Operating Instruction

D184B069U02

Electromagnetic Flowmeter FXP4000 (PARTI-MAG II)

for Full and Partially Full Pipelines
(Free and Surface Pipeline)

Valid as of software-level A.20

Flowmeter Primary:

FXP4000-DP41F
FXP4000-DP46F

External Converter:

FXP4000-XP2 (50XP2000)

Electromagnetic Flowmeter
FXP4000 (PARTI-MAG II)

Operating Instruction

D184B069U02

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Introductory Safety Notes for the EMF System

Regulated Usage
The electromagnetic flowmeter system PARTI-MAG II is designed to the latest state of the art technology and is safe to operate. The PARTI-MAG II is to be installed only in the specified applications.

Every usage which exceeds the specified applications is considered to be non-specified. Any damages resulting therefrom are not the responsibility of the manufacturer.

The application specifications include the installation, start up, and service requirements specified by the manufacturer.

Installation, Start Up, and Service Personnel
Please read this Instruction Manual and the safety notes before attempting installation, start up, or service.

Only qualified personnel should have access to the instrument. The personnel should be familiar with the warnings and operating requirements contained in this Instruction Manual.

Observe that the connections are in accordance with the interconnection diagrams. Ground the flowmeter system.

Observe the warning notes designated in this document by the symbol:

Hazardous Material Information

In view of the Disposal Law of 27.08.86 (AbfG. 11 Special Wastes) the owner of special wastes is responsible for its care and the employer also has, according to the Hazardous Material Law of 01.10.86 (GefStoffV, 17 General Protection Responsibility), a responsibility to protect his employees, we must make note that:

a) All flowmeter primaries and/or converters which are returned to ABB Automation Products for repair are to be free of any hazardous materials (acids, bases, solutions, etc.)

b) The flowmeter primaries must be flushed so that the hazardous materials are neutralized. There are cavities in the primaries between the metering spool and the housing. Therefore after metering hazardous materials the cavities are to be neutralized (see Hazardous Material Law -GefStoffV). For two piece housings the screws used to hold the sections together should be loosened. For primaries DN 350 the drain plug at the lowest point in the housing is to be opened to remove the hazardous materials and to neutralize the coil and electrode cavities.

c) For service and repair **written confirmation** is required that the measures listed in a) and b) have been carried out.

d) Any costs incurred to remove the hazardous materials during a repair will be billed to the owner of the equipment.

1 Functional Description

The electromagnetic flowmeters from ABB Automation Products “EMF” are the ideally suited flowmeters for metering the flow of all liquids, slurries and sludges who have a specific minimum electrical conductivity. These flowmeters measure accurately, create no additional pressure drop, contain no moving or protruding parts, are wear free and corrosion resistant. Installations are possible in all existing piping systems without difficulty.

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

1.1 Measurement Principle of PARTI-MAG II

The Faraday’s Laws of Induction form the basis for the electromagnetic flowmeter. The conductive fluid flows through the metering tube perpendicular to the direction of the magnetic field

$U_E \sim B \cdot D \cdot V$

The voltage induced in the fluid is measured by a number of electrode pairs. These are located in the metering tube so that at every flow cross section (full or partially full) the appropriate weighting factor corrected electrode pair is utilized for the flow signal measurement. An additional electrode is integrated for full pipe recognition.

The four electrode pairs in addition to optimally measuring the average flow velocity detect a superimposed alternating current field for determination of the fill height.

Utilizing the characteristic curves stored in the converter and the fill height information the signal voltage U_E is corrected and converted to a flowrate proportional output signal.

1.2 Design

The eletromagnetic flowmeter PARTI-MAG II consists of a flowmeter primary model DP41F (standard) or model DP46F (Ex-design) which is installed in the pipeline an of a converter model FXP4000-XP2 (50XP2000) which can be mounted locally or at a central station remote. The max. allowable length of the signal cable between flowmeter primary and remotely mounted converter is 50 m. The converter has to be mounted outside the ex-area.

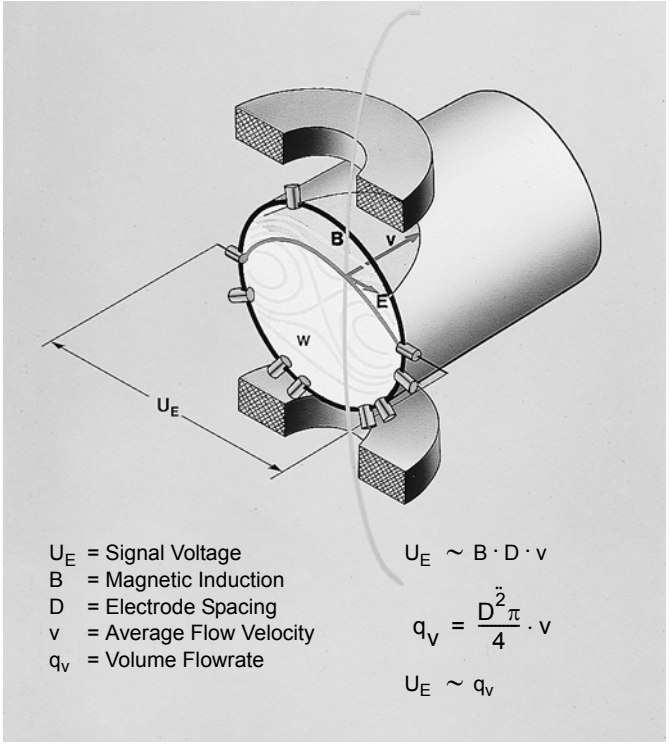


Fig. 1 Measurement Principle

2 Safety

2.1 General Safety Information

The "Safety" chapter provides an overview of the safety aspects to be observed for the operation of the device.

The device is built based on state-of-the-art technology and is operationally safe. It was tested and left the factory in a proper state. The requirements in the manual as well as the documentation and certificates must be observed and followed in order to maintain this state for the period of operation.

The general safety requirements must be complied with completely during operation of the device. In addition to the general information, the individual chapters of the manual contain descriptions about processes or procedural instructions with specific safety information.

Only the observance of all safety information enables the optimal protection of personnel as well as the environment from hazards and the safe and trouble-free operation of the device.

2.2 Intended use

This device is intended for the following uses:

- To transmit fluid or pulpy substances with electrical conductivity.
- To measure the flowrate of the operating volume.

The following items are included in the intended use:

- Read and follow the instructions in this manual.
- Observe the technical ratings; refer to the section "Technical limit values".
- Use only allowed liquids for measurement; refer to the section "Allowed fluids".

2.3 Improper use

The following uses of the device are prohibited:

- Operation as a flexible adapter in piping, e.g., to compensate for pipe offsets, pipe vibrations, pipe expansions, etc.
- Use as a climbing aid, e.g., for assembly purposes.
- Use as a support for external loads, e.g., as a support for pipes, etc.
- Material gain, e.g., by painting over the name plate or adding parts by welding / soldering.
- Material loss, e.g., by drilling the housing.

Repairs, alterations and enhancements or the installation of replacement parts is only permissible as far as described in the manual. Further actions must be verified with ABB Automation Products GmbH. Excluded from this are repairs performed by ABB-authorized specialist shops.

2.4 Technical limit values

The device is designed for use exclusively within the stated values on the name plate and within the technical limit values specified in the data sheets.

The following technical limit values must be observed:

- The permissible pressure (PS) in the permissible fluid temperature (TS) may not exceed the pressure-temperature ratings.
- The maximum operating temperature may not be exceeded.
- The permitted ambient temperature may not be exceeded.
- The housing protection class must be observed.
- The flowmeter primary may not be operated in the vicinity of powerful 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 mm should be maintained (based on IEC801-2 and IECTC77B).

2.5 Allowed Fluids

When measuring fluids, the following points must be observed:

- Fluids may only be used if, based on state-of-the-art technology or the operating experience of the user, it is assured that chemical and physical properties of the components coming into contact with the fluids (signal electrodes, ground electrodes, liners and, possibly, process connections, protective plates or protective flanges) are not affected during the operating life.
- Fluids with unknown properties or abrasive agents may only be used if the operator can perform regular and suitable tests to ensure the safe condition of the device.
- Observe the information on the name plate.

2.6 Operator liability

Before the use of corrosive and abrasive measuring medium, the operator must clarify the resistance of all parts that come into contact with the medium to be measured. ABB will gladly support you with the selection, however, cannot accept any liability.

The operators must strictly observe the applicable national regulations in their countries with regards to installation, function tests, repairs, and maintenance of electrical devices.

2.7 Personnel qualification

The installation, commissioning and maintenance of the device may only be carried out through trained specialist personell authorized by the plant operator. The specialist personnel must have read and understood the manual and comply with its instructions.

2.8 Installation safety information

Observe the following instructions:

- The flow direction must correspond to the direction indicated on the device, if labeled.
- Comply with the maximum torque for all flange bolts.
- Install the devices without mechanical tension (torsion, bending).
- Install flange units with coplanar counter flanges.
- Only install devices for the intended operating conditions and with suitable seals.
- Secure the flange bolts and nuts against pipeline vibrations.

2.9 Electrical installation safety information

The electrical connection may only be performed by authorized specialists according to the electrical plans.

Comply with electrical connection information in the manual. Otherwise, the electrical protection can be affected.

Ground the measurement system according to requirements.

2.10 Operating safety information

During operation with hot fluids, contact with the surface may result in burns.

Aggressive fluids may result in corrosion and abrasion of the liner or electrodes. As a result, pressurized fluids may escape prematurely.

Due to wear on the flange seal a pressurized medium may escape.

2.11 Maintenance and inspection safety information

Warning - Risk to persons!

When the housing cover is open, EMC and protection against contact are suspended. There are electric circuits within the housing which pose a contact risk.

The auxiliary power must be switched off before opening the housing cover.

Warning - Risk to persons!

The inspection screw (for draining condensate fluid) for devices ≥ DN 300 can be under pressure. The medium which spurts out can cause severe injuries.

Depressurize pipes before opening the inspection screw.

Corrective maintenance work may only be performed by trained personnel.

- Depressurize the device and adjoining lines or containers before removing the device.
- Check whether hazardous materials are used as materials to be measured before opening the device. Residual amounts of hazardous material may still be present in the device and could escape when the device is opened.
- As far as provided in the scope of the operational responsibility, check the following items through a regular inspection:
  - the pressure-carrying walls / lining of the pressure device,
  - the measurement-related function,
  - the leak tightness,
  - the wear (corrosion).

3 Transport

3.1 Inspection

Check the devices for possible damage that may have occurred from improper transport. Damages in transit must be recorded on the transport documents. All claims for damages must be claimed without delay against the shipper and before the installation.

3.2 General information on transport

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

- The center of gravity may not be in the center of the device.
- The protective pates or dust caps mounted at the process connections of devices equipped with PTFE/PFA may only be removed before installation. To prevent possible leakage, make sure that the liner is not cut or damaged.
- Flanged units may not be lifted by the terminal box.

3.3 Transport of flanged units

Warning - Danger of injuries due to slipping meter.

The center of gravity for the complete device may be higher than the lifting straps.

Make sure the device has not rotated or slipped unintentionally during transport. Support the meter laterally.

For transport of flanged units < DN 300 use a lifting strap. Wrap the straps around both process connections when lifting the device. Avoid chains since these may damage the housing.

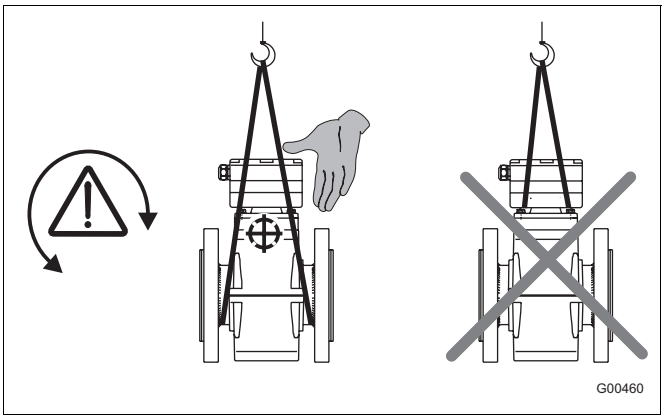


Fig. 2 Transport of flanged units < DN 300

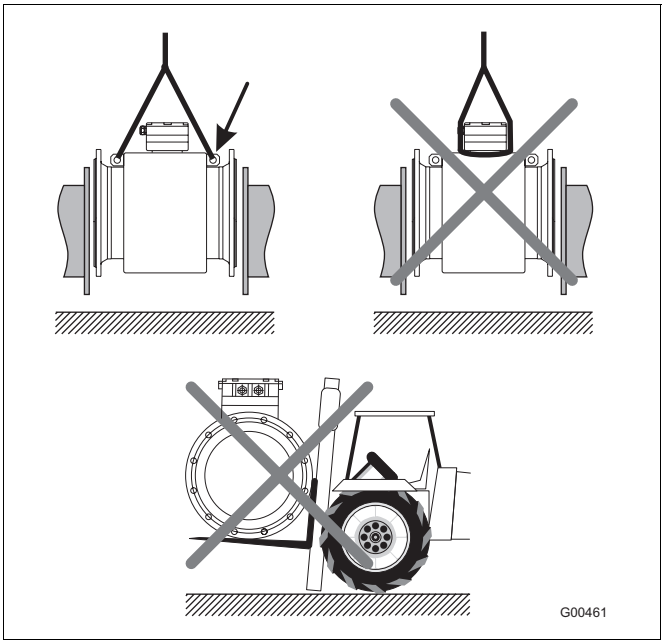


Fig. 3 Transport of flanged units > DN 250

4 Assembly and Installation

4.1 Electrode Axis

The installation orientation of the electromagnetic flowmeter primary for metering in partially full pipelines must be axisymmetric and care must be exercised to assure that the axis of upper electrode pair is exactly horizontal. An ideal installation with a horizontal electrode axis is shown in Fig. 4. A level is built into the connection box of the flowmeter primary as an aid for levelling the flowmeter primary.

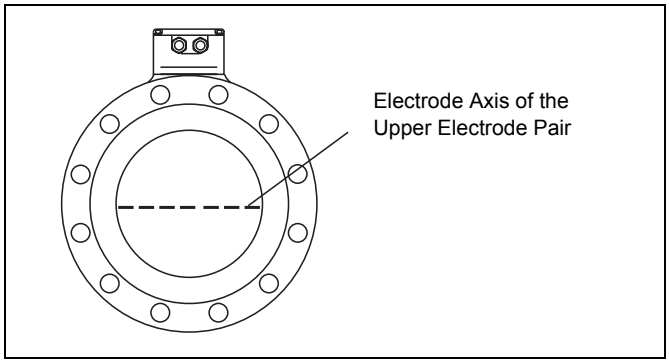


Fig. 4 Electrode Axis

4.2 Requirements within the metering section

4.2.1 Flow profile and pipeline slope

The flow profile within the metering section must be axisymmetric when the pipeline is full. The flow must be free from swirl and pulsations. No standing eddies should exist in the area of signal generation, such as may exist after space bends or tangential entries.

The water surface must not have any slope perpendicular to the flow direction such as might occur after elbows. Hydraulic jumps in the metering section should be avoided. The max. allowable pipeline slope is 5 % (5 cm per meter). Slope changes between the in- and outlet sections should be avoided. The optimal slope is between 0.8 to 1.5 %.

4.2.2 Conductivity

The conductivity of the liquid has to be within the range of 50 µS/cm up to 10 mS/cm.

4.2.3 Filling level withhin the magmeter

The minimum required filling level is 10 % of the primary diameter (15 % only with size DN 150). If this will not be exceeded, the flow will not be measured. When sizing the primary check if the 10 % filling level is assured. If not reduce the diameter of the primary. The filling level for max. drainage should clearly exceed 50 %. The filling level for normal flow, which occurs most of the time, should be greater than min. 30 %.

4.2.4 Sedimentation, Cleaning

Settings of sediments at the bottom of the meter should be avoided. This can be done by choosing a sufficient pipeline slope. If these requirements will not be met, a regular cleaning of the meter tube is necessary.

4.2.5 Mounting converter

When selecting a mounting location do not expose the converter to direct sunlight. The permitted operating temperature for the converter may not be exceeded.

4.3 In- and outlet sections

Straight sections with the same diameter as the flowmeter primary should be installed on either side of the flowmeter primary with lengths of at least 5 times the flowmeter diameter upstream and 3 times downstream (Fig. 5). If a vertically closing gate valve is installed downstream of the flowmeter primary, the outlet section length can be reduced to 2 times the flowmeter diameter. Sharp edges should be avoided in the area of the flowmeter primary and the pipeline. No additional in- or outlets may be located in the upstream section. For cleaning and inspection purposes the installation of an inspection opening is recommended.

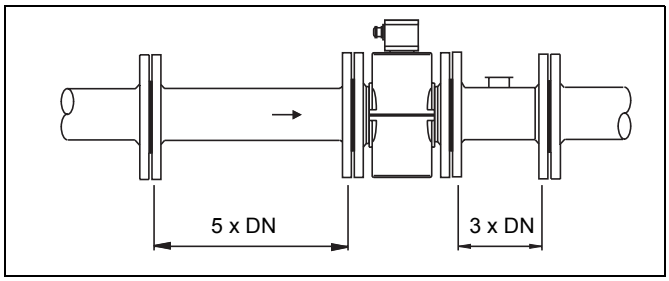


Fig. 5 In- and Outlet Sections

4.4 Torque Specifications for flanges

The flange 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. 6. Tighten the bolts during the first pass to ca. 50 % of the max. torque value, in the second pass to ca.80 % and only during the third pass to the max. torque specification.
The max. torque value should not be exceeded (see Table).

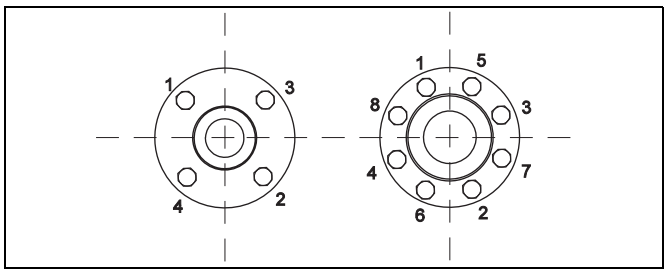


Fig. 6

Liner	Meter Size mm	Process Connections	Bolts	Torque max. Nm	Press. Rating bar
Hard Rubber	150	Flanged,	8 x M20	82,5	16
DN 150 ...	200	welded	12 x M20	81,0	16
DN 2000	250		12 x M24	120	16
	300		12 x M24	160	16
PTFE:	350		16 x M24	195	16
DN 150 ...	400		16 x M27	250	16
DN 600	500		20 x M24	200	10
	600		20 x M27	260	10
	700		24 x M27	300	10
	800		24 x M30	390	10
	900		28 x M30	385	10
	1000		28 x M33	480	10
	1200		32 x M30	365	6
	1400		36 x M33	480	6
	1600		40 x M33	500	6
	1800		44 x M36	620	6
	2000		48 x M39	725	6

Note

Itis important that graphite not be used for the gasketsat the flange connections because in certain instances a conductive layer can form on the inside surace of the liner which may short out the flow signal.The flowmetering system should not be installed in the viciniy of strong electromagnetic fields. Pipeline vacuum shocks are to avoided when PTFE or PFA lined flowmeter primaries are installed.

4.5 Pipeline Adapters

Transitions and adaptors to pipelines or other geometric shapes are to be designed to take into account the previous in- and outlet section requirements. Steps in the bottom of the pipeline are to be avoided.

4.6 Transport of flanged units larger than DN 300

Caution - Potential damage to parts!

Use of a forklift to transport the device can bent the housing and damage the internal magnet coils.

Flanged units may not be lifted at the middle of the housing when transporting via forklift.

Flanged units may not be lifted by the terminal box or at the middle of the housing. Use only the eye bolts on the device to lift and install it in the pipeline.

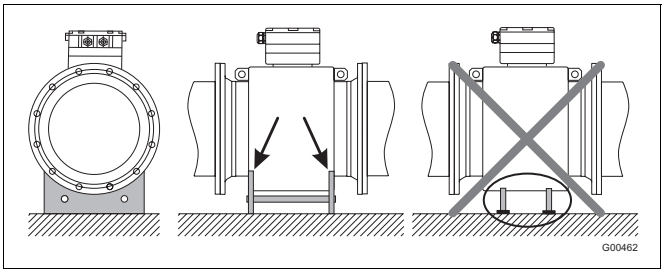
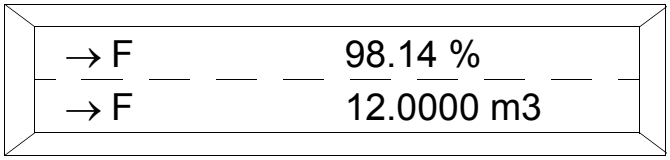


Fig. 7 Transport of flanged units > DN 300

5 Programming of the converter

5.1 General

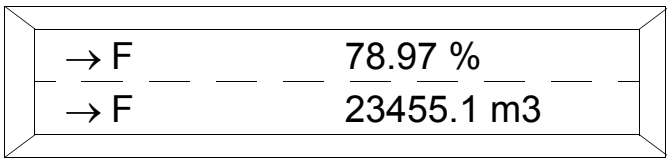
The present flow direction is displayed in the first line (>F for Forward < R for Reverse) together with the instantaneous flowrate value in percent or engineering units. Optionally the fill height (Fh) in percent can also be displayed.



The totalizer value for the present flow direction is displayed in the second line with a maximum of 7 digits followed by the corresponding units. The totalizer value represents the actually measured flow volume independent of the pulse factor settings. This display configuration is designated as “Process Information” in the following text.

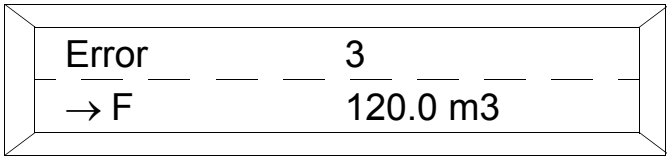
The totalizer value for the other flow direction can be displayed by pressing the Tot.-key.

