarm limit value	Increase flowrate
C	Primary data invalid	The flowmeter primary data in the external EEPROM are invalid. Contact ABB -Service department.
10	Entry >1.00 Q_{max} DN >10 m/s.	Reduce flow range Q_{max} .
11	Entry <0.05 Q_{max} DN <0.5 m/s.	Increase flow range Q_{max}.
16	Entry >10 % Low flow cut-off.	Reduce entry value.
17	Entry < 0 % Low flow cut-off.	Increase entry value.
20	Entry ≥ 100 s Damping. Entry < 2 s	Reduce/increase entry value.
22	Entry >99 Instrument address.	Reduce entry value.
38	Entry >1000 Pulses/unit. Entry < 0.001 Pulses/unit.	Reduce/increase entry value.
40	Max. count frequency exceeded, scaled pulse output,	Reduce pulse factor.
41	Frequency below min. count frequency <0.00016 Hz.	Increase pulse factor.
42	Entry >2000 ms Pulse width. Entry < 01 ms	Reduce/increase entry value.
44	Entry >5.0 g/cm^3 Density.	Reduce entry value.
45	Entry <0.01 g/cm^3 Density. Entry < 0.01 g/cm^3	Reduce/increase entry value.
54	Flowmeter primary zero > 50 Hz	Check ground and ground signals. The adjustment can be made when the flowmeter is filled with fluid and the flowrate is at an absolute standstill.
74/76	Entry > 105 % MAX - or MIN-Alarm	Reduce entry value
99	Entry too large	Reduce entry value
99	Entry too small	Increase entry value

9 Maintanance and Repair

9.1 General Information

Before opening the housing all connections must be voltage free. When the housing is open the EMC-Protection, the personnel contact protection and the Ex-Protection are voided. After the supply power is tourned off wait at least 2 minutes before opening the housing. Before the housing is opened the security closures are to be loosened.

9.1.1 Flowmeter Primary

The flowmeter primary is essentially maintainence free. An annual check should be made of the ambient conditions (ventilation, humidity), the integrity of the process connection seals, the cable entry, the cover screws, the functional reliablility of the supply power and the Potential Equalization PA.

All repair or maintenance operations should only be made by qualified user personnel.

Observe the notes in the Hazardous Material Information section if the flowmeter primary is to be returned to the ABB Automation Products factory!

Notice!

Changes or repairs to explosion protected instruments should only be made by the manufacturer. If repair work is performed by others, then these instruments may only be placed back in service after a specialist has determined that the repairs were made in a proper manner and issued a certificate, or applied a test symbol on the instrument. Repairs or changes are to be made in accord with ElexV §9.

9.1.2 Flowmeter Primary Replacable Parts List

If repairs to the liner, electrodes or magnet coils are required the flowmeter primary should be returned to ABB Automation Products, Göttingen, Germany. Observe the notes in the Hazardous Material Information section. See 1.1.14 Returns.

