

Supplement to
Instruction Bulletin D184B105U02 and to
Specification Sheet D184S044U02

D184B119U04

Rev. 01



Models DE21, DE23, DE41, DE43, E4
Valid for software version X.2x

Instrument Designation

COPA-XE/MAG-XE

Instruction Bulletin

Part No. D184B119U04

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This document includes additions and improvements resulting from product innovations which were introduced after the Instruction Manual COPA-XE / MAG-XE (D184B105U02) and the Specification Sheet COPA-XE / MAG-XE (D184S044U02) were printed. Specifically these include additions to the Ordering Information for hazardous area design meter with PROFIBUS PA or FOUNDATION Fieldbus communication ability, additions to the electrical connection of these meters and revisions to the menu structure.

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1 Safety Information

1. This instrument was tested for compliance with the safety requirements at the factory and was shipped in proper operating condition. In order to maintain this condition over the expected life of the instrument, the requirements and conditions described in this Instruction Bulletin must be observed and followed.
2. The instruments satisfy the EMC-Requirements in EN 61326/NAMUR NE 21.
3. All instrument parameters are permanently stored in a NVRAM during power outages (including the actual totalizer values). The instrument is immediately operational whenever the power is turned on.

1.1 Regulated Usage

These instruments are used:

- to transport electrically conductive liquid, slurries or pastes and to measure their flowrate.

Included in the Regulate Usage requirements are:

- installations compatible with the specified technical limits
- observing and following the notes relative to allowable fluids (liquids)
- observing and following the instructions in this Instruction Bulletin
- observing and following the information in the accompanying documents (Specification, Diagrams, Dimension Drawings)

1.2 Prohibited Usage

The following uses of the instrument are prohibited:

- operation when elastic elements are installed in the pipeline, e.g., to compensate for pipeline misalignment, pipeline vibration, pipeline expansion, etc. ,
- use as a step ladder, e.g., for personnel support during installation,
- use as a support for external loads, e.g., as a pipeline support etc..
- addition of materials or parts by painting (covering the Name Plate), welding or soldering
- repairs, changes, additions and the use of replacement parts are only permitted using the procedures described in this Instruction Bulletin. Additional tasks must be approved by ABB. We accept no liability for unapproved tasks.

The operation, service and maintenance requirements in this Instruction Bulletin must be observed. The manufacturer accepts no liability for damage due to improper or prohibited usage.

1.3 Technical Limits

The instrument is to be used exclusively within the technical limits specified on the Name Plate and in the Instruction Bulletin. The following technical limits are to be observed:

- the allowable pressure and the allowable temperature
- the maximum temperature limits specified in the instrument Specifications may not be exceeded.
- the allowable ambient temperature range specified in the instrument Specifications may not be exceeded
- the housing Protection Class is IP 67 or IP 68 per EN60529.
- graphite may not be used on the gaskets, because, under certain circumstances, it may cause an electrically conductive layer to form on the inside of the flowmeter.
- the flowmeter primary may not be operated in the vicinity of strong electromagnetic fields, e.g., motors, pumps, transformers, etc.
- a minimum spacing of approx. 100 cm should be provided from steel components (steel brackets).

1.4 Allowable Fluids

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

1.5 Safety Signs and Symbols, Name Plate, CE-Symbols and Certificate of Compliance

All safety signs and symbols and the Name Plate are to maintained in a readable condition and replaced if damaged or lost.

Observe the following general information:

	Warning!	Warning indicates possible hazards to personnel, which may result in serious injury or even death. Follow these instructions exactly to protect yourself and others.
	Attention!	Attention indicates possible damage which may result in incorrect operation or destruction of the instrument. Follow these instructions exactly to prevent damage to the instrument.
	Information	Information indicates an important task or procedure, which must be followed correctly to prevent operating interruptions or improper functioning of the instrument.

1.6 Transport, Installation, Start-Up, Operating and Maintenance Requirements

1.6.1 Transport

Note during transport of the instrument to the installation site:

- That the center of gravity may be off-center.
- The protection plates or caps installed on the process connectors for PTFE/PFA lined flowmeters should only be removed immediately prior to installation in the pipeline.
- Assure that the lining extending over the flange is not cut-off or damaged to prevent possible leaks.

1.6.2 Installation

Assure during the installation that:

- the flow direction agrees with the direction arrow, if present.
- all flange bolts are tightened to the maximum specified torque value.
- the instrument is installed in a stress free manner with parallel mating flanges and that suitable gaskets are used.
- the instrument display is positioned for best readability, if possible.
- the pipeline cannot exert any stresses or moments on the instrument.

1.6.3 Electrical Installation

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



Warning!

When the housing cover is removed the EMC- and personnel contact protection are voided.

Ground the flowmeter system.

Max. converter in- and output signal values are to be observed.