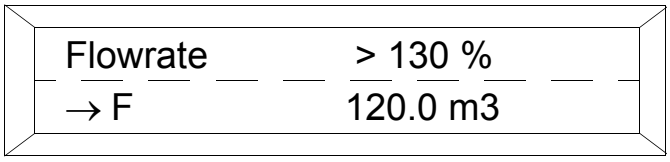
A totalizer overflow occurs whenever the totalizer value reaches 9,999,999 units. When the totalizer value for one of the flow directions exceeds 9,999,999 units, the flow direction indicator in the second line blinks (>F or <R) together with the totalizer units (e.g. m^3). The software can record up to 255 totalizer overflows. The overflow message can be cleared for each flow direction by pressing ENTER.

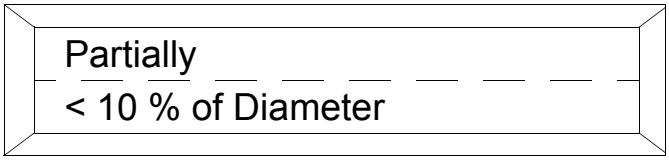


The totalizer has overflowed; >F and m3 blink.

If an error is detected an error message is displayed in the first line. For information, please refer to chapter 5.1.







When the fill height drops below 10% of the flowmeter primary diameter the output signals are automatically turned off and a corresponding error message is displayed on the converter. The output signals are turned off when the fill height is less than 15 % in meter size 150 only.

In addition to the error message in the display (applies to all error messages) the alarm relay is actuated. The current output can be configured to go to either 0 or 130 % when the alarm relay has been activated. In addition all error messages are stored in the Submenu "Instrument Status" and differing from the process information display, all error messages are described in detail.

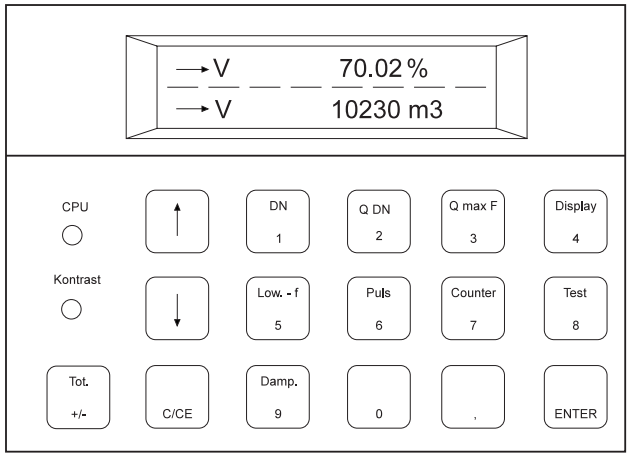
5.2 Data Entry at the Converter

Data is entered using the 16-key foil keypad. The desired parameter or function can be selected using the Direct Access keys (meter size, meter range, Qmax, pulse factor, damping and low flow cutoff) or by scrolling with the arrow keys.

The name of the parameter is displayed in the first line its setting value with units in the second line. An automatic return to the process information display occurs after ca. 20 seconds or immediately by pressing the C/CE-key.

The converter always remains on-line during the configuration, i.e. the current and pulse outputs continue to indicate the present operating status. Other control devices connected to the output do not have to be switched “manual” when accessing or changing operating parameters. No internal totalizer data is lost.

The Language information are displayed with is english. There is no possibility to switch over to another language.



Parameter selection
Arrow key, scroll up

Parameter selection
Arrow key, scroll down

Double function key
1. Direct access key Meter size
2. Number 1 (for numeric entry)

Double function key
1. Direct access key Meter range
2. Number 2 (for numeric entry)

Double function key
1. Flow range setting Qmax
2. Number 3 (for numeric entry)

Double function key
1. Direct access key Display
2. Number 4 (for numeric entry)

Double function key
Low flow cutoff
2. Number 5 (for numeric entry)

Double function key
1. Direct access key Pulse factor
2. Number 6 (for numeric entry)

Double function key
1. Direct access key Submenu Totalizer
2. Number 7 (for numeric entry

Double function key
1. Direct access key Submenu Self test
2. Number 8 (for numeric entry)

Double function key
1. Direct access key Damping
2. Number 9 (for numeric entry

Double function key
1. Direct access key “Load data from ext. EEPROM” (when exchanging converter, upload all meter location parameters into new converter)
2. Number 0 (for numeric entry

Double function key
1. Direct access key “Store data in ext. EEPROM (store all meter location parameters at start-up)
2. Comma

Press ENTER to access the parameter to be changed and accept the new parameter

Return to the process display;
Erase incorrectly entered data

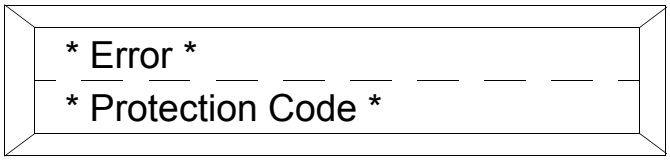
Double function key
1. Key for sign - (minus) for numeric data entry
2. Display of the totalizer value for the other flow direction

Adjust display contrast with a small screwdriver to local ambient conditions.

Control Processing Unit
The diode blinks if the CPU (processor) has failed.
In this case contact the ABB Automation Products Service Department

Settings can only be changed at the converter when the program protection has been turned off.

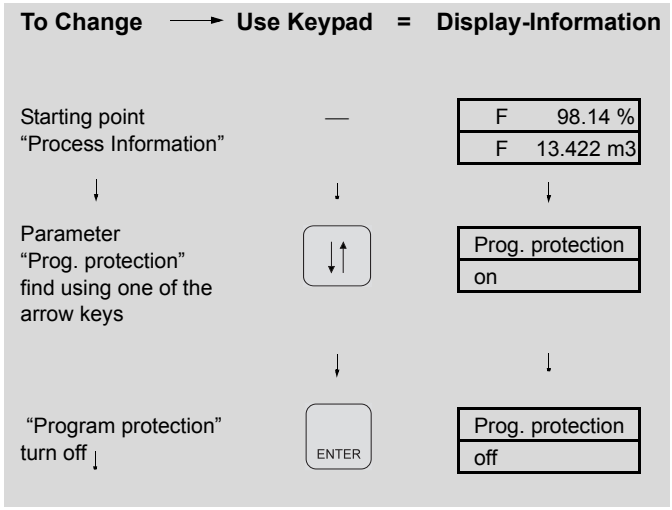
If the operator attempts to change data in the converter when the program protection is turned on the following message is displayed:



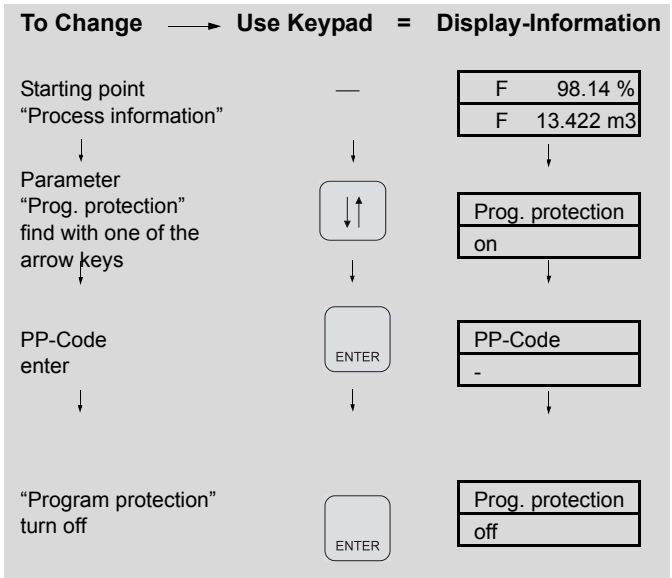
If the program protection is turned off parameters can be changed.

There are two methods to turn the program protection off

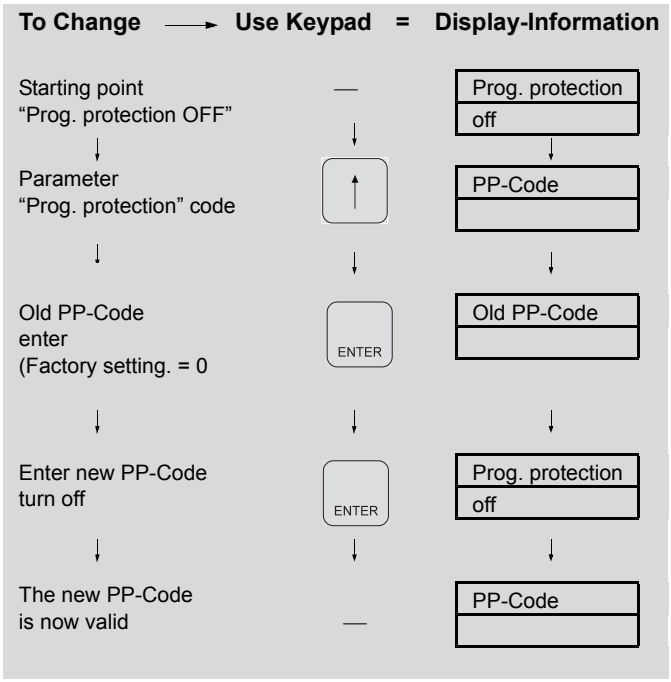
a) The program protection code (PP-code) is set to 0. (Factory setting)



b) Another protection code is set (1-255)



It is possible to change the PP-Code after the program protection has been turned off:



There two entry modes for entering data:

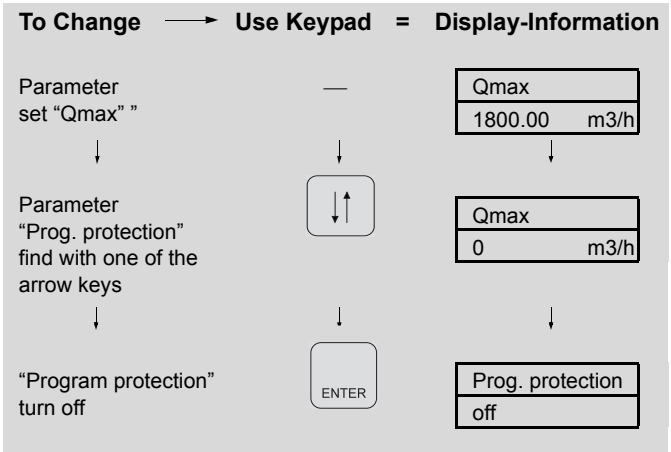
a) direct numerical entry and
b) selection from a table

5.2.1 Direct Numeric Entry

The following procedure is used for entering numeric values directly:

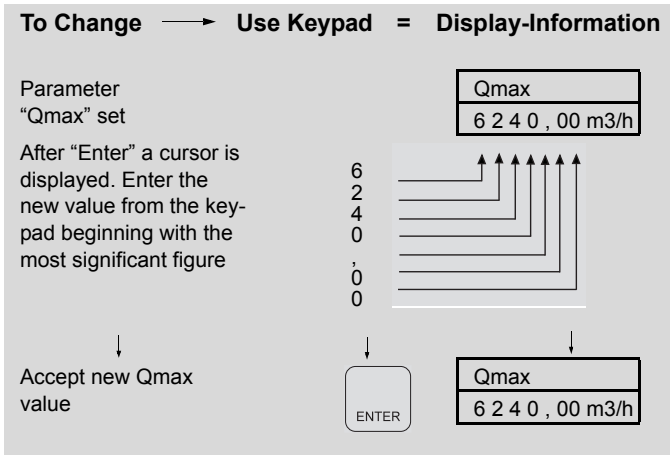
1. Access the desired parameter either with the Direct Access key or by using one of the arrow keys. The parameter is displayed in the first line

   The value together with its units is displayed in the second line

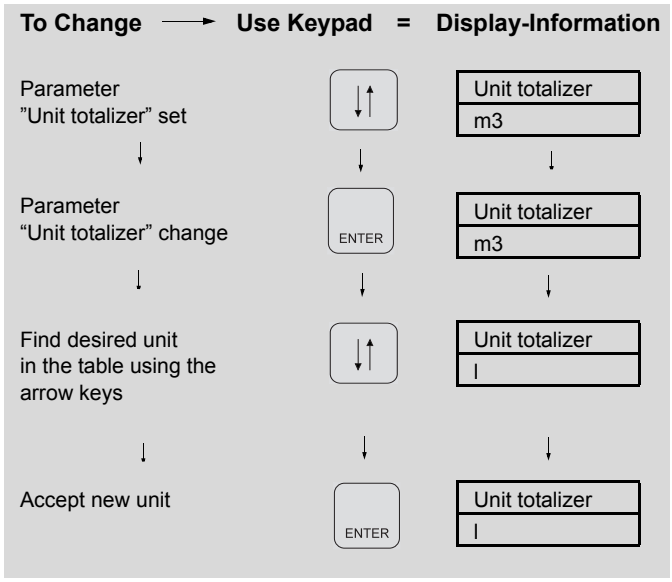


2. Press the ENTER-key. The text in the second line is cleared while the first line remains unchanged. A numeric entry now can be made.

3. Data entry starts with the most significant figure. After the entire value has been entered the new value can be accepted by pressing the ENTER-key. The new value is stored in the computer and displayed.

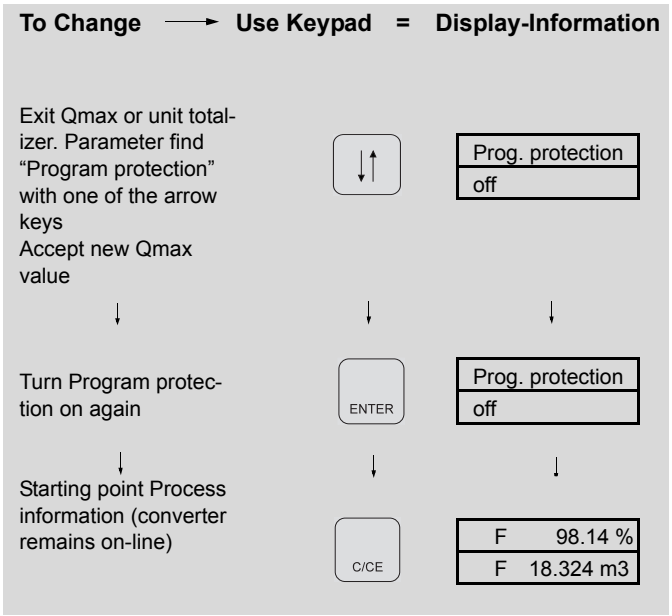


5.2.2 Entry from a Table

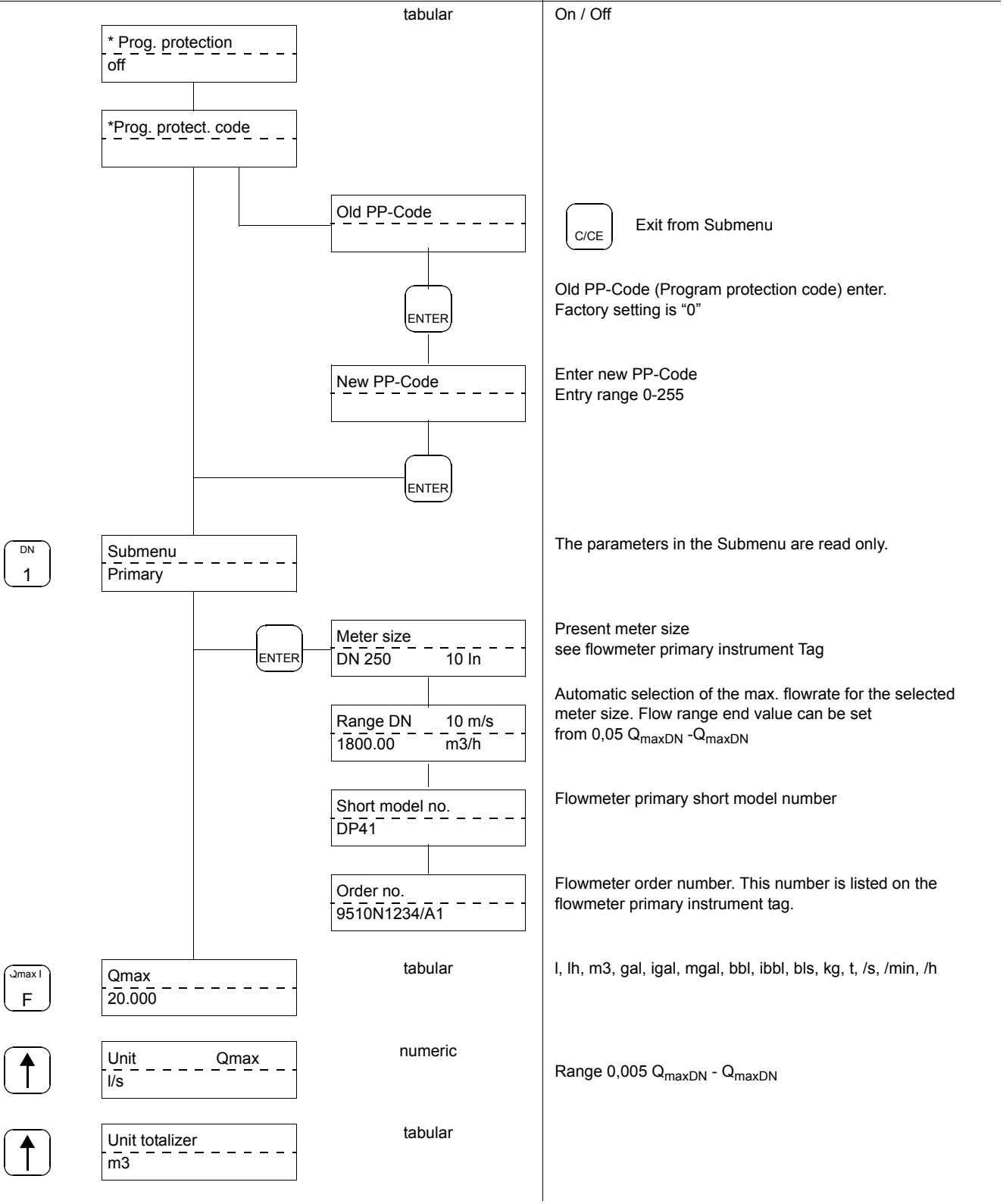


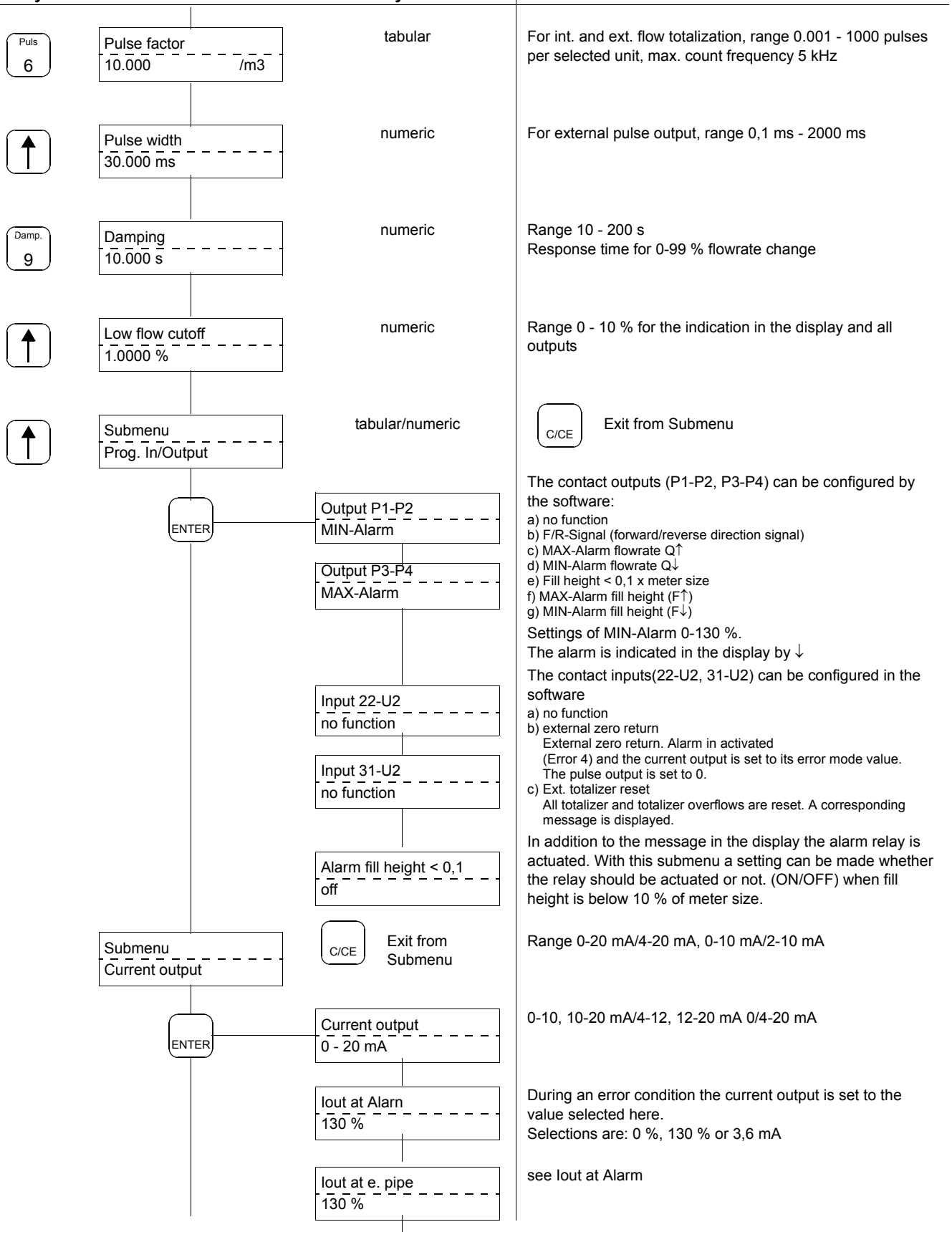
5.3 Terminate Data Entry and Exit Programming Mode

The entry is cleared by pressing the C/CE-key. Pressing C/CE a second time displays the value of the old setting and pressing the C/CE-key once more returns to the display of the process information.