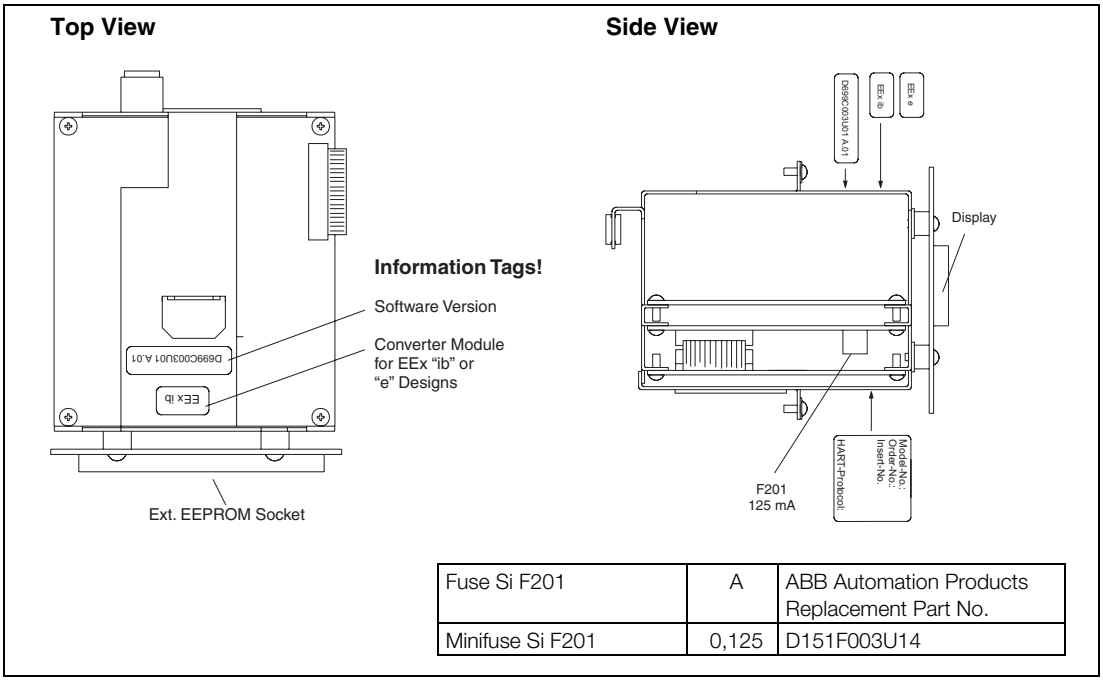
Replaceable Parts (Fuses)

For functional and safety reasons only original replacement parts from ABB Automation Products are to be used.

The fuses are safety relevany parts and can only be replaced by identical original parts.

- Ascertain that an explosion hazard does not exist.
- A fire permission certificate must be obtained. All connection leads must be potential free. The EMC-Protection is voided when the housing is opened. The surface temperature, as a function of the fluid temperature, may exceed 70 °C !

9.2 Converrter Circuit Boards



Fuse Si F201	A	ABB Automation Products Replacement Part No.
Minifuse Si F201	0,125	D151F003U14

Fig. 31: Converter Insert FXT4000 (COPA-XT)

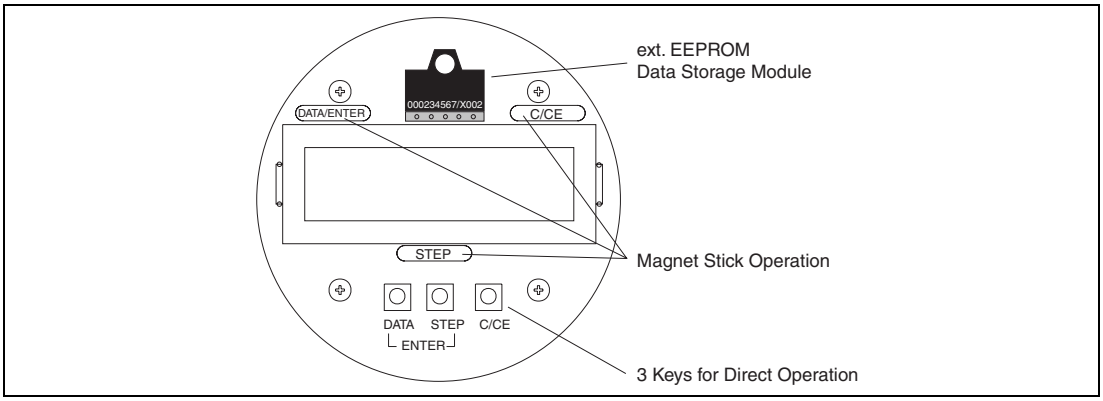


Fig. 32: Display Plate and ext. EEPROM Socket Location

10 Overview, Parameter Settings and Options

Meter location:			TAG-Nr.:	
Primary typ:			Converter typ:	
Order-No.:	Meter-No.:		Order-No.:	Meter-No.:
Fluid-Temp.:			Supply Voltage:	
Liner:	Electrodes:			
C_{zero}:	C_{span}:			