1.6.4 Operation

- When metering high temperature fluids touching the surface of the instrument may cause burns.
- Aggressive fluids can result in corrosion and/or abrasion and when fluids are under a vacuum, cavitation may result from premature vaporization.

1.6.5 Inspection and Maintenance

Before opening the instrument, assure that the instrument and, if necessary, the adjacent piping or tanks are depressurized.

Before opening the instrument ascertain whether hazardous materials were present in the flowmeter. Hazardous residues may still be present in the flowmeter and exit when it is opened.

During a regular inspection check:

- the operation
- the seals
- for wear (corrosion, abrasion, cavitation)

1.7 Returns

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



Hazardous Material Regulations

In view of the Disposal Law of 27 Aug. 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 Oct. 86 (GefStoffV, 17 General Protection Responsibility), a responsibility to protect his employees, we must make note that

1. all flowmeter primaries and/or flowmeter converters which are returned to ABB Automation Products for repair are to be free of any hazardous materials (acids, bases, solvents, etc.).
2. the flowmeter primaries must be flushed so that the hazardous materials are neutralized. There are cavities in the primaries between the metering tube and the housing. Therefore after metering hazardous materials, these cavities are to be neutralized (see Hazardous Material Law -GefStoffV).
3. for service and repairs written confirmation is required that the measures listed in 1) and 2) have been carried out.
4. any costs incurred to remove the hazardous materials during a repair will be billed to the owner of the equipment.

2 Communication PROFIBUS PA

This section of the Instruction Bulletin contains information for those converter designs which include the PROFIBUS PA and FOUNDATION Fieldbus communication options.

The PROFIBUS PA data link in the COPA-XE and the MAG-XE conforms to Profile 2.0 (Fieldbus Standard PROFIBUS, EN 50170, alias DIN 19245 [PRO91]). Fieldbus Standard PROFIBUS, EN 50170, alias DIN 19245 [PRO91]. The transmission signal from the converter is configured in accordance with IEC 61158-2.

The PROFIBUS-PA Ident-No. for the COPA-XE and the MAG-XE is: 6668 hex.

2.1 Layout Information

A typical PA-Network is shown in the following figure:

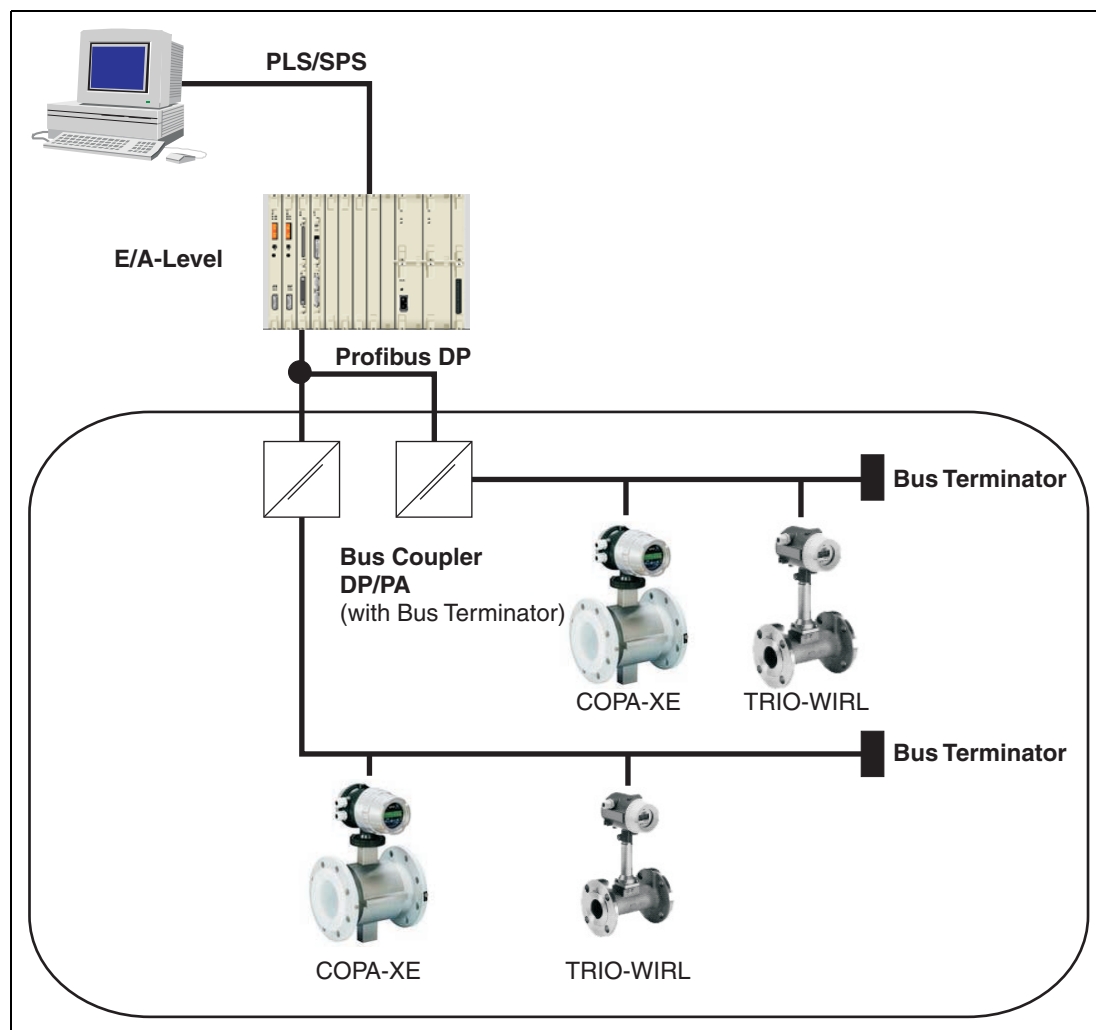


Fig. 1: Typical PA-Network

A shielded, twisted cable is recommended (Types A or B in IEC 61158-2 are preferred).

Additional detailed layout information may be found in the Brochure "PROFIBUS - Solutions from ABB" (No. 30/FB-10). Accessories such as hubs, connectors and cables may be found in the Spec. Sheet 10/63-6.44. Additional information may also be found on our home page <http://www.abb.de> and on the home page of the PROFIBUS User Group <http://www.profibus.com>.

2.2 Setting the Bus-Address

If no special customer specifications relating to the bus address were provided with the order, the address is set at the factory to "126". This address must be changed during the COPA-XE or MAG-XE start-up procedure to a value within the allowable range (0 - 125). An address may only be used once in a segment. The setting cannot be made directly at the instrument but must be made using a System Tool or a Profibus DP Master Class 2, e.g. SMART-VISION.

2.3 Information Regarding Voltage/Current Values

The turn on behavior corresponds to the Draft Standard DIN IEC 65C/155/CDV of June 1996. The average current draw of the COPA-XE or MAG-XE is 12mA. During an error condition the current draw is limited to max. 14 mA by an FDE-Function (= Fault Disconnection Electronic) integrated in the instrument. The upper value of the current is electronically limited.

The voltage on the bus line must be in the range 9 - 32V DC.

2.4 System Integration

Through use of the PROFIBUS PA Profile B, V2.0 the instruments are interoperable, that is, instruments of different manufacture can be physically interconnected and can be communicated with on a single bus.

The GSD-File is: ABB_6668.gsd

The GSD-Files and the "Data Link Description PROFIBUS PA" for COPA-XE / MAG-XE (Part No. D184B093U12) are contained on the CD included in the shipment (Part No.: D699D002U01).

They can also be ordered at no charge at any time from ABB.

2.5 Block Diagram, COPA-XE / MAG-XE with PROFIBUS PA Communication

The figure shows a diagram of the functions of the available blocks in the COPA-XE / MAG-XE. A communication tool or a SPC with Master Class 2 functionality can but used acyclically to configure all the blocks.

Descriptions of the Individual Blocks:

Physical Block (Instrument properties and actual status)	Includes instrument specific properties such as software version, TAG-No. etc.
Transducer Block (Measurement parameters)	Contains data for the flowmeter primary such as meter size, K-Factor, flow range etc. together with all the manufacturer specific parameters which are not contained in the function blocks.
Analog Input Block (Output of measured values and status)	Contains the values of the instantaneous flowrate, its engineering units and status.
Totalizer Block (Totalizer)	The totalizer value can be acyclically monitored/changed using the PROFIBUS PA-DTM in SMART-VISION. The totalizer can be cyclically reset or a totalizer value preset.