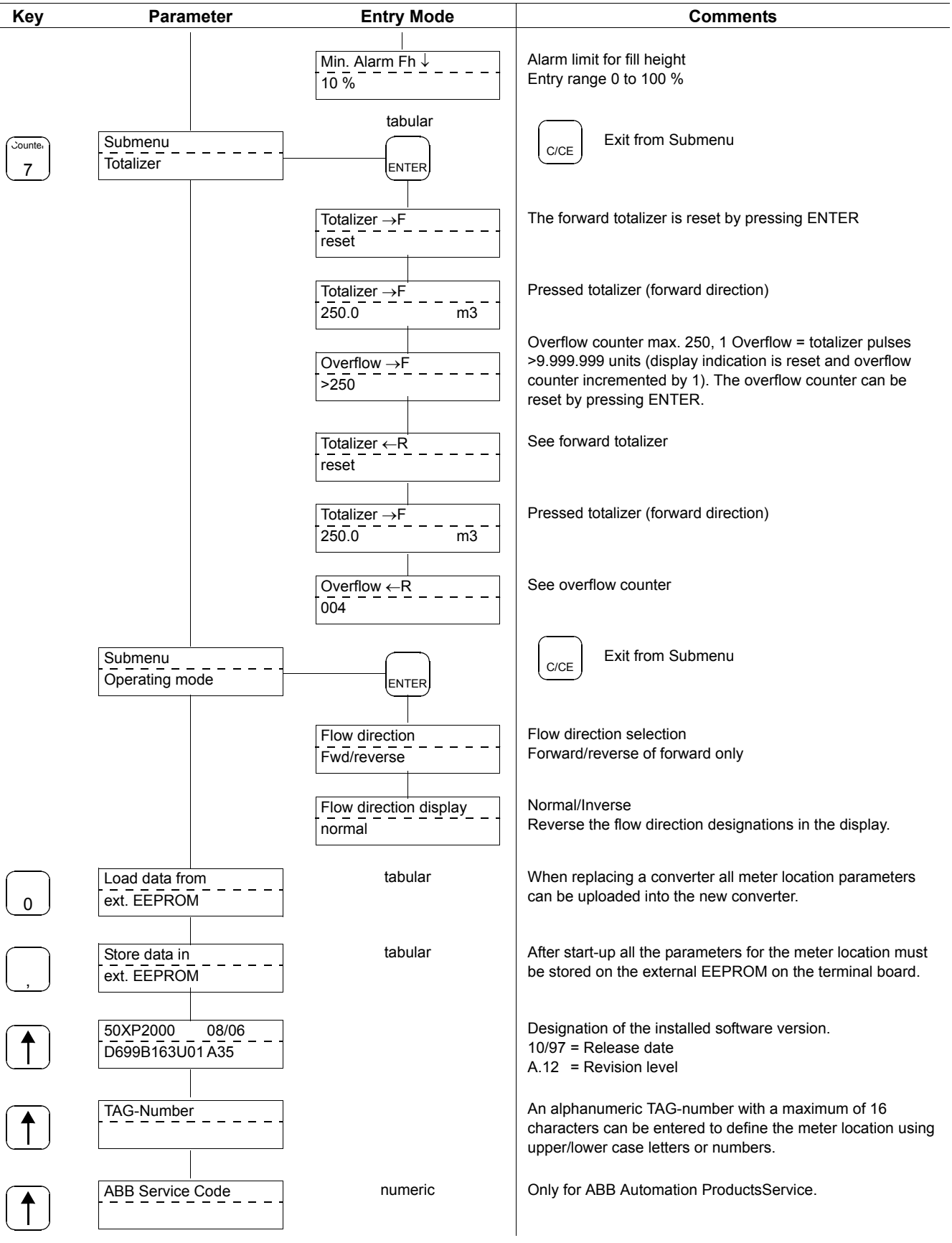
6 Parameter Overview with Display in Table Format




Key
Parameter
Entry Mode
Comments
Puls
6
Pulse factor
10.000 /m3
tabular
For int. and ext. flow totalization, range 0.001 - 1000 pulses per selected unit, max. count frequency 5 kHz
Pulse width
30.000 ms
numeric
For external pulse output, range 0,1 ms - 2000 ms
Damp.
9
Damping
10.000 s
numeric
Range 10 - 200 s
Response time for 0-99 % flowrate change
Low flow cutoff
1.0000 %
numeric
Range 0 - 10 % for the indication in the display and all outputs
Submenu
Prog. In/Output
tabular/numeric
C/CE
Exit from Submenu
ENTER
Output P1-P2
MIN-Alarm
The contact outputs (P1-P2, P3-P4) can be configured by the software:
a) no function
b) F/R-Signal (forward/reverse direction signal)
c) MAX-Alarm flowrate Q↑
d) MIN-Alarm flowrate Q↓
e) Fill height < 0,1 x meter size
f) MAX-Alarm fill height (F↑)
g) MIN-Alarm fill height (F↓)
Output P3-P4
MAX-Alarm
Settings of MIN-Alarm 0-130 %.
The alarm is indicated in the display by ↓
Input 22-U2
no function
The contact inputs(22-U2, 31-U2) can be configured in the software
a) no function
b) external zero return
External zero return. Alarm in activated (Error 4) and the current output is set to its error mode value. The pulse output is set to 0.
c) Ext. totalizer reset
All totalizer and totalizer overflows are reset. A corresponding message is displayed.
Input 31-U2
no function
Alarm fill height < 0,1
off
In addition to the message in the display the alarm relay is actuated. With this submenu a setting can be made whether the relay should be actuated or not. (ON/OFF) when fill height is below 10 % of meter size.
Submenu
Current output
C/CE
Exit from Submenu
Range 0-20 mA/4-20 mA, 0-10 mA/2-10 mA
ENTER
Current output
0 - 20 mA
0-10, 10-20 mA/4-12, 12-20 mA 0/4-20 mA
Iout at Alarn
130 %
During an error condition the current output is set to the value selected here.
Selections are: 0 %, 130 % or 3,6 mA
Iout at e. pipe
130 %
see Iout at Alarm

Key	Parameter	Entry Mode	Comments
		Iout select Flowrate Q [mA]	A selection can be made if the flowrate or the fill height (Fh) should be indicated by the current output.
		tabular/numeric	
	Submenu Data Link	ENTER	The Submenu Data Link is only displayed when a RS 232/ RS 485 has been installed.
		Communication ASCII	Communication protocol ASCII. This protocol is described in a separate document.
		Address 004	Instrument address:0-99
		Baudrate 2400 Baud	Baudrate: 1200-9600 Baud
			C/CE Exit from Submenu
Test 8	Submenu Self test	ENTER	
		Self test Current output	! The flow measurements are interrupted when the Submenu “Self test” is selected. Self test of current output range can be set 0-26 mA
		Self test RAM (ASIC)	Self test internal elements, automatically test. RAM, EPROM, EEPROM, external EEPROM. Additional functions: Alarm contact, P1-P2-contact, P3-P4-contact, Fout (frequency output) input 22-U2, input 31-U2, Test Mode (for operation with a simulator).
			C/CE Exit from Submenu
	Submenu Detector full pipe	ENTER	
		Detector full pipe off	OFF = Detector without function ON = When pipe is full, flowrate will be calculated similar to common magmeter flowrate calculation.
		Threshold 2400 Hz	Set threshold to 2400 Hz (factory setting). The threshold value should be about 400 Hz greater than it´s adjustment value when measured with a full pipe.
		Adjust Detector full pipe	The pipe line must be full pressing ENTER button the following display occurs: Poti: 193 2000 Hz Using the arrow keys adjust the reading to 2000 ± 25 Hz. Accept adjustment value with ENTER.
			C/CE Exit from Submenu
Display 4	Submenu Display	ENTER	
		1. Line Q [%]	Process display: Various values can be selected for the process information display (independently for each display line). e.g. Q [%], inst. flowrate in percent, Q [eng´g units] inst. flowrate in mA [current output], F/R: totalizer value for the forward- and reverse totalizers, TAG-number, Fill height in %. See 1. line
		2. Line Totalizer	

Key	Parameter	Entry Mode	Comments
		1. Line multipl. TAG Number	An additional value can be selected for display in the 1st line in the multiplex mode: flowrate in % or eng´g units, mA, totalizer, totalizer forward, totalizer reverse, TAG-number, or off. switches every 10 sec., see 1. line multipl.
		2. Line multipl. off	
↑	Submenu Alarm	tabular/numeric ENTER	C/CE Exit from Submenu
		Status A 2pA. 2nA. 7A. 8A	Active error messages (description see chapter 5) are displayed. Instrument status A: Error messages for upper coil (A) ir ASIC (A).
		Status B 2pB. 2nB. 7B. 8B	Instrument status B: Error messages for lower coil (B) or ASIC (B).
		Status C 0.4.5.6v6r9.E.H	Instrument status C: Error messages during system monitoring or internal instrument error.
		Status D 0.3.A.B.F.G	Instrument status D
		Status E Cc. Cd. Dc. Dd.	Instrument status E
		Status F 1pA. 1nA. 1pB. 1nB	Instrument status F
		Status reprot A 2pA. 2nA. 7A. 8A	All errors detected are stored. Reset by pressing ENTER.
		Status report B 2pB. 2nB. 7B. 8B	All errors detected are stored. Reset by pressing ENTER.
		Status report C 0.4.5.6.9....	All errors detected are stored. Reset by pressing ENTER.
		Status report D 0.3.A.B.F.G	All errors detected are stored. Reset by pressing ENTER.
		Status report E Cc. Cd. Dc. Dd.	All errors detected are stored. Reset by pressing ENTER.
		Status report F 1pA. 1nA. 1pB. 1nB	All errors detected are stored. Reset by pressing ENTER.
		Max. Alarm Q↑ 95 %	Alarm limit for the flowrate, entry range 0 - 130 % of the flow range setting.
		Min. Alarm W↓ 9 %	Alarm limit for the flowrate, entry range 0 - 130 % of the flow range setting.
		Max. Alarm Fh↑ 10 %	Alarm limit for fill height, entry range 0 to 100 %.


Key
Parameter
Entry Mode
Comments
Min. Alarm Fh ↓
10 %
Alarm limit for fill height
Entry range 0 to 100 %
tabular
Counter
7
Submenu
Totalizer
ENTER
C/CE
Exit from Submenu
Totalizer →F
reset
The forward totalizer is reset by pressing ENTER
Totalizer →F
250.0 m3
Pressed totalizer (forward direction)
Overflow →F
>250
Overflow counter max. 250, 1 Overflow = totalizer pulses >9.999.999 units (display indication is reset and overflow counter incremented by 1). The overflow counter can be reset by pressing ENTER.
Totalizer ←R
reset
See forward totalizer
Totalizer →F
250.0 m3
Pressed totalizer (forward direction)
Overflow ←R
004
See overflow counter
Submenu
Operating mode
ENTER
C/CE
Exit from Submenu
Flow direction
Fwd/reverse
Flow direction selection
Forward/reverse of forward only
Flow direction display
normal
Normal/Inverse
Reverse the flow direction designations in the display.
0
Load data from
ext. EEPROM
tabular
When replacing a converter all meter location parameters can be uploaded into the new converter.
,
Store data in
ext. EEPROM
tabular
After start-up all the parameters for the meter location must be stored on the external EEPROM on the terminal board.
50XP2000 08/06
D699B163U01 A35
Designation of the installed software version.
10/97 = Release date
A.12 = Revision level
TAG-Number
An alphanumeric TAG-number with a maximum of 16 characters can be entered to define the meter location using upper/lower case letters or numbers.
ABB Service Code
numeric
Only for ABB Automation ProductsService.

7 Error Messages/Status Messages of the converter

7.1 Error Messages on the display

Error messages are displayed alternately in clear text and with the corresponding error number. During the clear text display only the error with the highest priority is displayed, while other display indicates all the errors detected using their corresponding error number.

Error Messages	Clear text	Cause
0	Partly full < 0.1 DN	Fill high is less than 10 % of the flowmeter primary diameter
1	A/D saturated	A/D converter saturated
2	Ref. voltage	Reference votage too small
3	Flowrate > 130 % ext.	Flowrate greater than 130 %
4	ext. Zero return	External zero return is active
5	EEPROM corrupted	Data paramter EEPROM corrupted
6	Totalizer values	Corrupted totalizer values
7	Ref. voltage	Positive reference voltage too large
8	Ref. voltage	Negative reference voltage too large
9	Line frequency	Supply power ferquency outside of the allowable limits

7.2 Error Messages of the Submenus “alarm”

7.2.1 “Status A” and “Status Report A”

This display provides information about the alarm messages which affect the upper coil (A) or ASIC A. In the “Status A” display the present error messages are indicated. The “Status Report A” display indicates messages for all detected errors

Error Code	System Errors Detected	Corrective Measures
1A	ASIC A input saturated	Internal error, please contact ABB Service
2pA	Positive reference voltage coil A too small	Check wiring and magnetic field excitation
2nA	Negative reference voltage coil A too small	
7A	Positive reference voltage coil A too large	
8A	Negative reference voltage coil A too large	

coil A = upper coil
coil B = lower coil

7.2.2 “Status B” and “Status Report B”

Error Code	System Errors Detected	Corrective Measures
1B	ASIC B input saturated	Internal error, please contact ABB Service
2pB	Positive reference voltage coil B too small	Check wiring and magnetic field excitation
2nB	Negative reference voltage coil B too small	
7B	Positive reference voltage coil B too large	
8B	Negative reference voltage coil B too large	

coil A = upper coil
coil B = lower coil

7.2.3 “Status C” and “Status Report C”

Error Code	System Errors Detected	Corrective Measures
4	Ext. zero return	Zero return activated by pump or field contact
5	Data in parameter-EEPROM corrupted	Internal error, please contact ABB Service
6	Totalizer values corrupted	Totalizer values are no longer valid, reset
9	Line frequency outside allowable tolerances	Check line frequency
H	Power outage detected	Reset error message
E	Data in parameter EEPROM corrupted	Reset error message

7.2.4 “Status D” and “Status Report D”

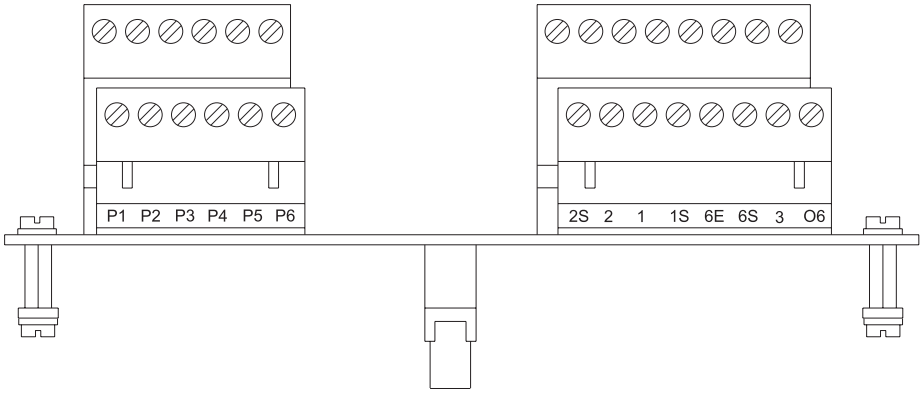
Error Code	System Errors detected	Corrective Measuree
0	Fill height < 10 % of flow-meter primary diameter	Open shut off valve
3	Flowrate > 130 %	Reduce flowrate, change flow rate
A	Max alarm limit value	Decrease flowrate
B	Min alarm value	Increase flowrate
F	Max alarm limit value	Decrease fill level
G	Min alarm limit value	Increase fill level

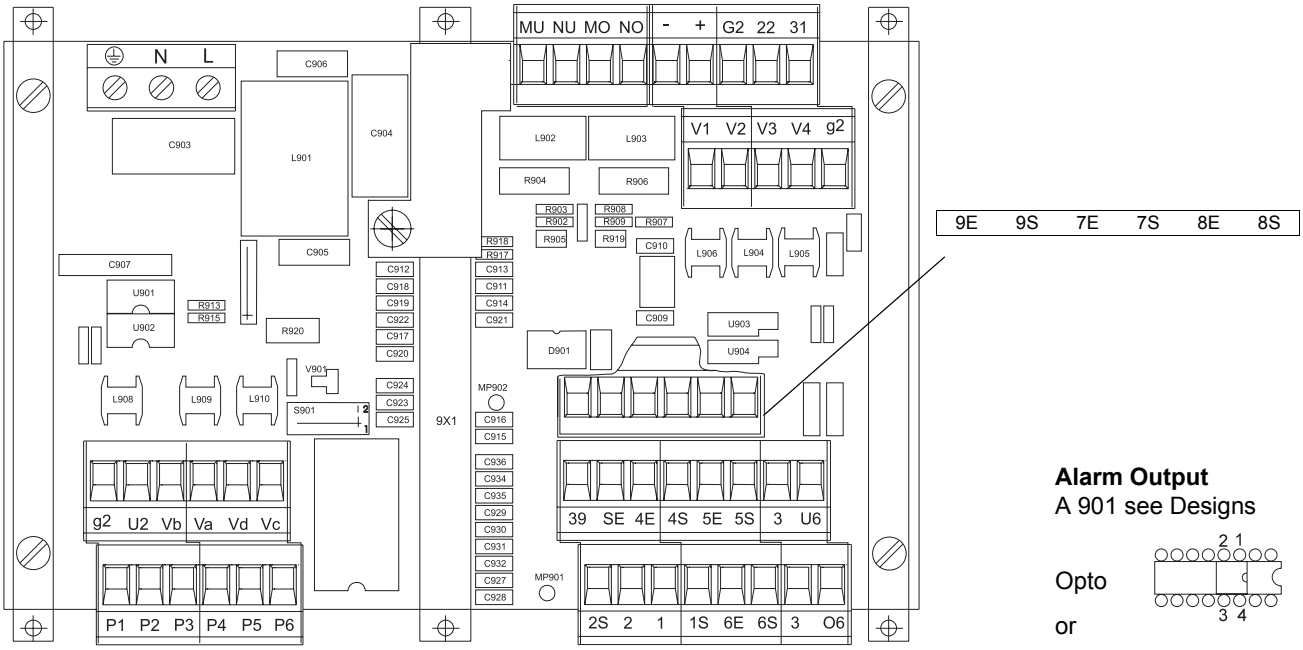
7.2.5 “Status E” and “Status Report E”

Error Code	System Errors detected	Corrective Measuree
Cc	Injection of PSI-signal at electrode C too small	Contact ABB Service
Cd	Injection of PSI-signal at electrode D too small	Contact ABB Service
Dc	Injection of PSI-signal at electrode C too large	Contact ABB Service
Dd	Injection of PSI-signal at electrode D to large	Contact ABB Service

8 Circuit Boards

8.1 Terminal Board Field Mount Housing



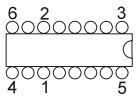


Alarm Output
A 901 see Designs

Opto

or

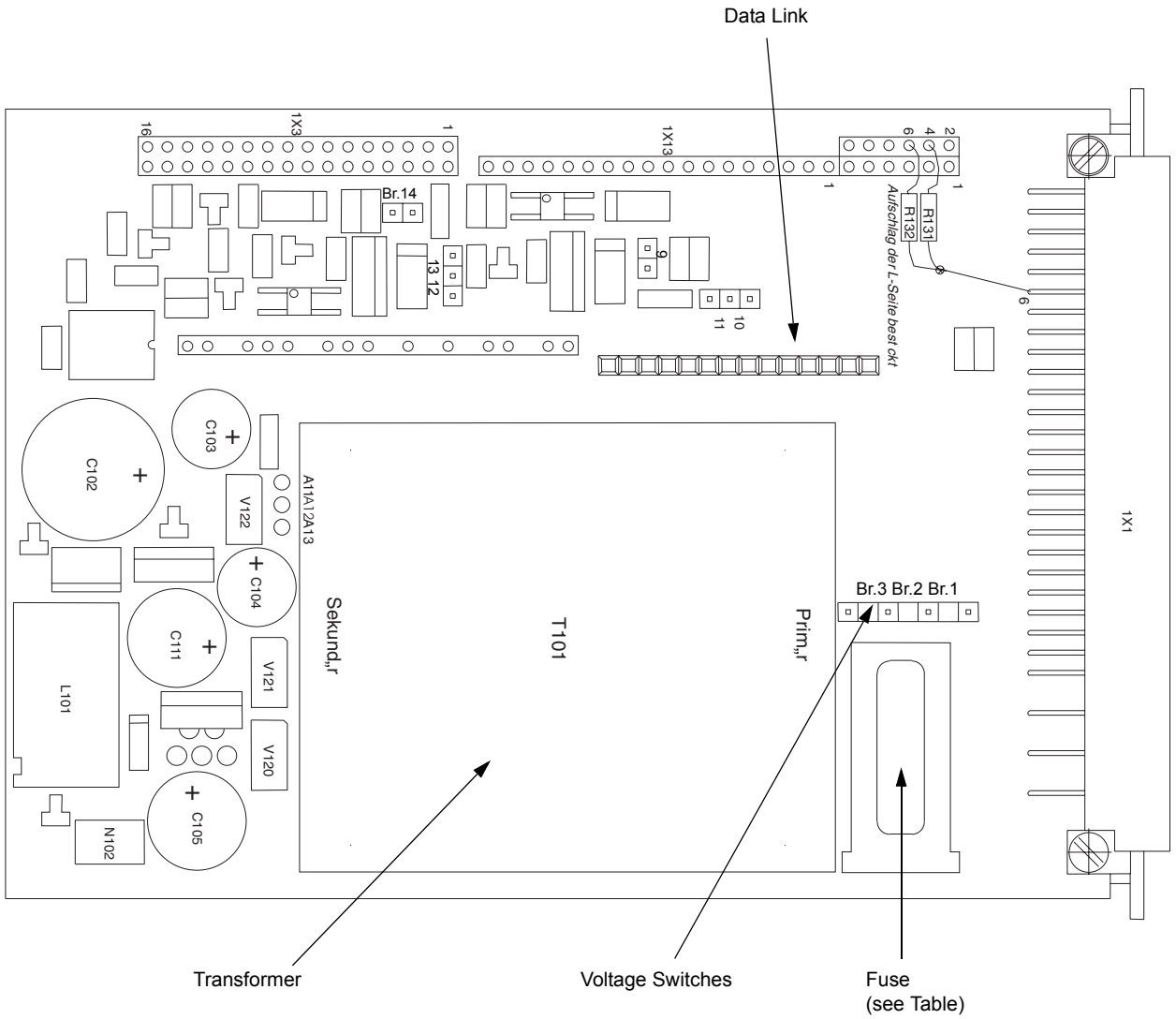
Relay



Switch	S901		S902	
Position	1	2	open	closed
Relay (relay contact opens at alarm)	x		x	
Relay (relay contact closes at alarm)		x	x	
Optocoupler	no function		x	
Optocoupler	no function		x	