Parameter		**Entry Range**
Prog. Prot. Code	.....	0-255 (0=Factory setting)
Language	.....	English,German
Meter size	.....	DN 10 – 100
Q_{max} :	.....	0.05 Q_{maxDN} -1 Q_{maxDN}
Pulse factor:	.....	0.001 – 1000 pulses./eng´g unit
Pulse width:	.....	0,1 – 2000 ms
Low flow cut-off:	.....	0 – 10 % flow range end value
Damping:	.....	2 – 100 Seconds
Filter:	.....	ON/OFF
Dichte:	.....	0.01 g/cm^3 – 5.0 g/cm^3
Units Q_{max}.:	.....	l/s, l/min, l/h, m^3/s, m^3/min, m^3/h, m^3/d, igps, igpm, igph, igpd, mdg, gpm, gph, bbl/s, bbl/min, bbl/h, bls/day, bls/min, bls/h, kg/s, kg/min, kg/h, kg/d, t/min, t/h, g/s, g/min, g/h, lbs/s, lbs/min, lbs/h, kga/s, kga/min, kga/h,
Units totalizer:	.....	l, m^3, iga, gal, bbl, g, kg, t, lbs, kga
Max. Alarm:	.....	%
Min. Alarm:	.....	%
Terminals V8/V9:	.....	Max. Alarm, Min. Alarm, Max./Min. Alarm, General alarm, F/R-Direction signal, no funktion
Current output:	.....	4-20 mA
I_{out} at alarm:	.....	0 %, 105 %
Totalizer function:	.....	Standard, Difference totalizer
1st Display line:	.....	Q (%), Q (Units), Q (mA), Totalizer F/R, TAG-Number Blank line, Bargraph
2nd Display line:	.....	Q (%), Q (Units), Q (mA), Totalizer F/R, TAG-Number Blank line, Bargraph
1st Zeile multiplex:	.....	ON/OFF
2nd Zeile multiplex:	.....	ON/OFF
Flow direction:	.....	Forward/Reverse Forward
Direction indication:	.....	Normal, Invers
Store data in ext. EEPROM:	.....	Yes/No

Pulse output:	❑ Yes	❑ No
Contact output:	❑ Yes	❑ No
Communication:	❑ HART-Protocol	❑ No

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TÜV
CERT

(1) **EG-Type Examination Certificate**

(2) Equipment or Protective Systems intended for use in potentially explosive atmospheres - **Directive 94/9/EC**

(3) **TÜV 98 ATEX 1333 X**

(4) Equipment: Electromagnetic Flowmeters Type DT2. and DT4.

(5) Manufacturer: Bailey-Fischer & Porter GmbH

(6) Address: Dransfelder Straße 2
D-37079 Göttingen [Germany]

(7) This equipment and any acceptable variations thereto are specified in the schedule to this certificate and documents therein referred to.

(8) The TÜV Hannover/Sachsen Anhalt e.V., TÜV Certification Body No. 0032 in accordance with the Article 9 of the European Community Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Safety and Health Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II of the Directive.

The examination and test results are recorded in the confidential report No. 98/PX1708.

(9) Compliance with the Essential Safety and Health Requirements has been assured by the compliance with

EN 50 014:1977 + A1...A5 **EN 50 020:1977 + A1...A5** **EN 50 019:1977 + A1...A5**

EN 50 018:1977 + A1 ... A3 **EN 50 028:1987**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to the special conditions for safe use specified in the schedule to this certificate.