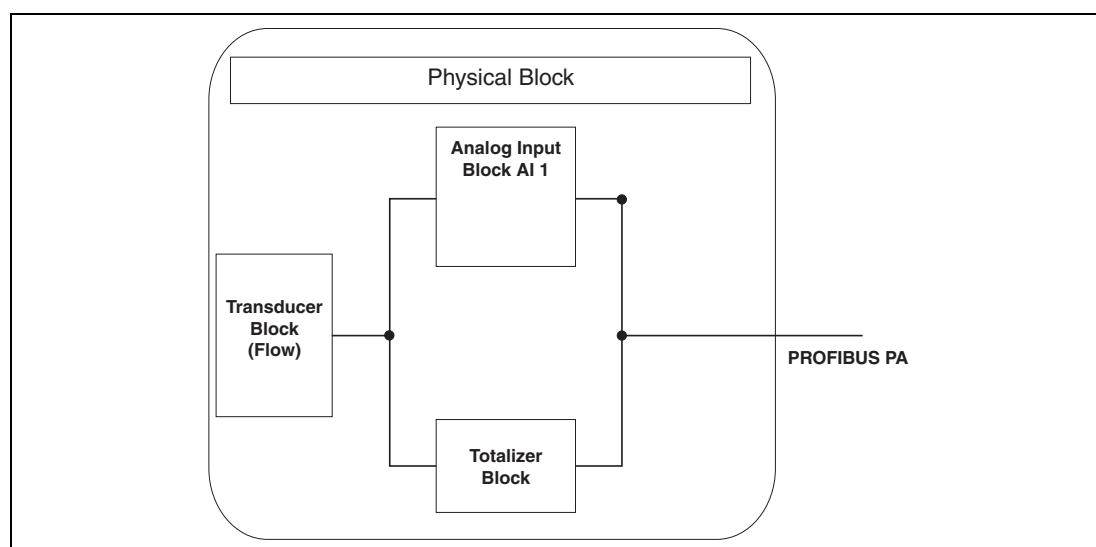


Fig. 2:



Information:

1. A detailed description of the blocks/parameters may be found in the separate "Data Link Description PROFIBUS PA" (Part No. D184B093U12). This is contained in the CD included with the shipment.
2. Configuration is accomplished acyclically using PROFIBUS PA-DTM in the COPA / MAG-XE

3 Communication FOUNDATION Fieldbus

The voltage on the bus is limited to 9–32V DC.

The FOUNDATION Fieldbus-Data Link conforms to the Standards FF-890/891 and FF-902 / 90. The transmission signal from the converter is configured in accord with IEC 61158-2. The COPA / MAG - XE is registered with the Fieldbus FOUNDATION. The Reg.-No. is: IT 008000.

The COPA / MAG - XE is registered with the Fieldbus Foundation under Manufacturer ID: 0x000320 and Device ID 0x0016.

3.1 Layout Information

A typical PA-Network is shown in the following figure:

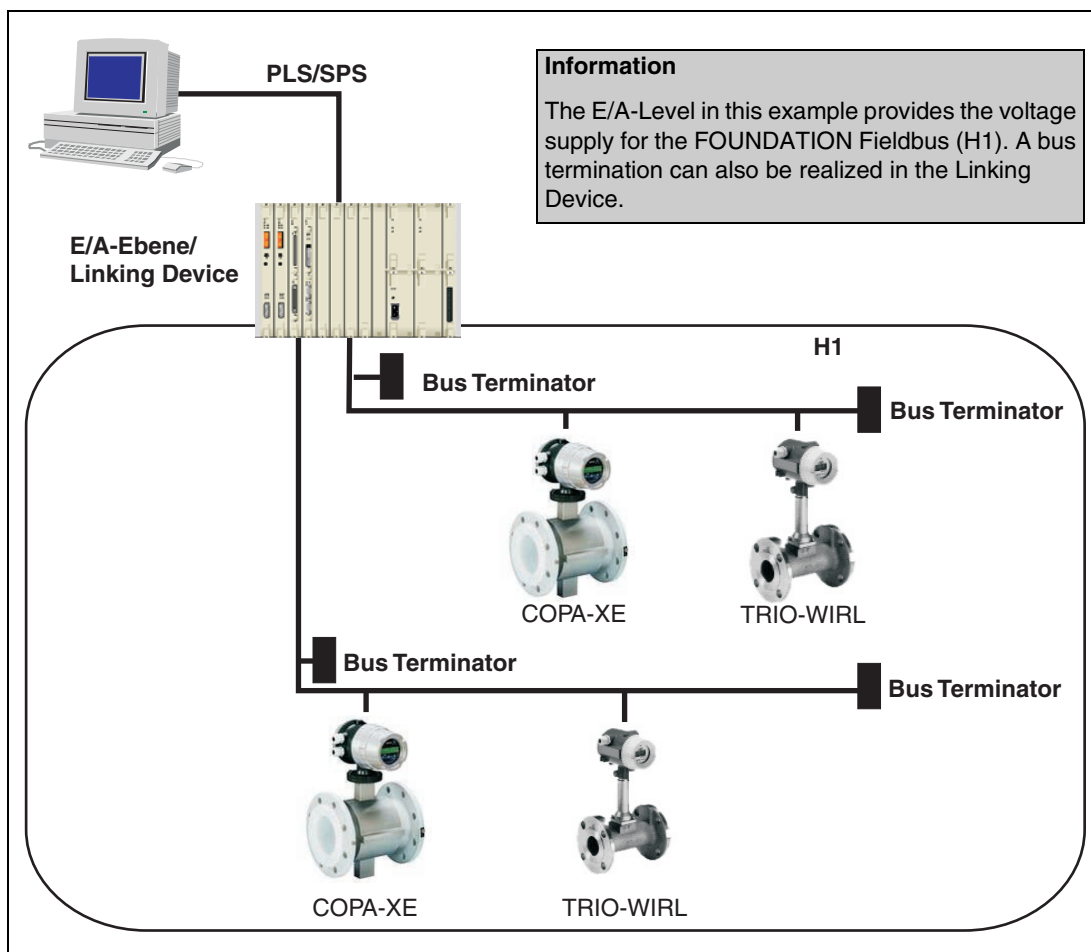


Fig. 3: Typical FF-Network

A shielded, twisted cable is recommended (Types A or B in IEC 61158-2 are preferred).