Fig. 8

8.2 Assembled Analog Board, supply voltage settings, pulse output settings, location of fuse



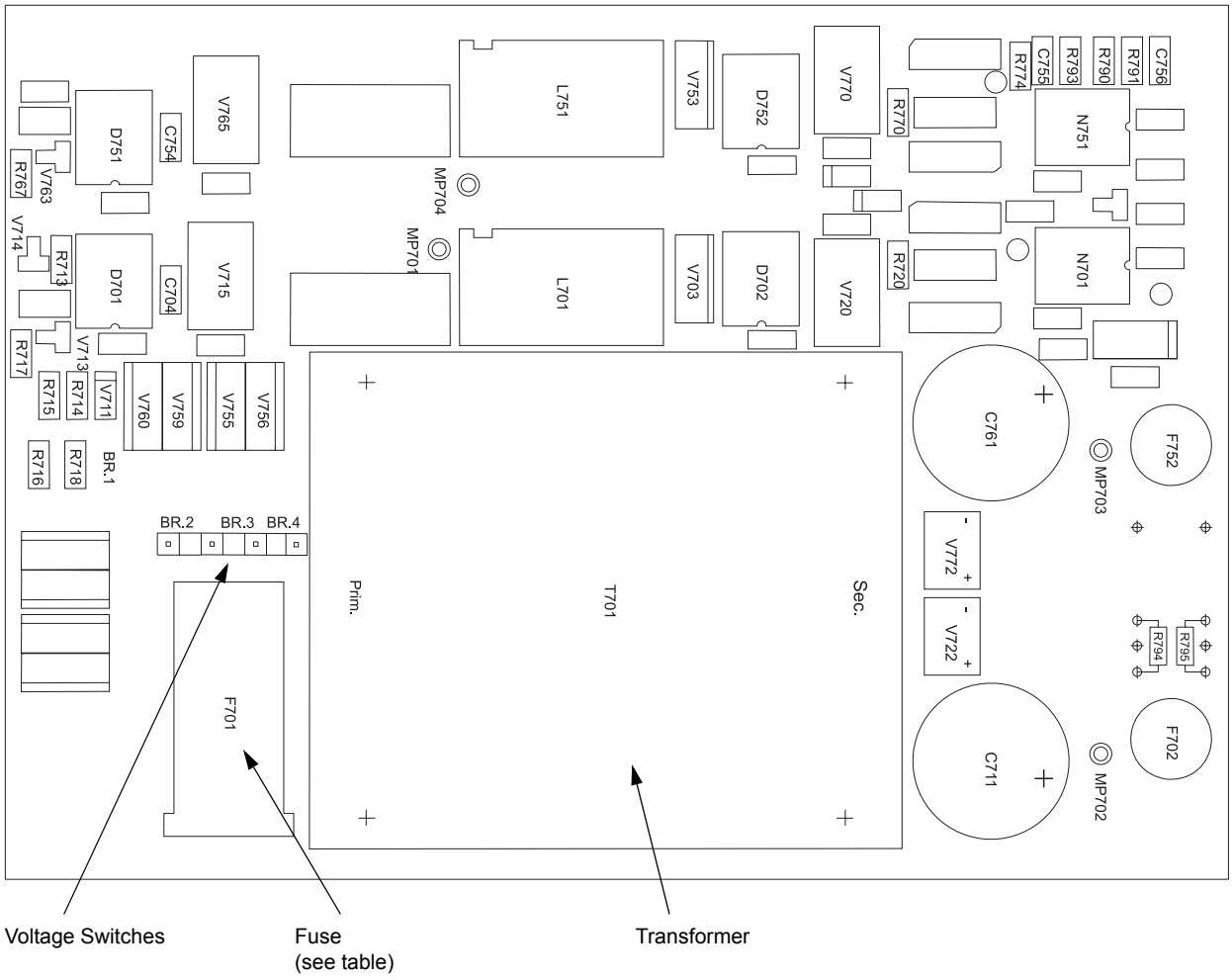
Supply Voltage Settings

	BR. 1	BR. 2	BR. 3	BR. 4	Transformer T 101	F 101	fuse ABB part no.
230 V ac		X			D692B071U01	0,160 A T	D151B025U02
115 V ac	X		X		D692B071U01	0,315 A T	D151B025U08
24 V ac	X		X		D692B071U02	1,250 A T	D151B025U04

Pulse Output Settings
Pulse active BR.9, 11, 13, 14 installed.
Pulse opto only BR.10, 12 installed.

Fig. 9

8.3 Assembled Driver board



	BR. 2	BR. 3	BR. 4	Transformer T 101	F 101	Fuse ABB Part Number
230 V ac		X		D692B072U01	0.160 A	D151B025U02
115 V ac	X		X	D692B072U01	0.315 A	D151B025U08
24 V ac	X		X	D692B072U02	1.250 A	D151B025U04

Fig. 10

9 Specification flowmeter primary

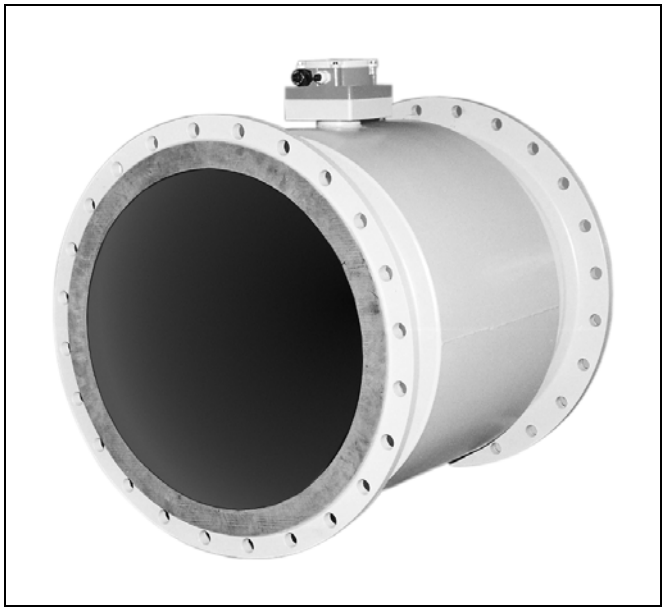


Fig. 11 Flowmeter Primary

9.1 Meter Size, Pressure Rating and Flow Ranges

Meter Size mm	Standard Pressure Rating PN	Min. Flow Range Flow Velocity 0 to 0.5 m/s	Max. Flow Range Q_{maxDN} 0 to 10 m/s
150	10/16	0 to 8.33 l/s	0 to 166.7 l/s
200	10/16	0 to 15.00 l/s	0 to 300,0 l/s
250	10/16	0 to 25.00 l/s	0 to 500.0 l/s
300	10/16	0 to 33.33 l/s	0 to 667.0 l/s
350	10/16	0 to 45.83 l/s	0 to 917.0 l/s
400	10/16	0 to 62.50 l/s	0 to 1250 l/s
500	10	0 to 91.67 l/s	0 to 1833 l/s
600	10	0 to 133.33 l/s	0 to 2667 l/s
700	10	0 to 183.33 l/s	0 to 3667 l/s
800	10	0 to 272.20 l/s	0 to 5000 l/s
900	10	0 to 333.33 l/s	0 to 6667 l/s
1000	10	0 to 375.00 l/s	0 to 7500 l/s
1200	6	0 to 590.00 l/s	0 to 11600 l/s
1400	6	0 to 750.00 l/s	0 to 15000 l/s
1600	6	0 to 1000.00 l/s	0 to 20000 l/s
1800	6	0 to 1250.00 l/s	0 to 25000 l/s
2000	6	0 to 1590.00 l/s	0 to 31700 l/s

Note

The output signals are automatically turned off when the fill height drops below 10 % of the flowmeter primary diameter (with DN 150 min. fill-level must be 15 %).

9.2 Flowrate Nomograph for Full Pipes

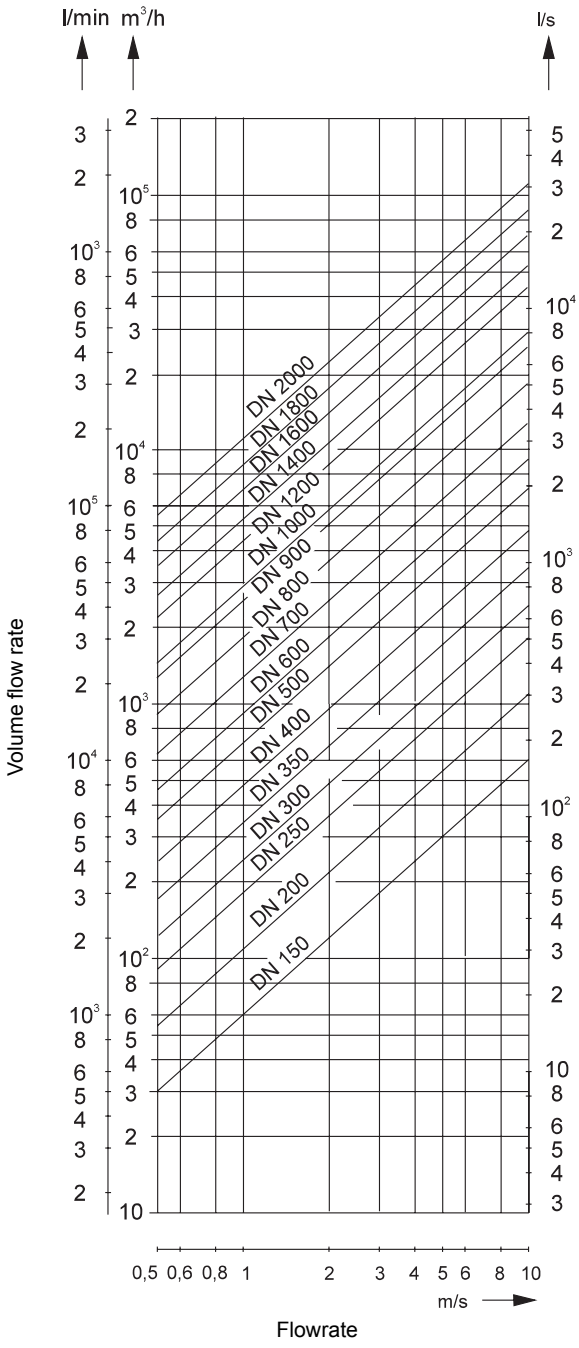


Fig. 12 Flow rate nomograph DN 150 - DN 2000

9.3 Model DP41F, DP46F

9.3.1 General specifications

Min. allow. Pressure as a function of Fluid Temperature

Liner	Meter Size	$P_{Operation}$ at $T_{Operation}$ mbar abs.	
Hard rubber	150 ... 250 (6 ... 10“)	0	< 80 °C (176 °F)
	300 ... 1000 (12 ... 40“)	0	< 80 °C (176 °F)
Soft rubber	150 ... 250 (6 ... 10“)	0	< 60 °C (140 °F)
	300 ... 1000 (12 ... 40“)	0	< 60 °C (140 °F)
PTFE KTW approved	150 ... 600 (6 ...24“)	270 400 500	< 20 °C (68 °F) < 80 °C (176 °F) < 80 °C (176 °F)

Max. Allowable Ambient Temperature as a function of Fluid Temperature

For flowmeters with carbon steel flangers

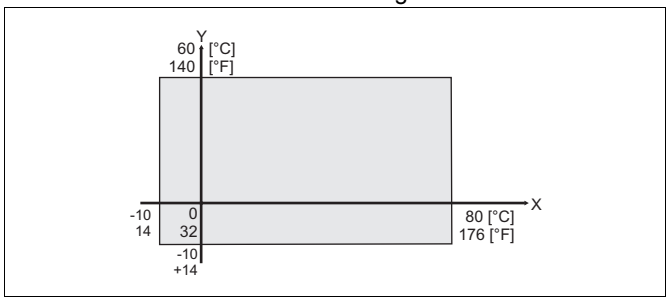


Fig. 13

For flowmeter with stainless steel flangers

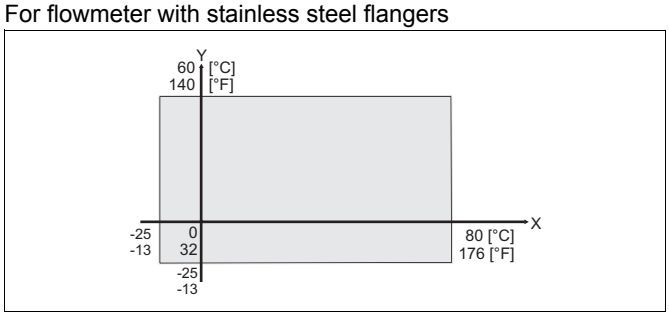


Fig. 14
Y = Ambient temperature °C/°F
X = Fluid temperature °C/°F

Notes regarding min./max. measuring temperature

Liner	Flange material	Min. Temp.	Max. Temp.
Hard rubber	Steel	-10 °C (14 °F)	80 °C (176 °F)
	stainless steel 1.4571	-15 °C (5 °F)	80 °C (176 °F)
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)
	stainless steel 1.4571	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	80 °C (176 °F)
	stainless steel 1.4571	-25 °C (-13 °F)	80 °C (176 °F)

Materials, Flowmeter Primary

Parts	Standard	Options
Liner	PTFE, PFA, hard rubber, soft rubber	–
Signal and ground electrodes for – Hard rubber – Soft rubber	SS 1.4571 [316Ti]	Hast. B-3 (2.4600), Hast. C-4 (2.4610) , Titanium, Tantalum, Platinum-Iridium, 1.4539 [904L]
– PTFE	Hast. C-4 (2.4610)	SS1.4571[316Ti] Hast. B-3 (2.4600) Titanium, Tantalum, Platinum-Iridium, 1.4539 [904L]
Ground plate	SS 1.4571 [316Ti]	Upon request
Protection plate	SS 1.4571 [316Ti]	Upon request

Process Connection Materials

Parts	Standard	Options
Flange DN 150 ... DN 300 (6 ... 12“)	Steel (galvanized)	SS1.4571[316Ti]
DN 350 ... DN 1000 (14 ... 40“)	Steel (painted)	SS1.4571[316Ti]

Parts	Standard	Options
Housing DN 150 ... DN 300 (6 ... 12“)	Two-piece cast aluminum housing, painted, paint coat 60 µm thick, RAL 9002	–
DN 350 ... DN 1000 (14 ... 40“)	Welded steel construction, painted, paint coat 60 µm thick, RAL 9002	–
Connection box	Cast aluminium, painted, 60 µm thick, frame: dark gray, RAL7012, cover: light gray, RAL 9002	–
Meter tube	SS 1.4301 [304]	–
PG-Connector	Polyamide	–

Storage Temperature
-20 ... 70 °C (-4 ... 158 °F)

Protection Class per EN 60529
IP 67
IP 68 (optional, max. Tauchtiefe: 5 m)

Pipeline Vibration Following EN 60068-2-6
Converter
- In the range of 10 - 55 Hz max. 0.15 mm deflection

Flowmeter primary
- In the range of 10 - 55 Hz max. 0.15 mm deflection
- In the range of 55 -150 Hz max. 2 g acceleration

Designs
The flanged flowmeters comply with the installation lengths defined in VDI/VDE 2641, ISO 13359 or DVGW (W420, Design WP, ISO 4064 short).

Electrical connection
Screw terminals
Cable gland DN 150 ... DN 2000
Excitation cable PG13.5
Signal cable PG21

Explosion protection
Sensor DP46F
II 2 G EEx em [ib] IIC T4,
EC-type Examination Certificate TÜV 97 ATEX 1219X

9.3.2 Ex-Data for model DP46F

The maximum allowable fluid temperatures [°C] are listed in the following table as a function of the maximum allowable ambient temperature and the flowmeter size:

Flowmeter size DN	Temperature class	Max. allowable ambient temperature [°C]	Max. allowable fluid temperature [°C]
150 - 250	T4	60	80
150 - 250	T4	50	80
150 - 250	T4	40	80
300 - 900	T4	60	80
300 - 900	T4	50	80
300 - 900	T4	40	80
1000 - 3000	T4	60	80
1000 - 3000	T4	50	80

The max. allowable fluid temperature (80 °C) is determined by the thermal fuse for the coils.

Allowable ambient temperature primary -20 ... 60 °C (-4 ... 140 °F)

9.3.3 Material load for flanged design model DP41F / DP46F

Limits for the allowable fluid temperature (TS) and allowable pressure (PS) are a function of the liner and flange materials of the flowmeter (see instrument name plate).

Temperature limits

Liner	Flange material	Min. Temp.	Max. Temp.
Hard rubber	Steel	-10 °C (14 °F)	80 °C (176 °F)
	Stainless steel 1.4571	-15 °C (5 °F)	80 °C (176 °F)
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)
	Stainless steel 1.4571	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	80 °C (176 °F)
	Stainless steel 1.4571	-25 °C (-13 °F)	80 °C (176 °F)

DIN-Flange SS 1.4571 [316Ti] to DN 600 (24")

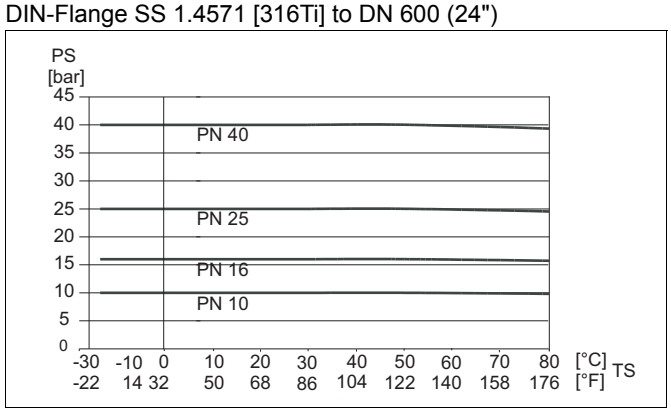


Fig. 15

ASME Flange SS1.4571[316TI] to DN 300 (12") (CL150/300) to DN 1000 (40") (CL150)

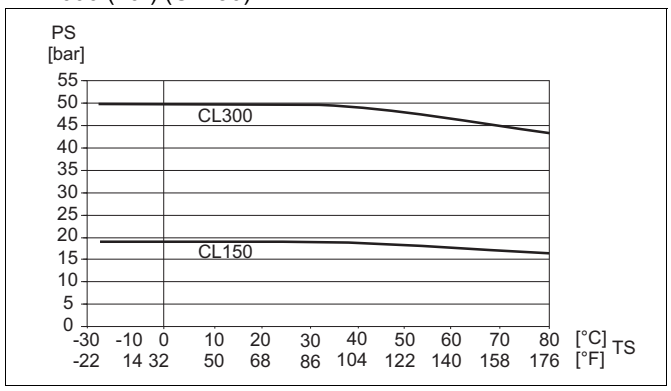


Fig. 16

DIN-Flange Steel to DN 600 (24")

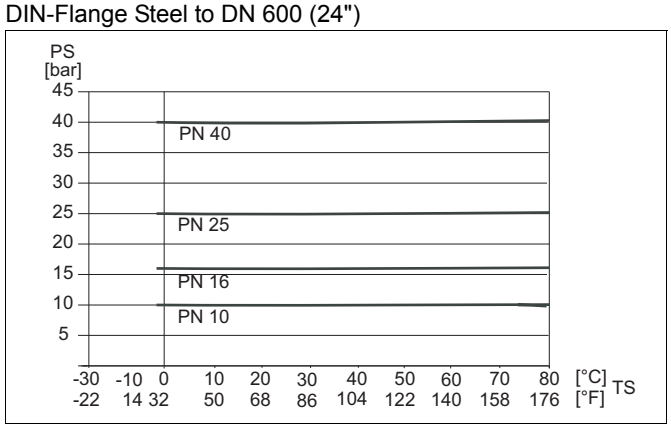


Fig. 17

ASME flange carbon steel to DN 300 (12") (CL150/300) to DN 1000 (40") (CL150)

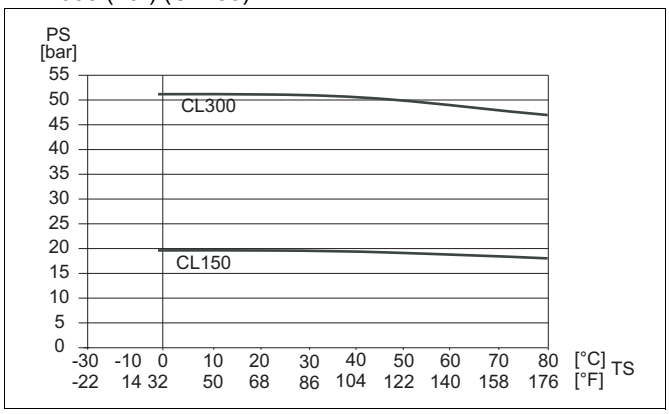


Fig. 18

DIN-Flange SS 1.4571 DN 700 (28") to DN 1000 (40")