(11) This EC-TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment or protective system. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The markings for the equipment shall include the following:

II 2G EEx em [ib] IIC T3...T6
or II 2G EEx emd [ib] IIC T3...T6
or II 2G EEx ed IIC T6
or II 2G EEx ed [ib] IIC T6

TÜV Hannover/Sachsen-Anhalt e.V.
TÜV CERT-Certification Authority
Am TÜV 1
D-30519 Hannover ;Germany

Hannover, 03 Aug 1998

On behalf Richter

Head of the Certification Body

Translated of German Original

(13) **SCHEDULE**

(14) **EC-Type Examination Certificate No. TÜV 98 ATEX 1333 X**

(15) Description of the Equipment

The Electromagnetic Flowmeters Types DT2. and DT4. are used for measuring proportionally the flowrate of electrically conductive and flowable fluids. Flammable liquids are allowed when they are free of air or oxygen to such a degree that they do not continuously or for long periods of time form an explosive mixture.
The flowmeters consist of a flowmeter primary in sizes DN 3 to DN 300 [1/8" - 12"] and their accompanying converters.
In reference to explosion protection the following combinations are possible:

Model DT.6: Flowmeter primary connected by a signal cable to a converter mounted in a non-explosion hazardous area
Ignition Class of the flowmeter primary: **EEx em [ib] IIC T3 ... T6**

Model DT.7: Compact design with the converter mounted directly on the flowmeter primary
Ignition Class: **EEx emd [ib] IIC T3 ... T6**

Model DT.8: Compact design flowmeter primary connected by a signal cable to a converter (both instruments mounted in the explosion hazardous area)
Ignition Class of the flowmeter primary: **EEx em [ib] IIC T3 ... T6**
Ignition Class of the converter: **EEx ed IIC T6**

To the supply circuit and binary output of Models DT.7 and DT.8 Intrinsically Safe circuits can also be connected:

Model DT.7: Compact version with the converter mounted directly on the flowmeter primary
Ignition Class: **EEx emd [ib] IIC T3 ... T6**

Model DT.8: Compact version flowmeter primary connected by a signal cable to a converter (both instruments mounted in the explosion hazardous area)
Ignition Class of the flowmeter primary: **EEx em [ib] IIC T3 ... T6**
Ignition Class of the converter: **EEx ed [ib] IIC T6**

The ambient temperature range is -20°C ... +60°C.

The maximum allowable fluid temperature [°C] as a function of the temperature class, the maximum allowable ambient temperature, the Model No. and the meter size is listed in the following table:

Model	Size DN	Temperature Class	Maximum Allowable Ambient Temperature			
			40°C [insul.]	50°C [insul.]	60°C [insul]	Cable Conn.. 80°C [insul.]
Primary DT26+DT28 DT46+DT48	3-40	T3	130 [-]	--	--	--
		T4	110	110 [95]	90 [80]	--
		T5	75	75	75	--
		T6	60	60	60	--
	50-100	T3	135 [-]	135 [-]	120 [-]	--
		T4	115 [110]	115 [95]	115 [-]	--
		T5	85	85	85	--
		T6	70	70	70	--
Primary DT46+DT48	125-300	T3	140 [-]	140 [-]	--	--
		T4	125 [110]	125 [95]	120 [-]	--
		T5	90	90	90 [80]	--
		T6	75	75	75	--
DT27 DT47	3-20	T3	130 [125]	130 [125]	--	130 [120]
		T4	110	110	85	110
		T5	75	75	75	75
		T6	60	60	60	60
	25-32	T3	125	125	--	120
		T4	110	110	85	110
		T5	75	75	75	75
		T6	60	60	60	60
	40-100	T3	135	125	--	120
		T4	115	115	--	115
		T5	80	80	80	80
		T6	70	70	70	70
DT47	125-300	T3	140	140	--	145
		T4	125	125	--	125
		T5	90	90	85 [80]	90
		T6	75	75	75	75
Converter for flowmeter primary Models DT 28 and DT 48: Temperature Class T6 at T_{amb} = 60°C						

Comments: The values in brackets refer to the thermal behavior of insulated pipelines; cells without bracketed values apply to both designs.
The lowest allowable fluid temperature is -25°C.