Additional detailed layout information may be found in the Brochure "FOUNDATION Fieldbus Solutions from ABB" (or Brochure 7592 FF). Additional information may also be found on our home page <http://www.abb.de> and on the home page of the Fieldbus FOUNDATION <http://www.fieldbus.org>.

3.2 Setting the Bus Address

The bus address in the FF is automatically assigned by the LAS (LinkActiveScheduler). The address recognition uses a unique number (DEVICE_ID), made up of the Manufacturer-ID, Instrument-ID and Instrument Serial-No.

3.3 Information Regarding Voltage/Current Values

The turn on behavior corresponds to the Draft Standard DIN IEC 65C/155/CDV of June 1996. The average current draw of the COPA-XE or MAG-XE is 12mA. During an error condition the current draw is limited to max. 14 mA by an FDE-Function (= Fault Disconnection Electronic) integrated in the instrument. The upper value of the current is electronically limited.

The voltage on the bus must be within the range 9–32 Volt DC.

3.4 System Integration

To integrate the instrument in a process control system a DD-File (Device Description), which contains the instrument description, and a CFF-File (Common File Format) are required. The CFF-File is required for engineering the segment. The engineering can be made on- or offline.

A description of the function blocks may be found in a separate document „Data Link Description FOUNDATION Fieldbus for COPA / MAG - XE " (Part No. D184B093U18).

Both files and the data link description are contained on the CD (Part No.: D699D002U01) included with the shipment. They can also be ordered at no charge at any time from ABB. The files can also be downloaded from <http://www.fieldbus.org>.

3.5 Block Diagram, COPA / MAG-XE with FOUNDATION Fieldbus Communication

The available blocks in the instrument are shown as a function block diagram. Communication tools such as a NI-Configurator, System Tools or SPC with appropriate functionality can but used acyclically to configure all the blocks.

Description of the Individual Blocks:

Resource Block	Includes instrument specific properties such as software version, TAG-No.
Transducer Block	Contains data for the flowmeter primary such as meter size, K-Factor, etc. together with all manufacturer specific parameters, which are not contained in the AI-Block. Included are the parameters of the volume flow totalizer.
Analog Input Block	Contains the values of the instantaneous flowrate, its engineering units and status..

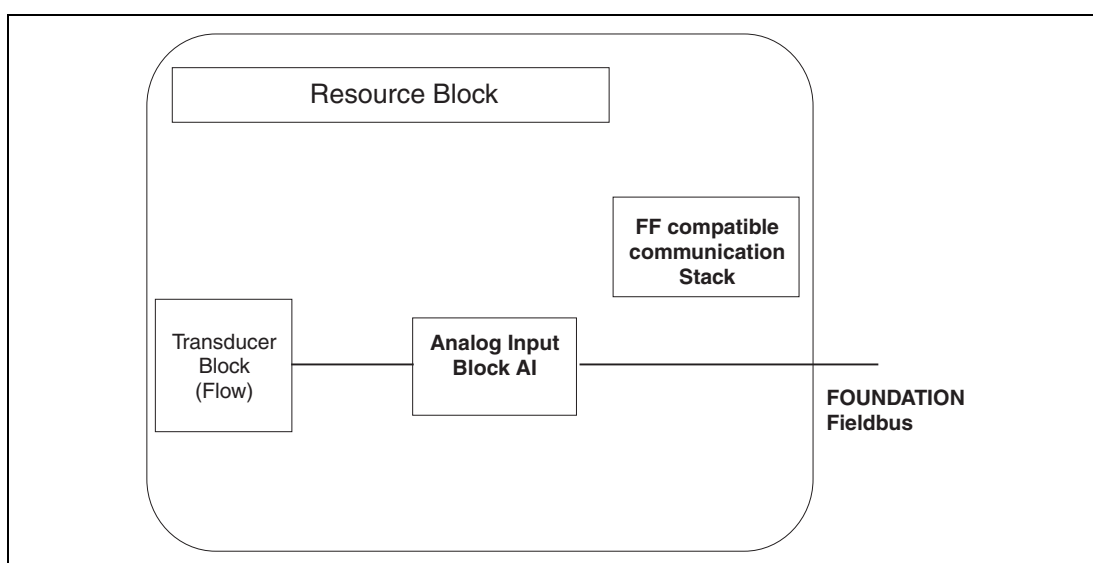


Fig. 4:



Information:

1. A detailed description of the Blocks/Parameters may be found in the separate "**Data Link Description FOUNDATION Fieldbus for COPA/MAG-XE**" (Part-No. D184B093U18). This is also contained on the CD included with the shipment.
2. Configuration is accomplished acyclically

4 Programming the Converter

4.1 General Information for the Possible Display Arrangements

After the power is turned on the Model Number of the converter is displayed in the 1st line, the Software Version and the Revision Level in the 2nd line. After these values have been displayed the actual process information for the instrument appears in the display.