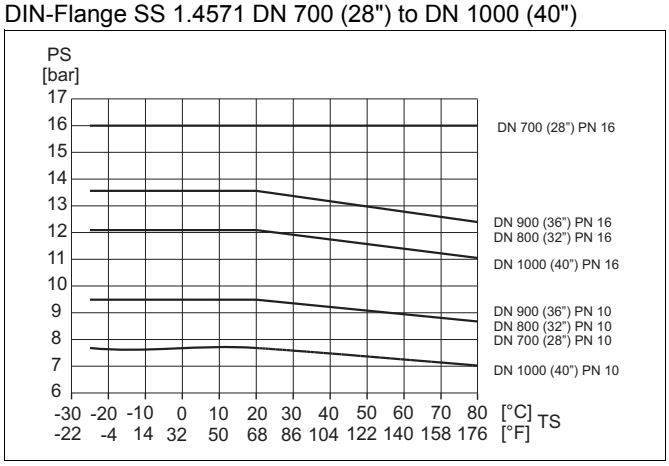


Fig. 19

DIN-Flange carbon steel DN 700 (28") to DN 1000 (40")

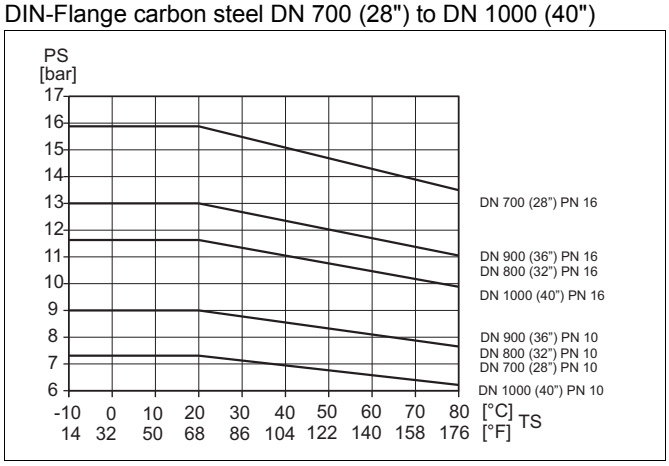


Fig. 20

9.4 Reference Conditions Based on EN 29104

Fluid Temperature
20 °C (68 °F) ± 2 K

Ambient Temperature
20 °C (68 °F) ± 2K

Supply Power
Nominal voltage per Instrument Tag U_N ± 1%

Straight Pipe Section Installation Requirements
Upstream > 10 x DN,
Downstream > 5 x DN,
DN = Flowmeter primary size

Warm Up Time
30 min

9.5 Accuracy (Pulse Output)

- **Full Filling**
  - $Q > 0.04\ Q_{maxDN}$ 1 % of rate
  - $Q < 0.04\ Q_{maxDN}$ $0.0004\ Q_{maxDN}$
- **Partially Full**
  (v > 0.2 m/s); (h> 0.1 x DN)
  (for DN 150 only: h > 0.15 x DN)
  - $Q > Q_u$ 3 % of rate
  - $Q_{min} < Q < Q_u$ 5 % of rate

  where
  $Q_u = 0.02\ Q_{maxDN}$
  $Q_{min} = 0.001\ Q_{maxDN}$

For Q_{maxDN} refer to chapter 7.1.

Analog Output Effects
Same as pulse output plus 0.1% of rate.

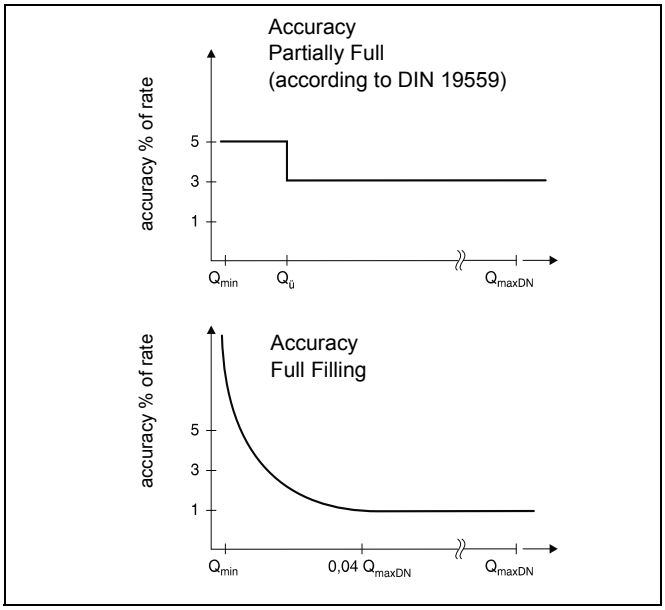
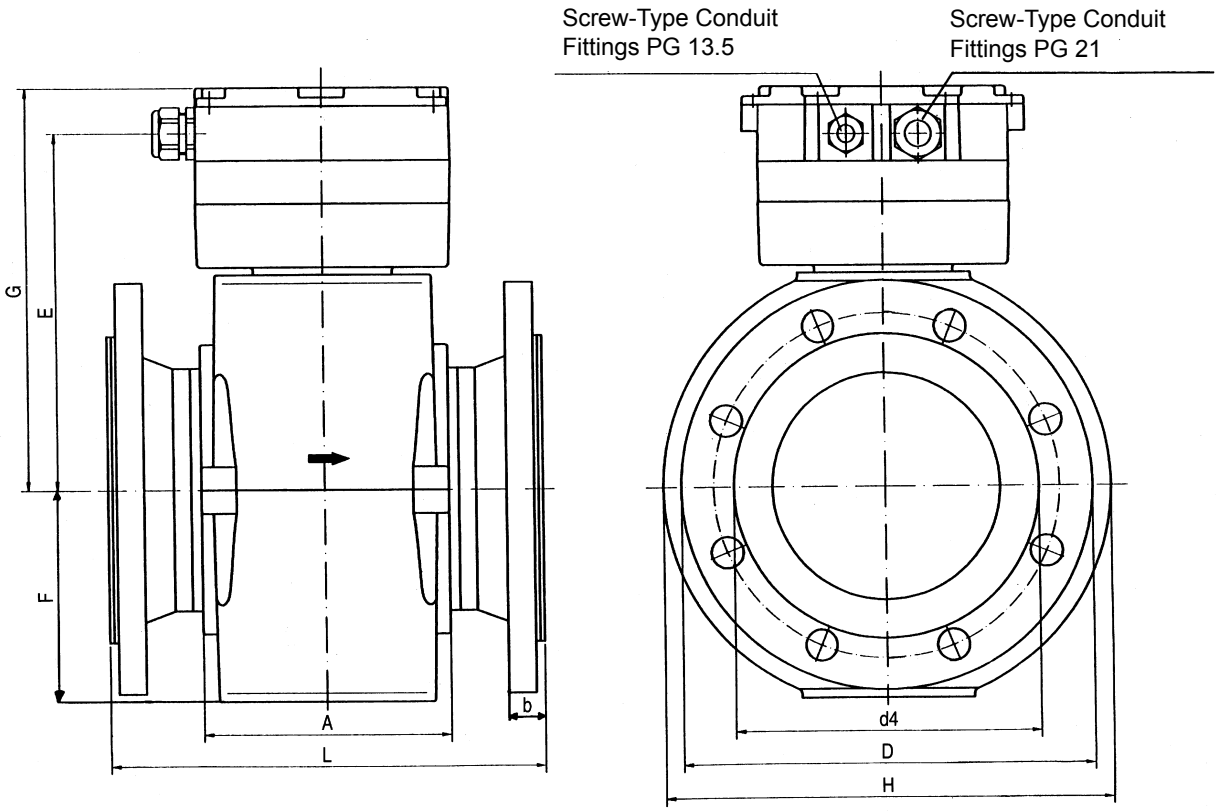


Fig. 21 Accuracy PARTI-MAG II

9.6 Dimensions Flowmeter Primary DN 150 to DN 250, DIN-flanges



All Dimensions in mm

projection ISO methode E

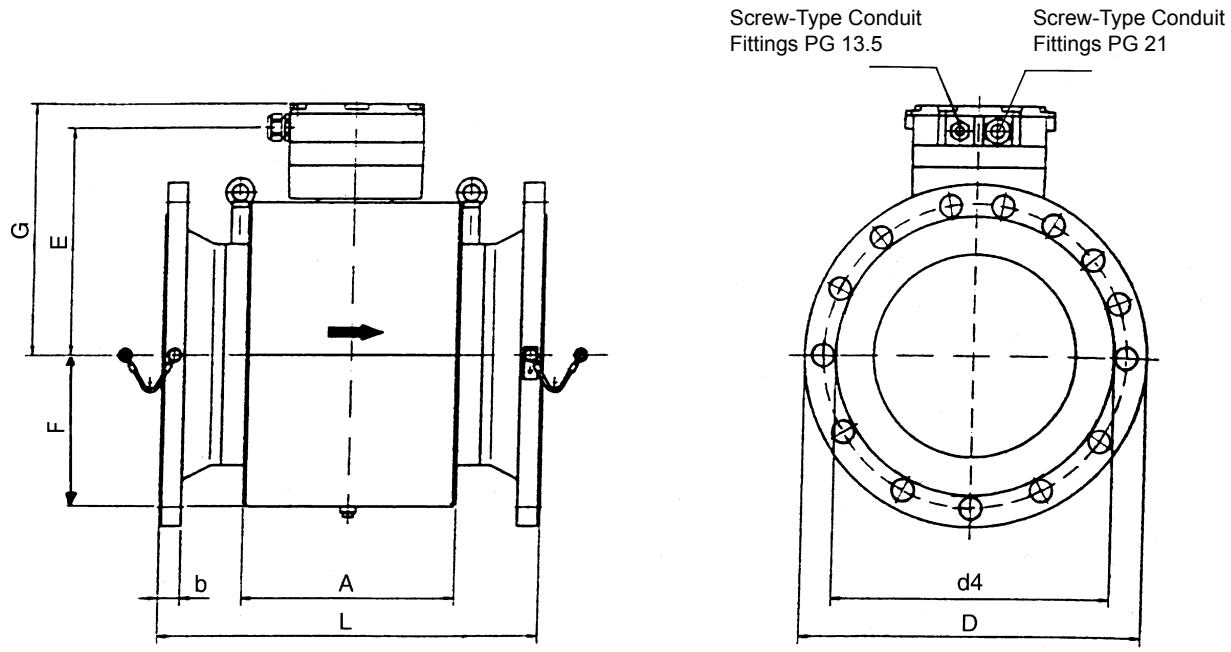
Flange Dimensions					Instrument Dimensions								Weight ca. kg
DN	PN	D	d4	b	A	L	L 1)	L 2)	G	E	F	H	
150	10	285	212	25	170	300	305	310	275	242	148	310	29
	16	285	212	25	170	300	305	310	275	242	148	310	29
200	10	340	268	28	195	350	355	360	306	274	179	340	56
	16	340	268	28	195	350	355	360	306	274	179	340	56
250	10	395	320	30	250	450	455	460	334	301	207	395	80
	16	405	320	30	250	450	455	460	334	301	207	405	80

1) Standard with one grounding plate SS No.1.4571. Other materials and DN 300 and up upon request. See Note section 9.1 and Footnote Ordering Information Primary .
For hard rubber liners + 2 mm for gasket.

2) With protection flange: Protection flanges provide the ground function, grounding plate not required.
For hard rubber liners + 4 mm for gasket.

Fig. 22 Flowmeter Primary DN 150 to DN 250

9.7 Dimensions Flowmeter Primary DN 300 to DN 1000, DIN-flanges



All Dimensions in mm

projection ISO methode E

Flange Dimensions					Instrument Dimensions						Weight ca. kg
						Protection Flange					
						without[2]	with [3]				
DN[1]	PN	D	d4	b	A	L	L	G	E	F	
300	10	445	370	31	279	500	Upon request	362	329	224	112
300	16	460	378	33	279	500		362	329	224	117
350	10	505	430	31	322	550		387	354	249	153
350	16	520	438	35	322	550		387	354	249	162
400	10	565	482	31	370	600		412	380	275	166
400	16	580	490	37	370	600		412	380	275	173
500	10	670	585	33	407	650		448	415	311	232
500	16	715	610	39	407	650		448	415	311	277
600	10	780	685	33	469	780		500	466	361	283
600	16	840	725	41	469	780		500	466	361	313
700	10	895	800	35	537	910		543	510	405	394
700	16	910	795	41	537	910		543	510	405	408
800	10	1015	905	37	605	1040		593	560	455	441
800	16	1025	900	43	605	1040		593	560	455	485
900	10	1115	1005	39	671	1170		643	610	505	757
900	16	1125	1000	45	671	1170		643	610	505	772
1000	10	1230	1110	39	739	1300		693	660	555	960
1000	16	1255	1115	47	739	1300		693	660	555	1007

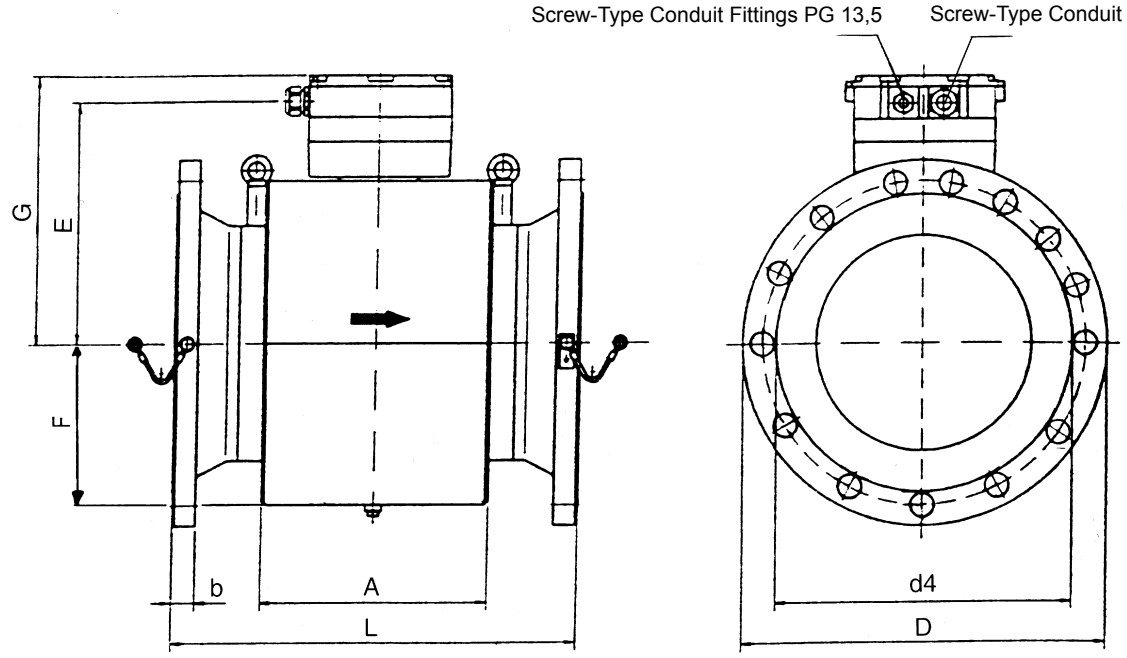
[1] > DN 1000 upon request

[2] Grounding plate DN 300 and up upon request. See Note “Grounding” section 9.1 and Footnote Ordering Information Flowmeter Primary

3) Protection flanges for PTFE-Liners provide the ground function, grounding plate not required

Fig. 23 Flowmeter Primary DN 150 to DN 250

9.8 Dimensions Flowmeter Primary DN 150 to DN 900, ASME-flanges



All Dimensions in mm

projection ISO methode E

Meter Size		Instrument Dimensions						Flange Dimensions ASME CL 150			Weight approx. kg.
DN	Inch	A	L[1) 2)]		E	F	G	D	d4	b	
			ISO 13359	Old inst. length							
150	6	170	300	450	242	139	275	279	216	29	39
200	8	195	350	500	273	179	306	343	270	34	68
250	10	250	450	550	301	207	334	406	324	35	98
300	12	279	500	620	330	224	362	483	381	37	112
350	14	322	550	650	354	249	387	534	413	40	144
400	16	370	600	700	350	275	412	597	470	42	174
500	20	407	762	780	416	311	443	699	584	48	217
600	24	469	914	850	466	361	500	813	692	53	371
700	28	537	–	910	510	405	543	837	762	50	343
800	32	605	–	1040	560	455	593	942	864	51	355
900	36	671	–	1170	610	505	643	1057	972	58	680

[1)] If a grounding disk is installed (attached by one side to the flange), the dimension L is increased by 5 mm.
See Note Grounding section 9.1 and Footnote Ordering Information Primary

[2)] If protective plates are installed (attached on both sides of the flange), the dimension L is increased by 10 mm.

Comments
Drawings < DN 250 upon request

Fig. 24 Flowmeter Primary DN 150 to DN 250

10 Technical Data

10.1 Dimension Drawing of the converter

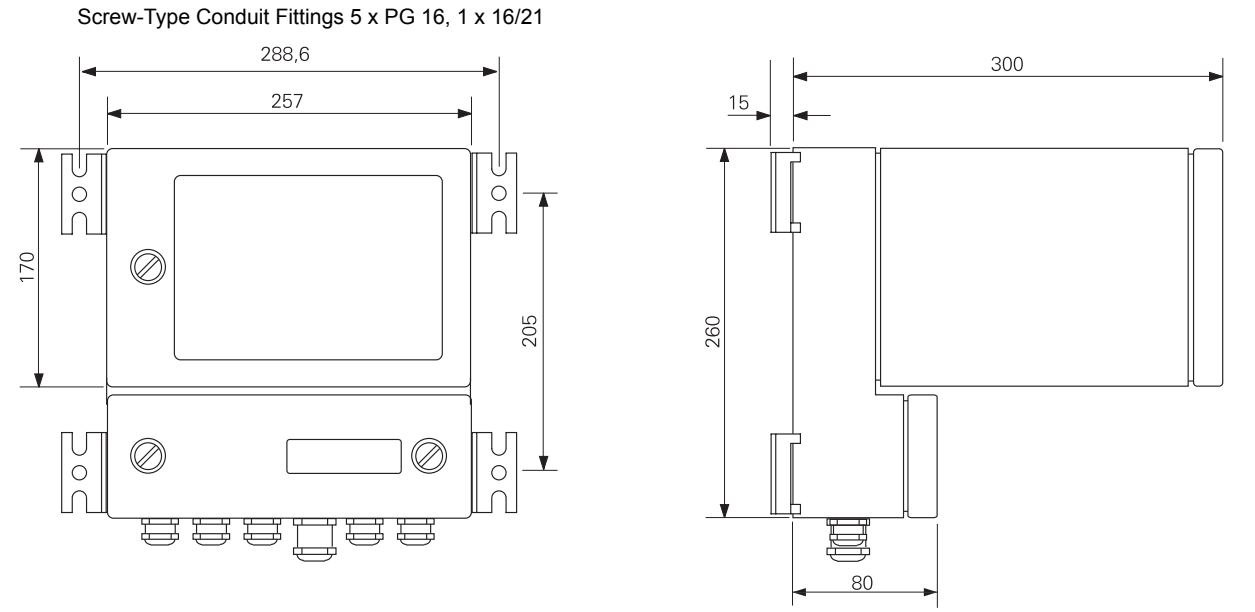


Fig. 25 Dimension Drawing, Field Mount Housing Converter MAG-XP

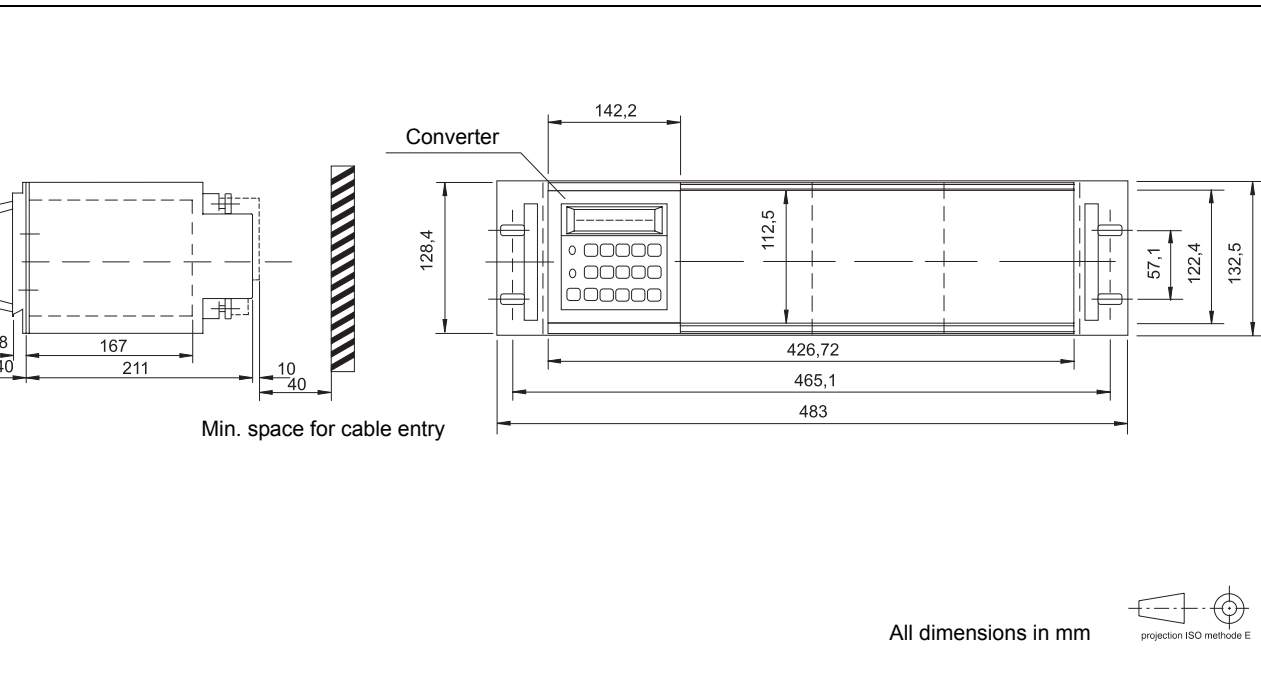


Fig. 26 Dimension Drawing, 19” Rack Mount

11 Safety relevant part of instruction manual

11.1 Grounding of flowmeter primary

Proper grounding procedures are important for safety reasons and for correct operation of the flowmeter primary with model DP46F (Ex-design), grounding terminals and primary flanges have to be connected to Potential Equalization. The amplitude of the flow signal at the electrodes is only a few millivolts and may be affected by stray ground currents flowing in the metering section which exceed a specific value. Therefore the grounding procedure described should be observed.