Electrical Specifications

Model DT.6 and Flowmeter Primary of the Compact Version Model DT.8

Signal circuit ..... non-Intrinsically Safe circuit
(Connection terminals 1 and 2) max. Voltage: U_m= 60 V
operating values: U_b = 5 V, I_b = 50 mA

Shield of the Signal circuit ..... non-Intrinsically Safe circuit
(Connection terminals 1S and 2S) max. Voltage: U_m= 60 V
operating values: U_b = 5 V, I_b = 0.5mA

Ground ..... connected to potential equalization
(Terminal 3)

Excitation circuit ..... non-Intrinsically Safe circuit
(Connection terminals M1 and M2) max. Voltage: U_m= 60 V
operating values: U_b = 15 V, I_b = 100mA

Outer shield ..... non-Intrinsically Safe circuit
(Clamp terminal SE)

Models DT.7 and DT.8 with Non-Intrinsically Safe Circuits

Supply circuit ..... operating values: $14V \le U_b \le 55V$ $3.8mA \le I_b \le 22mA$
(Connection terminals TW+ and TW-) max. Voltage: U_m= 60 V

Binary output ..... Operating values: $19V \le U_b \le 33V$ $2mA \le I_b \le 110mA$
(Connection terminals V8 and V9) max. Voltage: U_m= 60 V

Models DT.7 and DT.8 with Intrinsically Safe Circuits

Supply circuit..... in Ignition Type Intrinsically Safe EEx ib IIC/IIB
(Connection terminals TW+ and TW-) for connection to a certified Intrinsically Safe circuit with the following maximum values:
U_i = 30 V
I_i = 100 mA
P_i = 760 mW
effective internal capacitance: 13 nF
The effective internal inductance is negligibly small.

Translated from the German Original
Schedule EC-Type Examination Certificate No. TÜV 98 ATEX 1333 X

Binary output .... (Connection terminals V8 and V9)
in Ignition Type Intrinsically Safe EEx ib IIC/IIB for connection to a certified Intrinsically Safe circuit with the following maximum values:

U_i = 20 V
I_i = 30 mA
P_i = 150 mW
effective internal capacitance: 2.4 nF
effective internal inductance: 67 µH

The supply circuit and the binary output in the versions of Models DT.7 and DT.8 with Intrinsically Safe circuits are connected to the potential equalization.

All specified voltage values of U_m = 60 V are the maximum values, for safety reasons, which can be applied to the connection terminals without compromising the intrinsic safety.

100% Tests

The 100% pressure tests required by EN 50 018 can be eliminated because in accordance with Paragraph 15.2 a type test with four times the reference pressure was successfully completed.

(16) Test documentation consisting of 13 pages including 13 drawings, a EC-Type Examination Certificate and a Certificate of Compliance are listed in the Examination Report.

(17) Special Conditions

1.
All external ground connections terminals are to be connected to the potential equalization in the explosion hazardous area. The installation requirements currently in effect are to be observed.

2.
When the pipeline is insulated the corresponding values in the table are to be observed.

3.
Since the Intrinsically Safe circuit is grounded during operation, all the Intrinsically Safe circuits in the entire region of the installation must be at the equalization potential.

(18) Standard Safety and Health requirements

No additional

Page 5/5

11.2 EC-Certificate of Compliance

ABB

EG-Konformitätserklärung
EC-Certificate of Compliance

Hiermit bestätigen wir die Übereinstimmung der
Herewith we confirm that our

Magnetisch-induktiven Durchflußmesser
Electromagnetic Flowmeter

Modell DT26.., DT27.., DT28.., DT46.., DT47.., DT48..
Model

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

Die magnetisch-induktiven Durchflußmesser dienen zur durchflußproportionalen Messung leit- und fließfähiger Meßstoffe. Als Meßstoffe sind brennbare Medien zulässig, wenn diese soweit frei von Luft- oder Sauerstoff sind, daß sie nicht ständig oder langzeitig ein explosionsfähiges Gemisch bilden.
The electromagnetic flowmeter are utilized to meter electrical conductive fluids. As long as the combination with air or oxygen is not a permanent or long time hazardous mixture flammable fluids are allowed.