The actual flow direction (→F for forward or ←R for reverse) and the instantaneous flowrate value are displayed in percent or in direct reading engineering units in the 1st line. The totalizer value with a max. of 7 digits with its units is displayed in the 2nd line.

The totalizer value always represents the actual measured value in the selected units independent of the pulse factor setting. This display arrangement is referred to as the Process Display in the following text.

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

--> F	98.14 l/s
--> F	12.30000 m3

1st Line Forward direction instantaneous flowrate value
2nd Line Forward totalizer value

--> F	98.14 l/s
--> F	516.0000 m3

1st Line Forward direction instantaneous flowrate value
2nd Line Reverse totalizer value (Multiplex operation)

--> F	70.01 l/s
→ F	10230 m3

1st Line Forward direction instantaneous flowrate value
2nd Line Forward totalizer overflow. > F and m³ blink.

A totalizer overflow occurs when the value reaches 9,999,999 units. When the totalizer value in one flow direction exceeds 9,999,999 units, the flow direction symbol (→F or ←R) and the units text (e.g. m³) in the 2nd line of the display blink. The totalizer can register up to 250 overflows software wise. The overflow message for each flow direction can be individually reset using ENTER. An error message is displayed in the 1st line during an error condition.

Flowrate	>130 %
--> F	12.300 m3

The error message in clear text and its Error Number are alternately displayed. During the clear text error message display only the error with the highest priority is displayed, while during the Error Number display the Error Numbers for all the errors detected are displayed.

Fehlernummer	Klartext	Ursache
5	EEPROM	Data in the internal EEPROM corrupted.
C	Primary data	Error in the external EEPROM or not installed.
4	Ex. zero return	Ext. zero return contact activated.
0	Empty pipe	Pipeline not full.
7	Uref too large	Positive reference voltage too large
8	Uref too large	Negative reference voltage too large
2	Uref too small	Pos. or. neg. reference voltage too small.
1	A/D saturated	A/D-Converter saturated.
3	Flowrate 130 %	Flowrate greater than 130 %.
6	Totalizer	Totalizer values incorrect.
9	Excit. frequency	Frequency of the supply power or Driver-/Digital board incorrect.
A	Max. Alarm	Flowrate above max. alarm value.
B	Min. Alarm	Flowrate below min. alarm value.

Error Number Table by Priority

4.2 Data Entry

Data can be entered using a Magnet Stick without removing the housing cover.

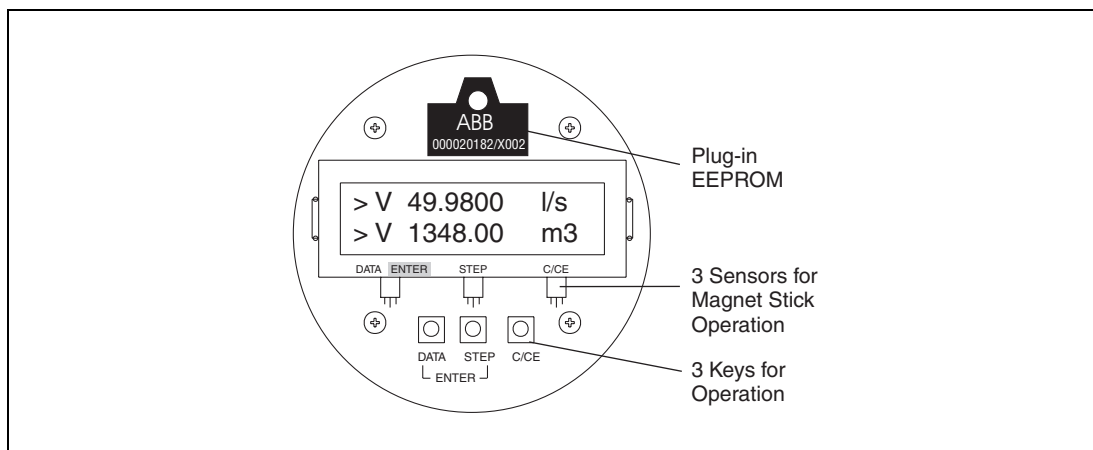


Fig. 5: Converter Keyboard and Display

A description of the functions of the individual keys follows:



C/CE The C/CE-key is used to toggle in and out of the operating mode.



STEP ↑ The STEP-key is one of two arrow keys. STEP is used to scroll forward through the menu. All desired parameters can be accessed.