A copper-conductor with at least a 4 mm^2 area should be connected between the ground screw on the flowmeter primary (on the flange or housing) and the protection ground. For measurement purposed this potential should be identical to the potential of the metered fluid. Additional grounding at the connection terminals is not required.

Three grounding procedures are described in the following where in cases a) and b) the fluid is in electric contact with the pipeline and in case c) it is insulated from the pipeline.

a) Metal Pipe

1) Drill blind holes into the flanges on the pipe.
2) Tap holes.
3) Attach ground straps using a screw, spring washer and flat washer and connect to the ground connection on the flowmeter primary.
4) Connect a 4 mm^2 copper-conductor between the ground connection on the flowmeter primary and a good ground.

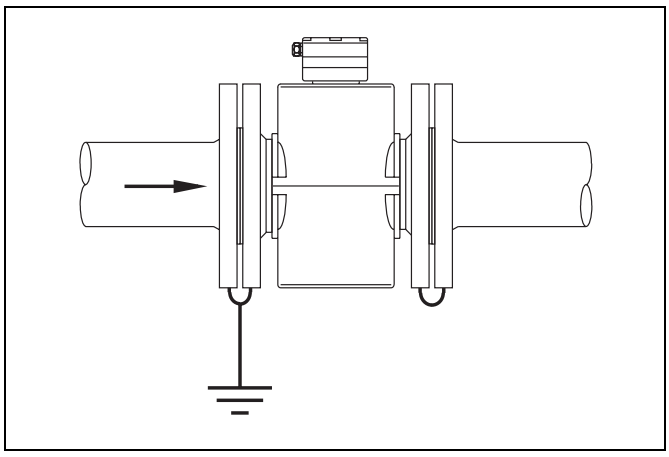


Fig. 27 Flowmeter Primary Meter Sizes 150 to 250, Two Piece Housing with Flanges

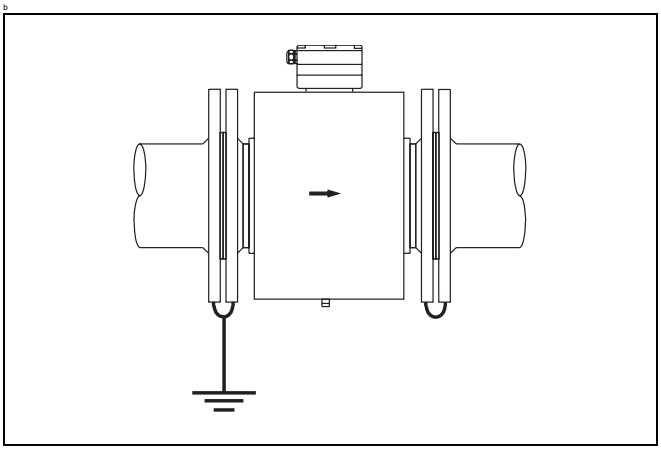


Fig. 28 Flowmeter Primary Meter > DN 250

b) Metal Pipe with Loose Flanges

1) In order to assure trouble free grounding of the fluid and the flowmeter primary 6 mm threaded studs are to be welded onto the pipe line.
2) Attach ground straps using a screw, spring washer and flat washer and connect to the ground connection on the flowmeter primary.
3) Connect a 4 mm^2 Cu-conductor between the ground connection on the flowmeter primary and a good ground.

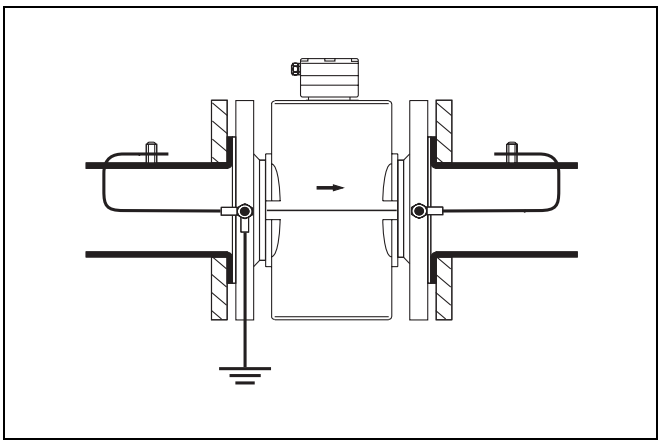


Fig. 29 Flowmeter Primary Meter Size 150 to 250 Two Piece Housing with Flanges

c) Plastic Pipe, Concrete Pipe or Pipes with Insulating Liners

1) When the EMF is lined with a hard- or soft rubber liner, an appropriate grounding element is integrated in the meter. A grounding plate is not required. When the EMF is lined with a PTFE liner a grounding plate must be installed in the pipeline.
2) Connect a ground strap between the tab on the grounding plate and the ground connection on the flowmeter primary.
3) Connect a 4 mm^2 Cu-conductor between the ground connection on the flowmeter primary and a good ground.

General note concerning grounding

For plastic pipelines or pipelines lined with an insulating liner the ground connection is made to a grounding plate or a grounding electrode. Flowmeter primaries with hard rubber liners incorporate a conductive element in the flange area for grounding. In this design grounding plates or electrodes are not required. When stray voltages exist in the pipeline and a flowmeter primary with a PTFE liner is installed grounding plates should be installed at both ends of the flowmeter primary.

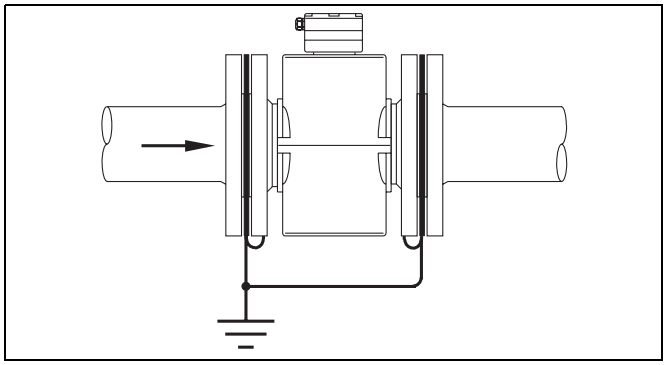


Fig. 30 Flowmeter Primary Meter Sizes 150 to 250, Two Piece Housing with Fixed Flanges

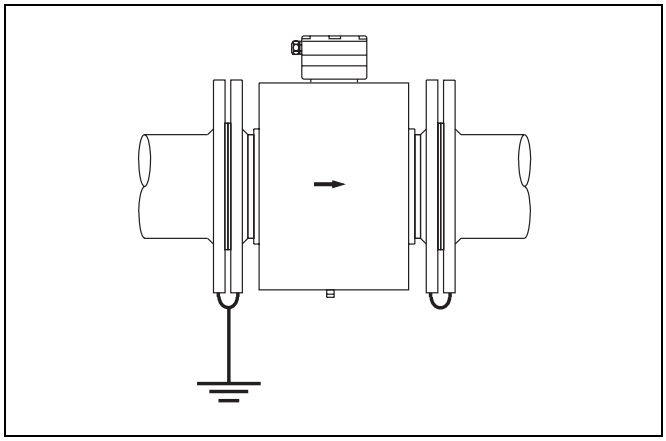


Fig. 31 Meter with an Integrated Conductive Element in the Liner for Grounding

11.2 Power supply Connection

The power supply, as specified on the instrument tag, is connected to the converter terminals L (phase) and N (neutral) over a main fuse and a main switch. The electromagnetic flowmeter primary is connected to the converter with the signal- and reference voltage cable and the excitation cable.

⚠ Pay attention to safety-notes section 9.4.

11.3 Signal- and excitation cable

The magnet coils in the flowmeter primary are supplied from the remote mounted converter over terminals MO/NO/MU/NU (excitation cable see Interconnection Diagram).

The signal cable is connected to the flowmeter primary and the converter as shown in the Interconnection Diagram. The flow direction indicated by the arrow on the flowmeter primary corresponds to the forward flow direction.

Shield 3 is connected to the common potential of the flowmeter primary, which is connected to ground per VDE 0100.

⚠ Pay attention to safety-notes section 9.4.

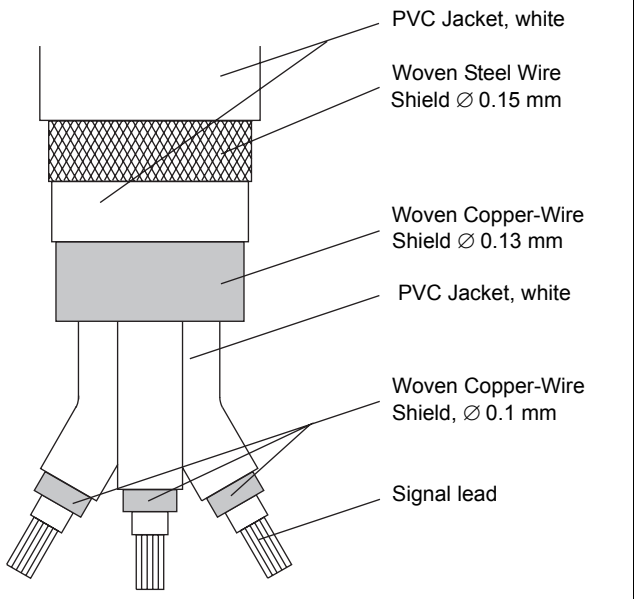
Note

If plant conditions make it impossible to avoid proximity to electrical machinery and switch gear equipment, it is recommended to route the signal cable in a grounded metal conduit.

11.3.1 Signal and excitation Cable Construction

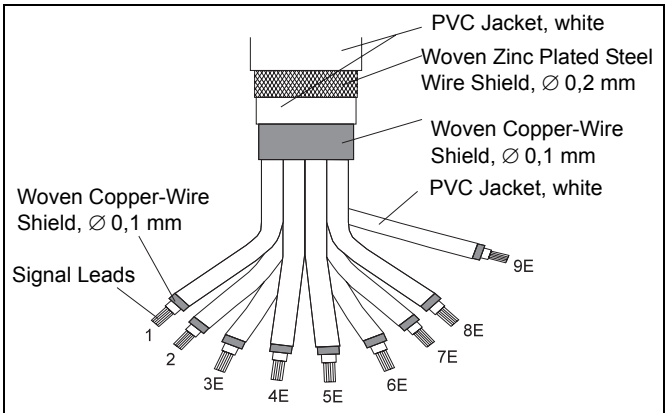
The signal cable conducts signals of only a few millivolts and therefore should be routed in the shortest manner. The maximum allowable signal cable length is 50 m. The cables should not be routed in the vicinity of large electrical machinery and switch gear equipment which could induce stray fields, pulses and voltages.

The signal cable design includes a steel and copper shield around the signal leads. The shields around the individual signal leads are "Driven Shields" for the signal transmission.



Insulation Color	Connection Terminal
red	MO
blue	MU
white	do not connect

Fig. 32 Excitation Cable Construction D173D025U01



Insulation Color	Connection Terminals
brown	1
red	2
orange	3E
yellow	4E
green	5E
blue	6E
black	7E
white	8E
violet	9E

Fig. 33 Signal Cable Construction D173D021U01

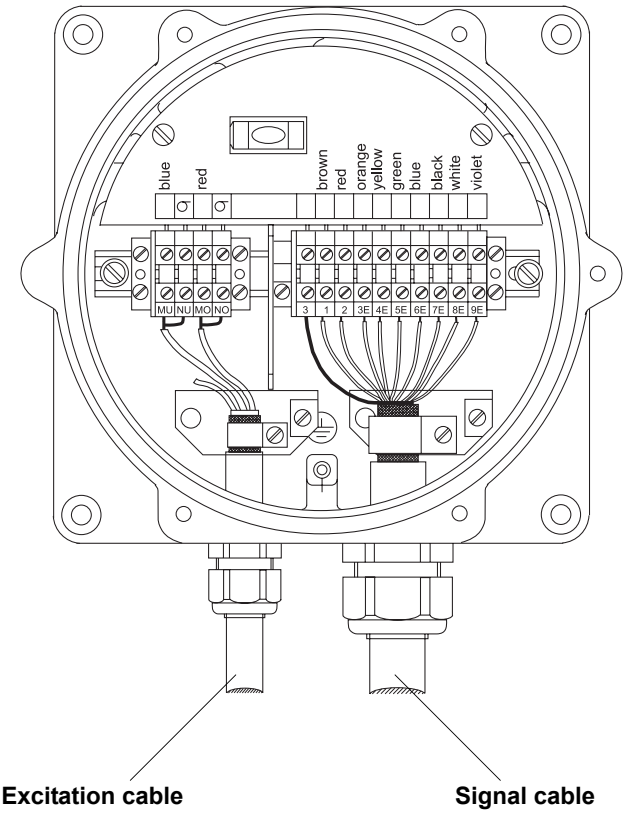
11.3.2 Interconnection of flowmeter primary and converter

The leads in the signal cable should be routed to the terminals in the shortest way possible. Loops are to be avoided.

Use care when replacing and tightening the housing cover. Check to make sure that the gasket is seated properly. Only then will Protection Class IP 67 be assured.

When installing the cable to the flowmeter primary a water trap should be provided.

⚠ The temperature of the primary´s surface might exceed 70 °C depending on the temperature of the fluid inside. Signal- and excitation cable shouldn´t be in contact.



Terminal Designations	Connection
1+2+3E to 9E	Flow signal leads
3	Inner cable shields (copper)
MU+NU+MO+NO	Connections for magnetic field excitation (from converter)
SE/PA	Outer cable shields

Fig. 34 Connection box of the Flowmeter Primary

Stripping of signal- and excitation cable for model DP46F (Ex-design)

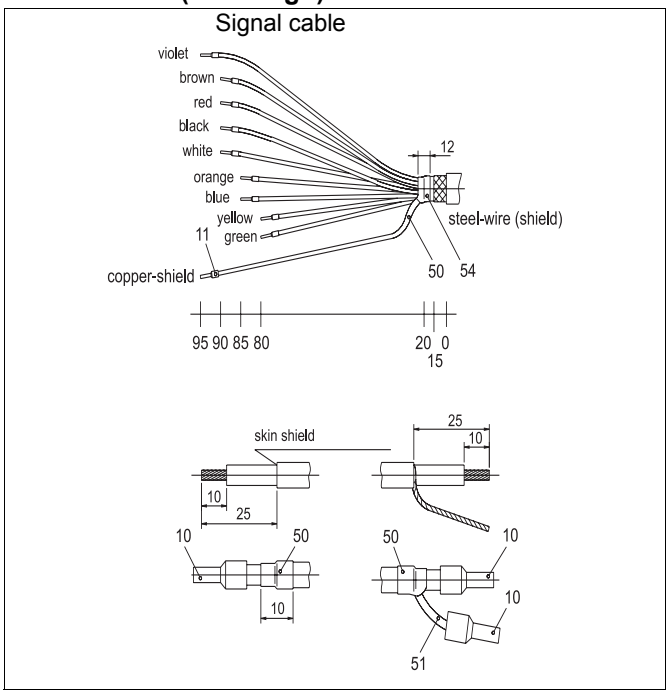


Fig. 35 Insulation of signal cables

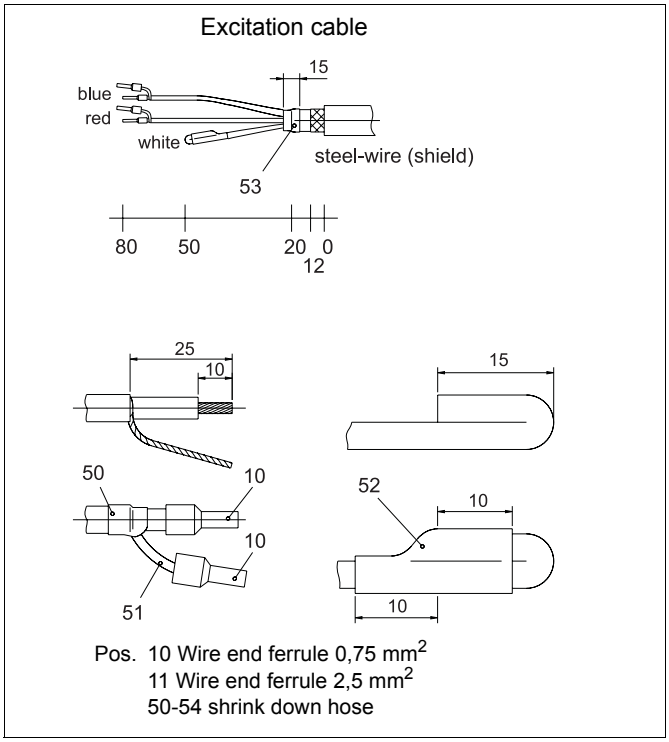


Fig. 36 Insulation of excitation cables

⚠ The insulation is ex-relevant.
The lengths of the insolation have to be complied.

Attention
The excitation circuit is liable to shock. Don´t touch the terminals MU, NU, MO, NO if the power supply is on.The primary is to be connected to the converter by use of ABB Automation Products signal- and excitation ca-ble only. Refer to fig. 24 and 33/34. For safety reasons the primary model DP41, is also to be connected to protection ground. Wit primary model DP46 (Ex-design), grounding terminals and primary-flanges have to be connected to potential equalisation.

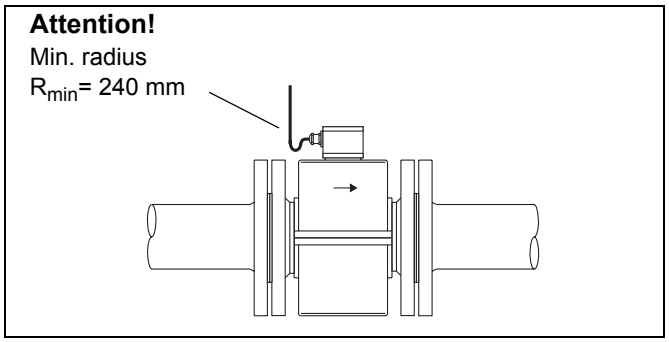


Fig. 37 Cable routing

11.3.3 Connection for protection class IP 68

For flowmeters primary with protection class IP 68, the maximum flooding height is 5 m. The supplied cable (part no. D173D025U01) fulfills all submersion requirements

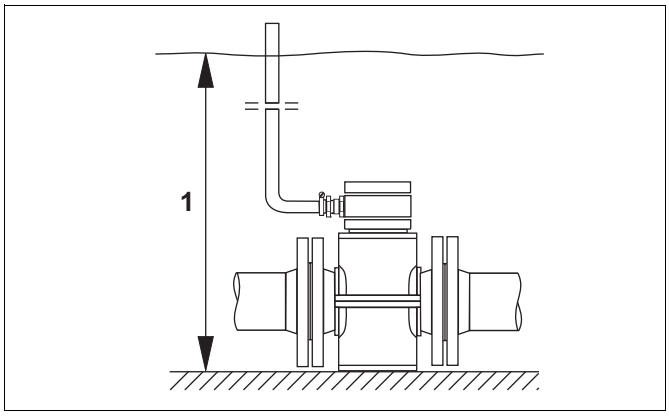


Fig. 38
1 Max. flooding height 5 m

11.3.3.1 Connection

1. Use the signal cable (part no. D173D025U01) to connect the flowmeter primary and the transmitter.
2. Connect the signal cable in the terminal box of the flowmeter primary.
3. Route the cable from the terminal box to over the maximum flooding height of 5 m.
4. Tighten the cable gland.
5. Carefully seal the terminal box. Make sure the gaskets for the cover are seated properly.

Caution - Potential damage to parts!
The jacket of the signal cable must not be damaged. Otherwise, the protection class IP 68 for the flowmeter primary cannot be ensured.

Important
As an option, the flowmeter primary can be ordered with signal cable already connected to the terminal box.

11.3.3.2 Potting the connection box

If the terminal box is to be potted on-site, a special potting compound can be ordered separately (order no. D141B038U01). Potting is only possible if the flowmeter primary is installed horizontally.

Observe the following instructions during work activity:

Warning - General hazards!
The sealing compound is toxic. Observe all relevant safety measures.
Risk notes: R20, R36/37/38, R42/43
Harmful by inhalation. Avoid direct skin contact. Irritating to eyes.
Safety advice: P4, S23-A, S24/25, S26, S37, S38
Wear suitable protective gloves and ensure sufficient ventilation.
Follow the instructions that are provided by the manufacturer prior to starting any preparations.

Preparation

- Complete the installation before beginning sealing activities in order avoids 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 seal/groove (see below).
- Prevent the potting compound from penetrating a conduit if an NPT 1/2" thread is used.

Procedure

1. Remove the outer wrapper by cutting with scissors where indicated.
2. Remove the rubber end caps from the centre clip. Remove the clip.
3. Knead both components thoroughly until a uniformly blend is reached.
4. Cut open the bag at a corner.
5. Carefully fill the terminal box with potting compound until the connecting cable is covered.
6. Wait 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.