EG-Baumusterprüfbescheinigung: TÜV 98 ATEX 1333 X
EC-Type Examination Certificate:

Benannte Stelle: TÜV Hannover/Sachsen-Anhalt e.V., Kennummer 0032
Notified Body:

Geräte-Kennzeichnung: DT26.., DT46.. II 2G EEx em [ib] IIC T3...T6
Apparatus code: DT27.., DT47.. II 2G EEx emd [ib] IIC T3...T6
DT28.., DT48..
➥ Aufnehmer / *Primary* II 2G EEx em [ib] IIC T3...T6
➥ Meßumformer / *Converter* II 2G EEx ed IIC T6
II 2G EEx ed [ib] IIC T6

Sicherheitstechnische Daten: siehe EG-Baumusterprüfbescheinigung TÜV 98 ATEX 1333 X
Safety values: *refer to EC-Type Examination Certificate TÜV 98 ATEX 1333 X*

Angewandte Normen: EN 50 014: 1977 + A1...A5 EN 50 018: 1977 + A1...A3
Standards: EN 50 019: 1977 + A1...A5 EN 50 020: 1977 + A1...A5
EN 50 028: 1987

Göttingen, 11. Dezember 2000

Unterschrift / *Signature*

BZ-13-8007, Rev.01, 2628

ABB Automation Products GmbH

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ABB

EG-Konformitätserklärung
EC-Declaration of Conformity

CE 0045

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

Hersteller: *manufacturer:*	ABB Automation Products GmbH, 37070 Göttingen - Germany
Modell: *model:*	SE2_F, D_2_F, SE4_F, D_4_F *SE2_F, D_2_F, SE4_F, D_4_F*
Richtlinie: *directive:*	Druckgeräterichtlinie 97/23/EG *pressure equipment directive 97/23/EC*
Einstufung: *classification:*	Ausrüstungsteile von Rohrleitungen *piping accessories*
Normengrundlage: *technical standard:*	AD 2000 Merkblätter
Konformitätsbewertungsverfahren: *conformity assessment procedure:*	B1 (EG-Entwurfsprüfung) + D (Qualitätssicherung Produktion) *B1 (EC design-examination) + D (production quality assurance)*
EG-Entwurfsprüfbescheinigungen: *EC design-examination certificates:*	Nr. 07 202 4534 Z 0601 / 3 / H
benannte Stelle: *notified body:*	TÜV Nord e.V. Rudolf-Diesel-Str. 5 37075 Göttingen - Germany
Kennnummer: *identification no.*	0045

Göttingen, den 10.02.2003

ppa .....
(B.Kammann, Standortleiter APR Göttingen)

2310 BZ-25-0002 Rev 03

ABB

EG-Konformitätserklärung
EC-Certificate of Compliance

CE

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

Herewith we confirm that the listed instruments are in compliance with the council directives of the European Community. The safety and installation requirements of the product documentation must be observed.

Modell: *Model:*	DT4…	
Richtlinie: *Directive:*	EMV Richtlinie 89/336/EWG * EMC directive 89/336/EEC *	
Europäische Norm: *European Standard:*	EN 50081-1, 3/93 * EN 50082-1, 3/93 *	EN 50081-2, 3/94 * EN 50082-2, 2/96 *

* einschließlich Nachträge
including alterations

Göttingen, 12.05.2000

.....
Unterschrift / Signature

BZ-13-5027, Rev.1, 1699

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ABB optimiert kontinuierlich ihre Produkte,
deshalb sind Änderungen der technischen Daten
in diesem Dokument vorbehalten.

Printed in the Fed. Rep. of Germany (07.05)

D184B104U02 Rev. 03

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