DATA ↓ The DATA-key is one of two arrow keys. DATA is used to scroll backward through the menu. All desired parameters can be accessed.



ENTER

The ENTER function requires that both arrow keys, STEP and DATA, be pressed simultaneously. ENTER turns the Program Protection on and off. ENTER is used to access the values in the parameter to be changed and to accept the new values or selections. The ENTER function is only active for approx. 10 Sec. If no entries are made during this 10 Sec. time interval the old value is redisplayed on the converter. If an additional 10 seconds elapses without any action, the standard process display reappears.

ENTER Function for Magnet Stick Operation (Option)

The ENTER function is initiated when the DATA/ENTER sensor is activated for more than 3 seconds. The display blinks to indicate that the function is active. There are two types of data which can be entered:

- Direct numeric entries
- Selections from a predefined table



Information:

During data entry the entries are checked for plausibility and if necessary, rejected with an appropriate message.



Attention:

When the housing cover is removed the EMC-, personnel contact is lost.

4.3 Data Entry in "Condensed Form"

Action	Keys=	Display Information
Starting basis "Process information"	-	→ F 98.14 % → F 12.000 m3
Example: Change Qmax F or Units (Table)	C/CE	Any arbitrary parameter is displayed
Find parameter "Program Protection"	STEP or DATA	*Program Protection* on
"Program Protection"	ENTER	*Program Protection* off

Direct numeric Entry		
Action	Keys	Display Info
Find parameter "Qmax"	STEP or DATA	Qmax 1800.00 m3/h
Change parameter "Qmax"	ENTER	Qmax - m3/h
Enter the desired numbers in sequence	6 x DATA 6 STEP 2 x DATA 2 STEP 4 x DATA 4 STEP 0 10 x DATA , STEP 0 STEP 0	Qmax 6 2 4 0 , 0 0 m3/h
Accept new Qmax value	ENTER	Qmax 6 2 4 0 , 0 0 m3/h

Selection from a Table		
Action	Keys =	Display Info
Find Submenu "Units"	STEP or DATA	Submenu Units
Change parameter "Units"	ENTER	Units l/s
Change units from l/s to m3/h	ENTER	Units l/s
Find the desired unit in the table	STEP or DATA	Units m3/h
Accept new - unit	ENTER	Units m3/h

Exit from Qmax or Units Find parameter "Program Protection"	STEP or DATA	*Program Protection* off
Turn on Program protection again	ENTER	*Program Protection* on
Exit basis Process information (Converter remains on-line)	C/CE	→ F 98.14 % → F 13.422 m

4.4 Parameter Overview and Data Entry

Submenu/Parameter	Entry Type	Comments
* Prog. Protection* on	from table/numeric	Data can only be entered or changed after the Program Protection has been turned off.
ENTER		on/off
* Prog. Protection* off		
PP-Code? 0		If a number other than „0“ (Factory setting) has been selected for the Program Protection Code, then this PP-Code (1-255) must be entered in order to turn the program protection off.
* Prog. Protection* off		Parameters can be changed when the Program Protection is turned off.
Prog. Prot. Code	numeric	After the Program Protection is turned off it is also possible to change the PP-Code.
ENTER		Enter the old PP-Code 0 = Factory setting
Old PP-Code? 0		
New PP-Code? 0		Enter the new PP-Code (0-255)
Language English	from table	German, English, French, Spanish
Submenu Primary	numeric	
ENTER		Actual meter size See Name Plate on flowmeter primary
Meter Size DN 250 10 In		
Span Cs 6.25 Hz 56.123 %		Flowmeter span value Cs for the selected excitation frequency See Name Plate
Zero Cz 6.25 Hz 0.1203 %		Flowmeter zero value Cz for the selected excitation frequency See Name Plate

Submenu/Parameter	Entry Type	Comments
Short model no. DE47...		Flowmeter Primary Short Model Number
Order no. 6400/X001		Order No. of the flowmeter primary. This number is identical to the number listed on the flowmeter primary and on the sticker on the external EEPROM located above the display on the converter.
RangeMax 10/ms 1800.00 m3/h	numeric	Automatically set based on the meter size selection. The flow range end value can be set between 0.05 RangeMax and 1.0 RangeMax
Qmax 400.000 m3/h		Flow range for the forward and reverse flow directions. Min. flow range setting 0.5 m/s Max. flow range setting 10 m/s Set the flow range end value (0.5 - 10 m/s). The units selection is made in the Submenu Units.
Pulse 1.0000 /m3	This menu has no function for PROFIBUS PA or for FOUNDATION Fieldbus FF.	For int. and ext. flow totalizing, range 0.001 - 1000 pulses per selected units, max. count frequency 5 kHz. The units selection is made in the Submenu Units.
Pulse Width 100.000	This menu has no function for PROFIBUS PA or for FOUNDATION Fieldbus FF.	For the external pulse output, Pulse widths can be set between 0.1 ms and 2000.
Low Flow Cutoff 1.000 %	numeric	Range 0-10 % of the flow range setting, applicable to the display indications and all outputs. If the flowrate is below the low flow cutoff setting, the flow is not measured.
Damping 10.0000 s	numeric	Range 0.5 - 99.9999 s, Response time of the 20 mA current output signal to a 0-99 % step flowrate change
Filter ein		On/Off. Standard is off, for noisy output signals turn on the filter and set the damping to > 2.4 s.
Density 2.54300 g/cm3	from table	Range 0.01 - 5 g/cm ³ . Used for mass flowrate for the display indications and totalizers in g, kg, t.
System-Zero 3.5 Hz	numeric	Zero value
ENTER		Manual entry
Adjust manuel		
Adjust automatic		Valve must be closed. Pipeline must be full. Fluid must be at rest. The automatic adjustment is initiated by pressing ENTER.