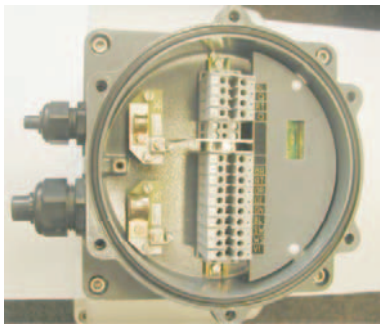


Fig. 39
1 Packaging bag
2 Drying bag
3 Clamp
4 Sealing compound

11.3.4 Signal Cable Connections at the Converter

Both cables are connected to the PARTI-MAG II converter prior to shipment. If the cables need to be shortened, then we recommend rolling up the cable.

11.3.4.1 Field Mount Housing Connections

The signal cable should be prepared as shown in Fig. 32. All shields for the individual conductors are to be covered with suitable insulating tubing since they are at different potentials.

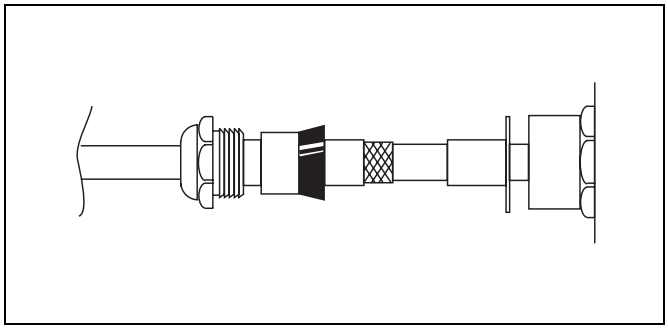


Fig. 40

The outermost shield of the signal cable is not connected at the converter. The shield is electrically connected to the converter housing by a plug-in brass bushing through the special PG-connector 16/21.

Fig. 41 Converter field housing design

⚠ Before opening the housing the power supply must be turned off.

11.3.4.2 19”-Rack Mount Connection

Signal- and excitation cable should be prepared as shown in Fig. 31. The length L should be prepared in accordance to the requirements at the location where the converter is to be installed. To shield against magnetic picup the cable incorporates and steel shield. At location X the insulation is to be removed and the steel shield is to be connected to ground as shown in Fig. 31.

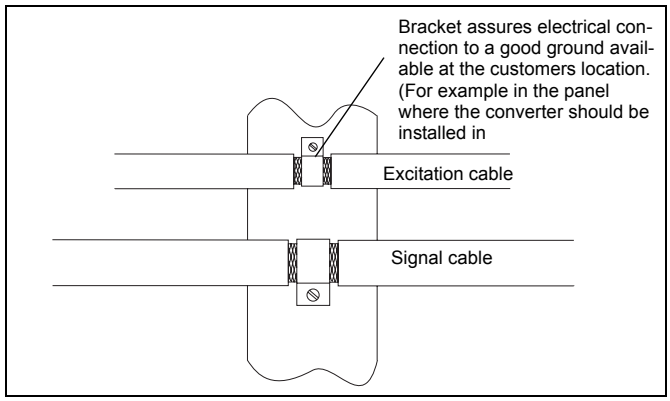


Fig. 42

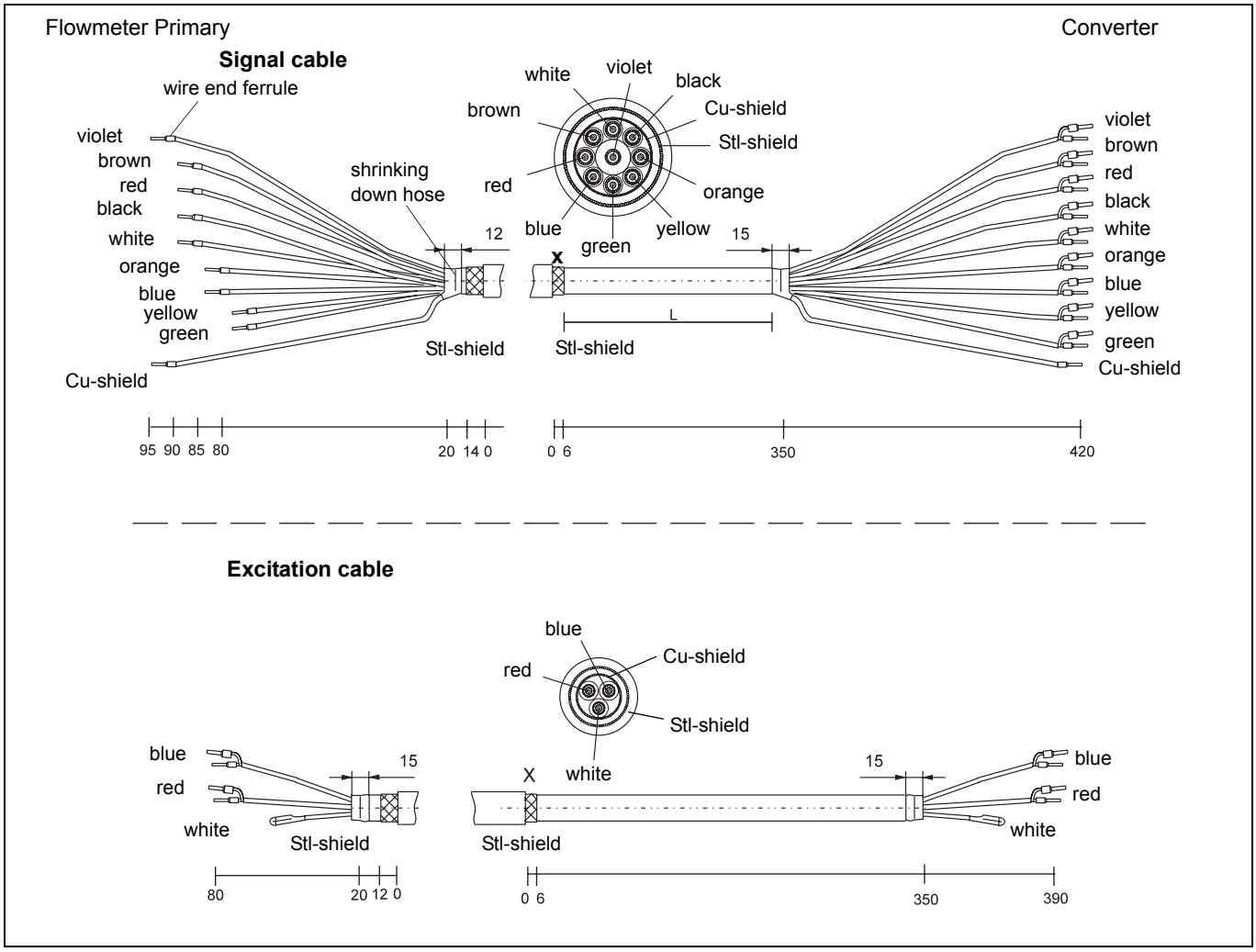


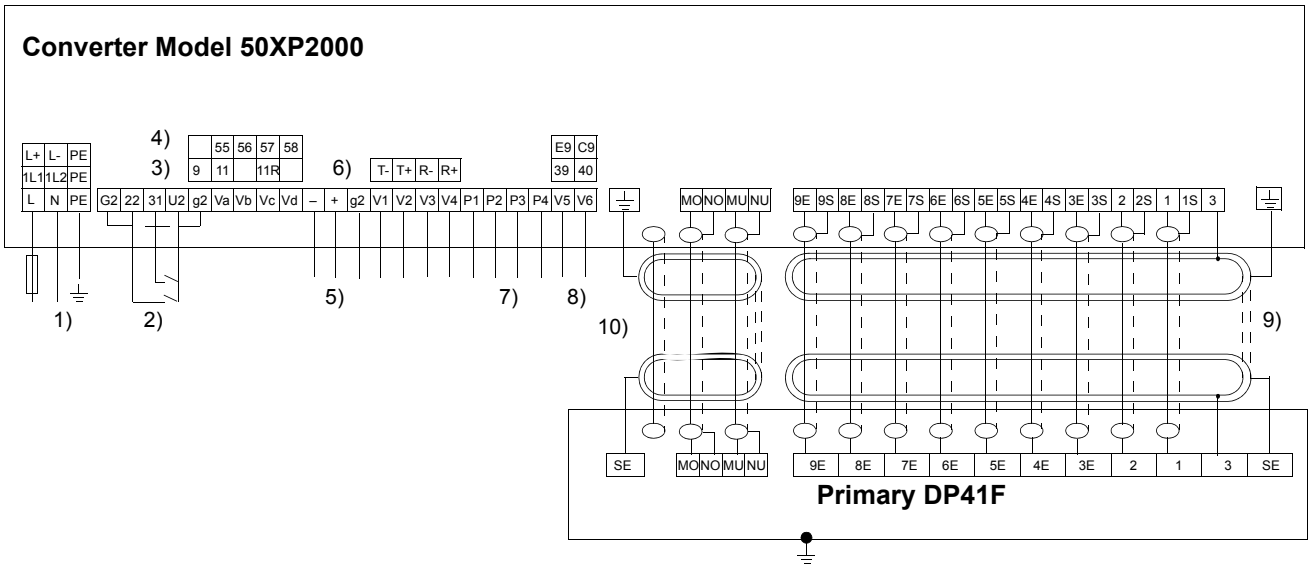
Fig. 43

Note

The copper shield of the excitation cable is not used. Therefore it is to be covered with is suitable insolution tubing.

11.4 Interconnection Diagramm

11.4.1 Primary DP41F and converter FXP4000-XP2 (50XP2000)



1) Supply Power, see Instrument Tag

2) Contact Input (optocoupler),16 V < U < 30 V, R_i = 2000 Ω, Function software selectable for:
   a) External zero return
   b) External totalizer reset
   Optocoupler contact input control
   - passive, over contact (closer). Install jumper G2/g2 for this mode
   - active, over terminals G2/22 or G2/31. Jumper is not to be installed.

3) Scaled Pulse Output, active 24 V DC, load > 150 Ω, f_{max} < 5 kHz
   Terminals g2 and Va, Function 9 and 11 forward
   Terminals g2 and Vc, Function 9 and 11 R reverse

4) Scaled Pulse Output, passive, optocoupler,
   5 V < U_{CE} ≤ 25 V DC, 5 mA < I_{CE} < 200 mA; f_{max} 5 kHz
   Terminals Va and Vb, Function 55 and 56 forward
   Terminals Vc and Vd, Function 57 and 58 reverse

5) Current Output, Terminals +/-, selectable as
   a) 0/4-20 mA, load < 1000 Ω or
   b) 0/2-10 mA, load < 2000 Ω,

6) Data Link RS 485[1)], Terminals: g2, V1, V2, V3, V4; Function: shield, T-, T+, R-, R+

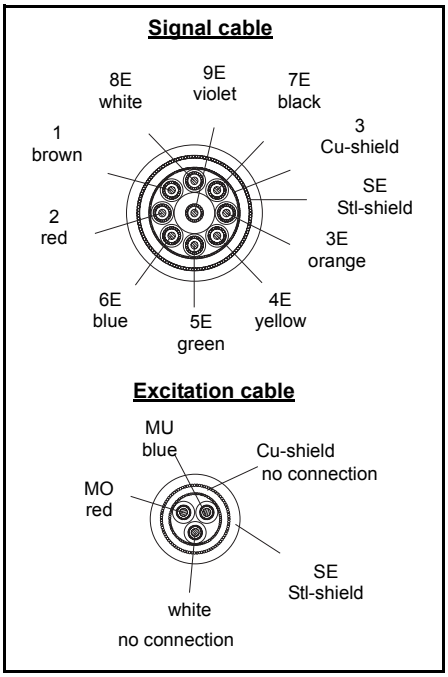
7) Two Contact Outputs (optocoupler), Function selectable:
   Forward-/reverse direction signal, Min-/Max-Alarm for fill height or flowrate
   Optocoupler: 16 V < U_{CEH} < 30 V; 0 V < U_{CEL} < 3,5 V
   0 mA < I_{CEH} < 0,2 mA; 2 mA < I_{CEL} < 15 mA
   Terminals: P1, P2, P3, P4; P1/P3 = emitter P2/P4 = collector

8) Alarm Output, relay contact < 3 W; < 250 mA; < 30 V DC, opens at alarm,
   Terminals V5, V6, Function 39/40 or
   Alarm Output, optocoupler, same specifications in 8), opens at alarm,
   Terminals V5, V6, Function E9/C9

9) Shielded Signal Cable, connected to converter when shipped

10) Shielded Excitation Cable, connected to converter when shipped

Colour-Code

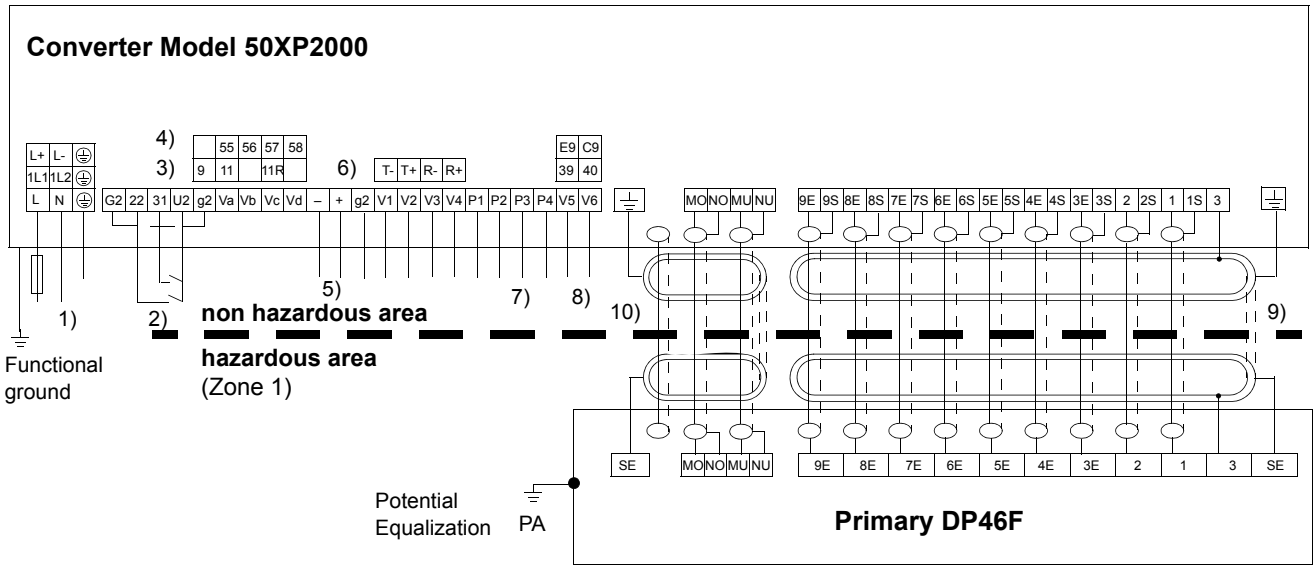


Note:

[1)] When using data link RS 485 a shielded data cable with individually twisted pairs is recommended.

Fig. 44 Signal- and Coil Excitation Cable Connections

11.4.2 Primary DP46F (ex-design) and converter FXP4000-XP2 (50XP2000)



1) Supply Power, see Instrument Tag

2) Contact Input (optocoupler),16 V < U < 30 V, R_i = 2000 Ω, Function software selectable for:
   a) External zero return
   b) External totalizer reset
   Optocoupler contact input control
   - passive, over contact (closer). Install jumper G2/g2 for this mode
   - active, over terminals G2/22 or G2/31. Jumper is not to be installed.

3) Scaled Pulse Output, active 24 V DC, load > 150 Ω, f_{max} < 5 kHz
   Terminals g2 and Va, Function 9 and 11 forward
   Terminals g2 and Vc, Function 9 and 11 R reverse

4) Scaled Pulse Output, passive, optocoupler,
   5 V < U_{CE} ≤ 25 V DC, 5 mA < I_{CE} < 200 mA; f_{max} 5 kHz
   Terminals Va and Vb, Function 55 and 56 forward
   Terminals Vc and Vd, Function 57 and 58 reverse

5) Current Output, Terminals +/-, selectable as
   a) 0/4-20 mA, load < 1000 Ω or
   b) 0/2-10 mA, load < 2000 Ω,

6) Data Link RS 485[1)], Terminals: g2, V1, V2, V3, V4; Function: shield, T-, T+, R-, R+

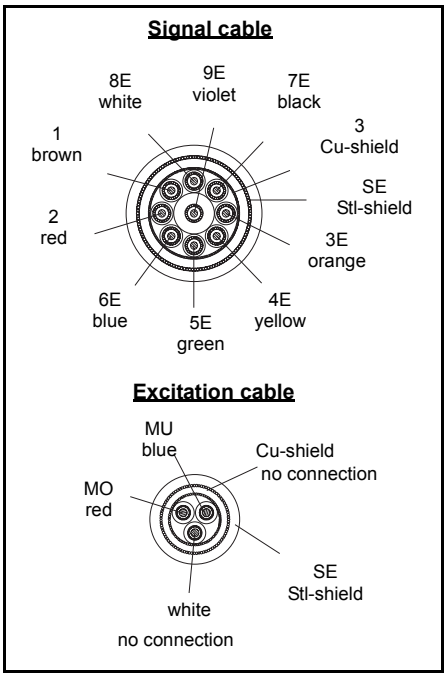
7) Two Contact Outputs (optocoupler), Function selectable:
   Forward-/reverse direction signal, Min-/Max-Alarm for fill height or flowrate
   Optocoupler: 16 V < U_{CEH} < 30 V; 0 V < U_{CEL} < 3,5 V
   0 mA < I_{CEH} < 0,2 mA; 2 mA < I_{CEL} < 15 mA
   Terminals: P1, P2, P3, P4; P1/P3 = emitter P2/P4 = collector

8) Alarm Output, relay contact < 3 W; < 250 mA; < 30 V DC, opens at alarm,
   Terminals V5, V6, Function 39/40 or
   Alarm Output, optocoupler, same specifications in 8), opens at alarm,
   Terminals V5, V6, Function E9/C9

9) Shielded Signal Cable, connected to converter when shipped

10) Shielded Excitation Cable, connected to converter when shipped

Colour-Code



Note:

1) When using data link RS 485 a shielded data cable with individually twisted pairs is recommended.

⚠ The rated voltage U_M for the in- and outputs is 60 V

Fig. 45 Signal- and Coil Excitation Cable Connections

11.4.3 Safety-notes

Note

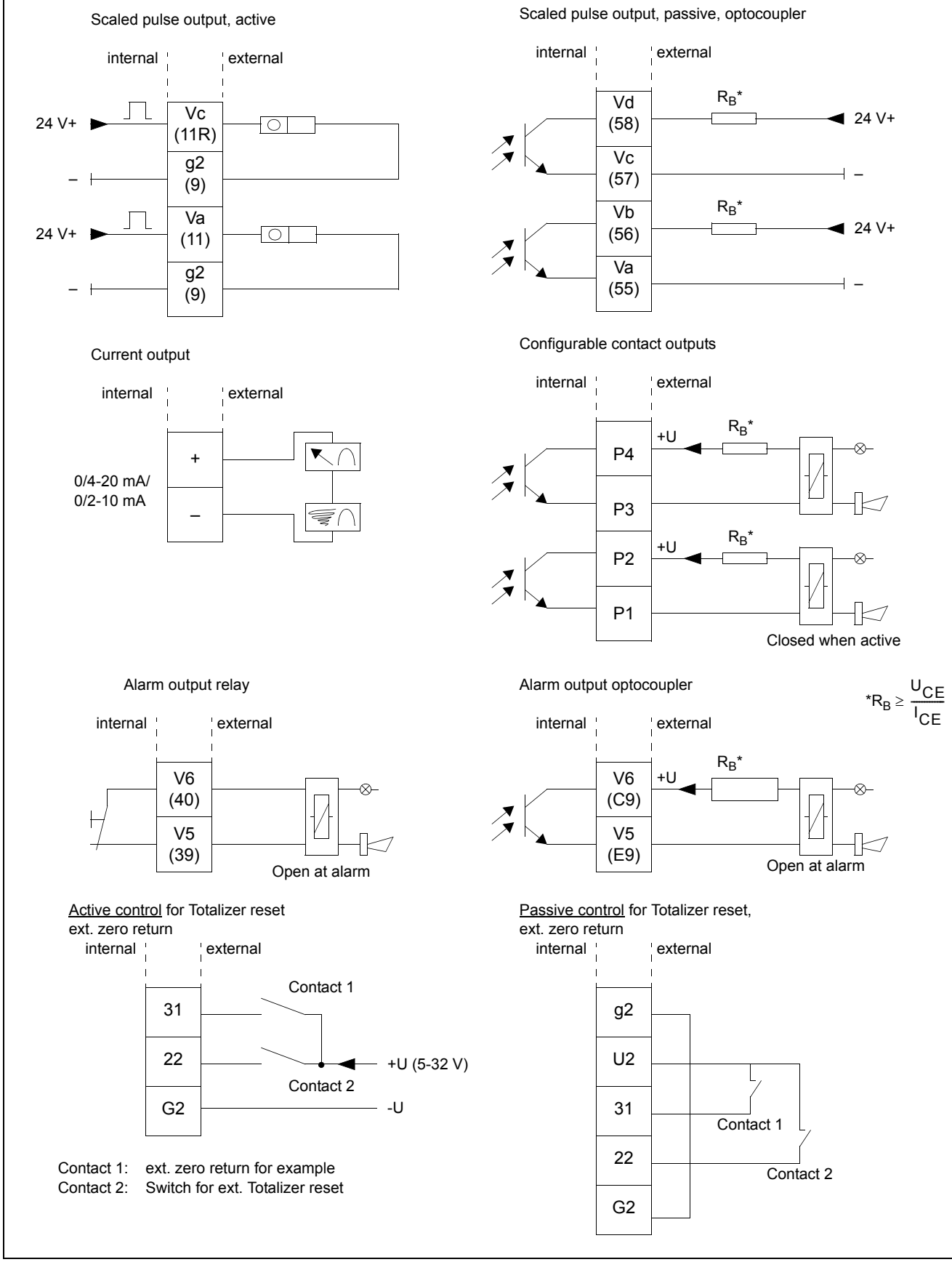
Dangerous electrical currents are present in the flowmeter primary and the converter. You must therefore turn off the supply power before opening the housing. Work activities on open meters should only be performed by trained personnel.

- Flowmeter primary and converter consist of electrical circuits that are liable to shock. Turn off the power supply prior opening the housing. All repair or service work is to be performed by qualified personnel.
- The primary and the converter are to be connected to protection ground. With the ex-design the primary is to be connected to potential equalization.
- The supply power conducter cress section must be in accord with IEC227 or IEC245.
- The converter is tobe connected to the supply power over a main fuse and a main switch. The switch should be located near the converter. A tag on the switch is recommended to identify the switch belonging to the converter.
- The primary is connected to the converter by use of ABB Automation Products signal- and excitation cable only. The interconnection must be in accord with fig. 30 und 31.
- To assure a safe operating of the flowmeter the installation has to be in accordance with this instruction manual an the notes ⚠ that are made.

Note Connection of peripheral

Except the supply power circuit and the excitation circuit the other signal output circuits of the converter are not liable to shock. Therfor peripherals that are also not liable to shock are permitted to be connected to the converter.

11.5 Interconnection Example for Peripherals



Contact 1: ext. zero return for example
Contact 2: Switch for ext. Totalizer reset

Fig. 46 Interconnection Examples for Peripherals

11.6 Electrical specification of the converter (supply power, power consumption etc)

Fig. 47 Converter Field Mount Housing and 19 “-Rack Mount

Flow Range
Continuous, 0.5 m/s to 9.99 m/s

Conductivity
≥ 50 µS/cm

Max. Conductivity
10.000 µS/cm

Response Time
0-99 % response to a step change (corresp. to 5 τ)
≥ 10 s

Damping
Setable to 200 s

Supply Power
115/230 V AC ± 10 %
24 V AC ± 10 %
50/60 Hz ± 6 %
Ripple < 1.5 Vp

Magnetic Field Supply
6 1/4 Hz, 7 1/2 Hz (50/60 Hz supply power)

Power
DN 150 to DN 2000
< 60 VA (flowmeter primary and converter)

Ambient Temperature
-20 ... 50 °C (-4 ... 122 °F)

Protection Class per EN 60529
IP 65 for field mount housing
IP 00 for 19”-Rack Mount

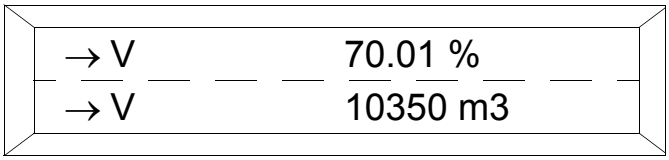
Construction
Field mount housing in stainless steel
19”-Rack Mount, 167 mm deep, 28 TE, 3 HE

Electrical Connections
Screw terminals
5 x cable connectors Pg 13.5
1 x cable connectors Pg 16/21 for signal cable

Weight
Field mount housing ca. 9.3 kg
19”-Rack Mount ca. 2.8 kg

Signal Cable / Excitation Cable
The max. cable length between the flowmeter primary and the converter is 50 m. The signal and excitation cables are preassembled and connected to the converter prior to shipment (field mount housing version). Ordering number see section 8.2.

Display
2 x 16-character dot matrix display in Super-Twist technology with LED background lighting. In the 1st line the flowrate direction and its instantaneous value are displayed in % or in the selected engineering units. Optionally the instantaneous fill height can be displayed. In the 2nd line the integrated flow volume value is displayed in engineering units. There is a separate totalizer for each flow direction, 7 digit with overflow counter.



Parameter Entry
Entries are made from the keypad, menu controlled in a clear text dialog. All entry parameters including the totalizer values are stored for a 10 year period in an EEPROM. The meter location specific parameters can be uploaded into an exchanged converter by pressing a single button

Forward-/Reverse Flow Metering
An arrow in the display and a contact output (optocoupler) for an external signal indicate the existing flow direction.

11.7 Specification of the input signals

11.7.1 External Zero Return

All output signals can be turned off over an external passive or active contact (closure).

Optocoupler: 16 V ≤ U_{CE} ≤ 30 V DC, R_i = 2000 Ω

11.7.2 External Totalizer Reset

The internal totalizer values can be reset over an external passive or active contact (closure).

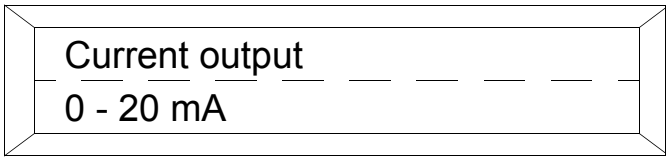
Optocoupler: 16 V ≤ U_{CE} ≤ 30 V DC, R_i = 2000 Ω

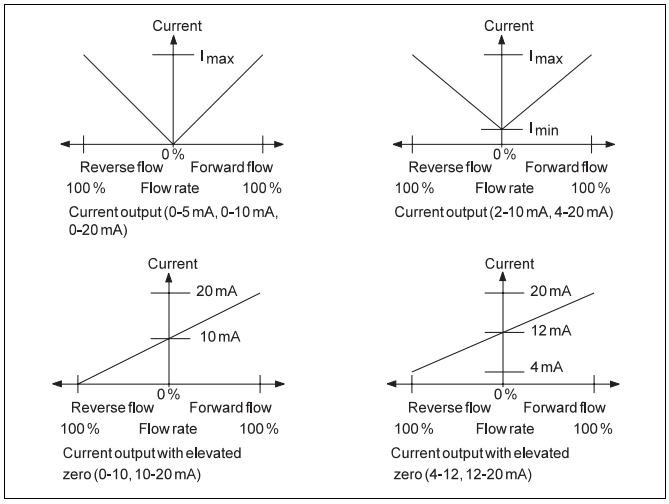
11.8 Specification of output signals

Isolation In-/Outputs
All in-and output signals are isolated from the flow signal circuit and each other.

11.8.1 Current Output

0/4-20 mA, load < 1000 W
0/2-10 mA, load < 2000 W
Software selectable





11.8.2 Scaled Pulse Output

Scaled pulse output, separate for each flow direction, max. count frequency 5 kHz. The pulse factor can be set between 0.001 and 1000.The pulse width can be set between 0.1 ms and 2000 ms.

11.8.2.1 Active

Potential free 24 V rectangular, load > 150 Ω.

11.8.2.2 Passive

Passive, optocoupler:
5 V < U_{CE} < 30 V DC
2 mA < $_{ICE}$ < 220 mA, f_{max} 5 kHz

11.8.3 Contact Output for System Monitoring

The internal system monitor displays a clear text message when an error is detected and actuates the contact output, optocoupler or relay (opens at alarm). Detected errors are stored in the error register.

Optocoupler: 16 V < U_{CE} < 30 V DC; 0 V < U_{CEL} < 3.5 V
0 mA < I_{CE} < 0.2 mA; 2mA < I_{CEL} < 15 mA

Relay: max. 3W, max. 250 mA, max 30 V DC

11.8.4 Configurable Contact Outputs (Optocoupler)

The functions of the contact outputs can be set by the software for the following:
No function Function,
Empty pipe,
Forward-/reverse direction signal,
Max.-Alarm or Min.-Alarm for fill height,
Max.-Alarm or Min.-Alarm for flowrate
Optocoupler: 16 V < U_{CE} < 30 V DC; 0V < UCEL < 3.5 V
0 mA < ICE < 0.2 mA; 2mA < ICEL < 15 mA

11.8.5 Serial Data Link RS 485

Vpp = 5 V. Input impedance: ≥ 12 kΩ,
Max. cable length 1200 m
Baudrate 1200-9600 Baud.
Max. 32 instruments in parallel on a single bus. A shielded data cable with individually twisted pairs is recommended.
Terminals:V1, V2, V3, V4; Function T-, T+, R-, R+.

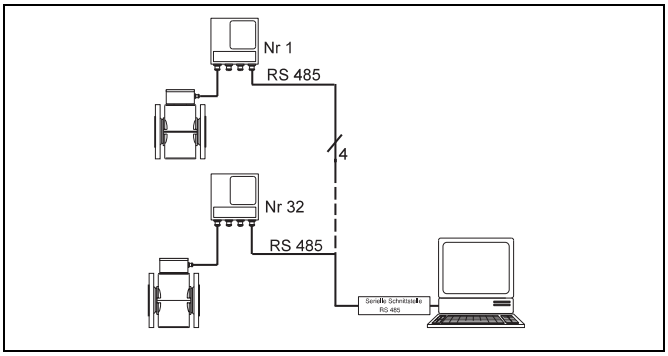


Fig. 48 Communication over Data Link RS 485

11.9 Start-up

11.9.1 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.

11.9.2 Installation of the converter 50XP2000

The housings for wall mounted converters are designed for Protection Class IP 65. The lower section of the housing is mounted using 4 screws. The mounting location should be essentially free of vibration. The specified temperature limits from -20 °C ... 50 °C (-4 ... 122 °F) are to be observed. Note that the maximum signal cable length between the flowmeter primary and the converter of 50 m may not be exceeded. The mounting location should be selected accordingly. It is also important when selecting a mounting location that the converter not be exposed to direct sunlight.

11.9.3 Converter Electrical Connections

The supply power, as specified on the instrument tag, is connected to the converter terminals L (phase) and N (neutral) or 1L1 and 1L2 over a main fuse and a mains switch. The supply power conductor cross section and the main fuse must be compatible. The power consumption is maximum 60 VA (converter and flowmeter primary). The connections are made in accord with Interconnection Diagram section 9.4
Pay attention to safety-notes made in section 9.4

11.9.4 Start-Up-Checklist

Follow the start-up procedure described below after the assembly and installation of the flowmeter primary and converter have been completed.

The supply power is turned off!

Check that the flow direction agrees with the direction indicated by the arrow on the flowmeter primary housing.

- Check the grounds per section 9.1.
- Check that the connections agree with the Interconnection Diagram section 9.4.
- Check that the supply power agrees with the specifications on the Instrument Tag.
- Check that the ambient temperature agrees with values listed in the Specifications
- Check that the coordination between the flowmeter primary and the converter is correct. Instruments with the same end characters A1 and B1 or A2 and B2 on the Instrument Tags belong together.
- Close the connection box of the primary and the connection box of the converter.

Turn on the supply power.

Check the contrast setting of the display. A small screwdriver can be used to adjust the contrast of the display for the ambient conditions. The adjustment potentiometer is located on the front plate of the converter.

A few parameters must first be selected or set in order to operate the system. The flow range is automatically set to 10 m/s. Enter the desired flow ranges for the forward and reverse flow directions in the appropriate engineering units.

In the "Submenu Current output" select the required current output range (0-20 mA/4-20 mA). If the converter includes an active or passive pulse output option, the pulses per unit must set for the selected engineering units. The pulse width for an external counter or for processing in a computer can be selected between 0.1 ms and 2000 ms.

After completion of the start-up procedure all parameters should be stored in the EEPROM that is located on the terminal board. Therfore selected the submenu “Stored data in ext. EEPROM”. When the converter is exchanged the parameters can be uploaded into the new converter.

The data and parameters entered and the options included in the converter can be recorded on the last page of this Instruction Manual for service or repair reference.

11.10 Maintenance

11.10.1 Primary

The flowmeter primary is essential maintenance free. Monitor on a yearly basis the ambient conditions (humidity, air circulation), the integrity of the flange gaskets, cable entries and cover screws, operational safety of the supply power, lightning protection and the protection ground connections.

Note

All repair or service work is to be performed by qualified personnel.

Please review the Notes (Hazardous Material Law) on the yellow page if the flowmeter primary is to be returned to the Abb Automation Products factory for repair.

Notes Regarding the Opening of the Housing

The following notes must be observed if the converter housing is opened:

- All interconnection leads must be potential free.
- The EMC-Protection is limited when the housing is open.
- The temperature of the primary´s surface might exceed 70 °C (158 °F).

Spare parts

Fore funktional and safety reason original ABB Automation Products spare parts are to be used.

11.11 Flowmeter System Error Search

Note
When the housing cover is removed and the supply power turned on physical contact and EMC protection are voided.

Turn off supply power before removing the housing cover. The temperature of the primary´s surface might exceed 70 °C (158 °F). Pay attention to safety notes in section 9.10.

Service work is to be performed by qualified personnel.

Checks of the meter system are made after the assembly and installation of the flowmeter primary and converter is complete.

Is the supply power in accord with the specifications on the converter Instrument Tag?	no	Set jumpers for required voltage (see Analog- and Driver boards).
yes		
Are the flowmeter primary and converter installed in the correct location? (Protection Class, temperature, vibration, cable length, cable type, flow direction arrow, sunlight on display).	no	Check allowable installation conditions (see Specifications).
yes		
Are the interconnections in agreement with the Interconnection Diagram? Are the ground connections on the flowmeter primary correctly installed, the protection ground of the line connected to the converter?	no	Check connections against Interconnection Diagram (see Page 32).
yes		
Is the supply power within the allowable tolerances at the terminals? Terminals L, N: AC voltage. tolerance +10% to -10%; 1L1, 1L2: low voltage AC, tolerance +10 % to -10 %.	no	Provide supply power within tolerances.
yes		
Is the flowmeter primary partially filled with liquid?	no	Partially fill flowmeter primary.
yes		
Are the present flow direction (>F for forward, < R for reverse) and the instantaneous flowrate value in percent or in engineering units displayed? Does the present flowrate value correspond to the display and output signals?	no	Fuse defective, conductivity < 50 µS/cm. Defective flowmeter primary or converter.
yes		
Flowmetering system operational		

Note
For Error and status messages refer to section 5.

Translation

TÜV CERT

(1) **EC Model Test Certificate**

(2) Instruments and protection systems for utilization in regulated explosion hazardous areas - **Guideline 94/9/EC**

(3) EC Model Test Certificate number

TÜV 97 ATEX 1219 X

(4) Instrument: Electromagnetic Flowmeter Type DP46

(5) Manufacturer: Bailey-Fischer & Porter GmbH

(6) Address: Dransfelderstr. 2
D 39079 Göttingen, Germany

(7) The design of these instruments as well as the allowable versions are defined in the Appendix to this Model Test Certificate.

(8) The TÜV Hannover/Saxony Anhalt e.V., TÜV Certification Authority, certifies as designated authority No. 0032 per Article 9 of the Guideline of the Board of the European Community dated 23 March 1993 (94/9/EC) that the design and manufacture of instruments and protection systems satisfy the basic safety and health requirements for the designated use in explosion hazardous areas in accordance with Appendix II of the Guideline.

The results of the tests are documented in the confidential Report No. 125/97/0233.

(9) The basic safety and health requirements were satisfied in accordance with

EN 50 014:1977 + A1 ...A5 EN 50 020:1977 + A1...A5 EN 50 019:1977 + A1...A5
EN 50 028:1987

(10) When the letter "X" appears after the certificate number, then special conditions for the safe application of this instrument are listed in the Appendix to this certificate.

(11) This EC-Model Test Certificate is based only upon the concept and the manufacture of the defined instrument per Guideline 94/9/EC. Additional requirements included in this Guideline apply to the manufacture and installation of this instrument.

(12) The markings for this instrument must include the following characters:

II 2G EEx em [ib] IIC T4

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

Hannover 1997-09-29

/s/
Director

Elsag Bailey **Bailey-Fischer & Porter**

EG-Konformitätserklärung
EC-Certificate of Compliance

CE

Hiermit bestätigen wir die Übereinstimmung der
Herewith we confirm that our

Magnetisch-induktiven Durchflußaufnehmer Modell DP46..
Electromagnetic Flowmeter Type DP46..

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: *EC-Type Examination Certificate:*	TÜV 97 ATEX 1219 X
Benannte Stelle: *Notified Body:*	TÜV Hannover/Sachsen-Anhalt e.V., Kennummer 0032
Geräte-Kennzeichnung: *Apparatus code:*	II 2G EEx em [ib] IIC T4
Umgebungstemperatur: *Ambient Temperature:*	-20°C bis +60°C *-20 °C to +60 °C*
Sicherheitstechnische Daten: *Safety values:*	siehe EG-Baumusterprüfbescheinigung TÜV 97 ATEX 1219 X *refer to EC-Type Examination Certificate TÜV 97 ATEX 1219 X*
Angewandte Normen: *Standards:*	EN 50 014: 1977 + A1...A5 EN 50 019: 1977 + A1...A5 EN 50 020: 1977 + A1...A5 EN 50 028: 1987

Göttingen, 29. September 1997

Unterschrift / *Signature*

Bailey-Fischer & Porter GmbH · ein Unternehmen der Elsag Bailey Process Automation N.V. BZ-13-8006, Rev.0, E19812

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Sparkasse Göttingen (BLZ 26050001) 588507
Volksbank Göttingen (BLZ 26090050) 160004400

Handelsregister/Court of Register: Göttingen
HRB Nr. 423

Geschäftsführer/General Manager:
Wilfried Kiene

Translation

TÜV Hannover/Sachsen-Anhalt e.V.

Appendix EC Model Test Certificate No. TÜV 97 ATEX 1219 X

(17) Special conditions

1.
All external ground connection terminals are to be connected to the potential in the hazardous area. The applicable installation requirements are to be observed.

2.
The listed voltage values of U_m = 60 V are the maximum values which can be applied to the connection terminals for safety reasons so that the intrinsic safety is not endangered. The flowmeter can only be operated with converters which assure that these maximum values are not exceeded.

(18) Basic safety and health requirements

No additional

Translation

TÜV Hannover/Sachsen-Anhalt e.V.

(13) **APPENDIX**

(14) **EC Model Test Certificate No. TÜV 97 ATEX 1219 X**

(15) Description of the instrument

The Electromagnetic Flowmeter Type DP46 is used for measuring the flow of electrically conductive liquids. 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 maximum allowable fluid temperatures [°C] are listed in the following table as a function of the maximum allowable ambient temperature and the flowmeter size:

Flowmeter Size DN	Inch	Temperature Class	Maximum Allowable Ambient Temperature [°C]	Maximum Allowable Fluid Temperature [°C]
150-250	6-10	T4	60	90
150-250	6-10	T4	50	110
150-250	6-10	T4	40	130
300-900	12-36	T4	60	90
300-900	12-36	T4	50	110
300-900	12-36	T4	40	130
1000-3000	40-120	T4	60	90
1000-3000	40-120	T4	50	110

Electrical data

Coil supply.....Non-intrinsically safe electrical circuit
(Connection terminals MO,MU; NO, NU: and angle clamp SE Max. voltage: U_m = 60 V

Electrode current circuit.....Non-intrinsically safe electrical circuit
(Connection terminals 1,2,3E, 4E,5E,6E,7E,8E<9E and angle clamp SE Max. voltage: U_m = 60 V, $I_i \leq$ 100 mA

Signal ground:.....Connected to potential equalization
(Terminal 3)

(16) Test documents consisting of 9 pages and including 12 drawings and 1 Certificate of Compliance are included in the test report.

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:*	FXE4000, FXM2000, FSM4000, FXL4000, FXT4000, FXF2000 FEP .., FEH.., (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 0124 Z 0052/2/0002 Nr. 07 202 0124 Z 0052/2/0002a Nr. 07 202 4534 Z 0601/3/H Nr. 07 202 0124 Z 0205/6/1
Benannte Stelle: *notified body:*	TÜV Nord Systems GmbH & Co. KG Große Bahnstr. 31 22525 Hamburg - Germany
Kennnummer: *identification no.*	0045

Göttingen, den 28.08.2007

ppa .....
(J. Harr, Standortleiter APR Göttingen)

2310 BZ-25-0002 Rev 05

11.13 Overview:Parameter Setting and Technical Overview

Meter Location: . . . . . .

Primary Type: . . . . . Conver Type: . . . . . .

Order No.: . . . . . Instrument No.: . . . . . Order No.: . . . . . Instrument No.: . . . . . .

Supply Power: . . . . . V . . . . . .Hz. . . . . .

Parameter		Entry Range
Meter Size:	. . . . .	DN 150 bis DN 2000
Unit Q_{max}.:	. . . . .	ml, l, m^3, /s, /min, /h, Ml/min, /h, /d
	. . . . .	igal, gal, bbl, bls, /s, /min, /h, mgd,
	. . . . .	g, kg, t, /s, /min, /h, uton/min, /h, /d, lbs/s, /min, /h
$Q_{max\ DN}$ 10 m/s:	. . . . .	Depend from meter size
Q_{max} Forward/Reverse flow:	. . . . .	0,05 Q_{maxDN} -1 Q_{maxDN}
Unit Totalizer:	. . . . .	Ml, ml, l hl, m^3, igal, gal, mgal,bbl, bls, g,kg, t, uton, lb
Pulse Forward/reverse flow :	. . . . .	0,1 - 1000 Imp./Unit
Pulse width:	. . . . .	0,064 - 2000 ms
Density:	. . . . .	10 - 200 Sec.
Low flow cutoff:	. . . . .	0 - 10 % from end value
Current output:	. . . . .	0/4 bis 20 mA
I_{out} at alarm	. . . . .	0 % oder 130 %
Communication:	. . . . .	ASCII
Instrument adress:	. . . . .	0 bis 99
Baudrate:	. . . . .	110 - 9600 Baud
	. . . . .	
MIN-alarm:	. . . . .	0 - 130 %
MAX-alarm:	. . . . .	0 - 130 %
Store data in ext. EEPROM:	. . . . .	All Parameters can be stored after start up.
	. . . . .	
	. . . . .	

Alarm output	❑ Opto	❑ Relais
Pulse output:	❑ aktiv	❑ Opto
Communication:	❑ RS 485	❑ ASCII-protocol
External totalizer reset:	❑ yes	❑ no
		❑
External turned off:	❑ yes	❑ no

Configurable contact output P1 - P2	❑ no function	❑ Min-alarm	❑ MAX-alarm	❑ Empty pipe	❑ Forw./reverse signaling
Configurable contact output P3 - P4	❑ no function	❑ Min-alarm	❑ MAX-alarm	❑ Empty. pipe	❑ Forw./reverse signaling

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