Submenu/Parameter	Entry Type	Comments
Submenu Units	from table/numeric	Exit from submenu C/CE
ENTER Units Qmax l/s		lbs/s, lbs/min, lbs/h, l/s, l/min, l/h, m3/s, m3/min, m3/h, igps, igpm, igph, mgd, gpm, gph, bbl/s, bbl/min, bbl/h, bbl/d, kg/s, kg/min, kg/h, kg/d, g/s, g/min, g/h, kgal/d, kgal/h, kgal/min, kgal/s, t/d, t/h, t/min
Units Totalizer m3		m3, l, ical, gal, bbl, kg, t, g, lbs, lb, kgal
Units Factor 3785.41 Liter		If a desired unit is not listed in the table it is possible for the user to define a unit (user programmable units) based on liters. The constant 3785.41 displayed applies to kgal units (factory setting).
Units Name kgal /s /min /h		Four character name for the user programmable unit.
Prog. Units without Density		User programmable unit for mass (with density) or volume (without density) flowrate
Submenu Alarm	from table/numeric	Exit the menu C/CE
ENTER Error Register 0 ... 3 ...		All detected errors (Error 0-9, A, B, C) are stored. ENTER can be used to clear the Error Register.
Max-Alarm 130 %		Max. limit alarm, range 0-130 % of the flow range setting. Settings can be made in 1 % steps, switching hysteresis 1 %.
Min-Alarm 10 %		Min. limit alarm, range 0-130 % of the flow range setting. Settings can be made in 1 % steps, switching hysteresis 1 %.
Submenu Prog. In/Output	This menu has no function for PROFIBUS PA or for FOUNDATION Fieldbus FF.	Exit the menu C/CE
ENTER Terminals P7/G2 General Alarm		Contact output Terminals P7/G2 selectable (as Profibus Terminals Ux/P7): General alarm ¹⁾ , empty pipe ¹⁾ , F/R-Signal, no function, MAX-Alarm ¹⁾ , MIN-Alarm ¹⁾ , MAX/MIN-Alarm ¹⁾ 1) Contact output can be configured as normally open or closed.
Terminals X1/G2 Ext. Zero Return		Contact input Terminals X1/G2 selectable: External zero return, totalizer reset, external totalizer stop, no function. With HART-Protocol the external totalizer stop is not available.

Submenu/Parameter	Entry Type	Comments
Submenu Current Output	This menu has no function for PROFIBUS PA or for FOUNDATION Fieldbus FF.	If „ASCII Communication“ was selected in the Submenu Communication (only available if the option was ordered), then the menu structure in the Current Output menu is as follows: Current Output 4 - 20 mA Selections 0-20 mA/4-20 mA, 0-10mA/2-10 mA, 0-5 mA/0-10 mA, 10-20 mA/4-12, 12-20 mA Out at Alarm 130 % Current output settings during an alarm 0 %, 3.8 mA or 130 %. For Error 3 Flowrate > 130 % alarm is always set to 130 % If „HART Communication“ was selected in the Submenu Communication (only available if the option was ordered), then the menu structure in the Current Output menu is as follows: Attention: With HART Protocol the Current Output setting is fixed at 4-20 mA. The output current value during an error condition can be set using the following menus.
Submenu Data Link	from table/numeric	Current Output settings during an alarm condition „Low“ or „High“. The current values for „Low“ or „High“ are set in the following menu. Out at Alarm Low User selectable range for the „Low“ current value between 3.000 and 4.000 mA Low Alarm 4.000 mA User selectable range for the „High“ current value between 20.000 and 30.000 mA High Alarm 24.8 mA Exit the menu C/CE The Submenu Data Link is only displayed when that option is installed. Communication Fieldbus (PROFIBUS PA or FOUNDATION Fieldbus) For these options the menu structure in the Submenu Data link is as follows: Communication Fieldbus For information only, no changes can be made Instrument Address: 126 Default value can only be set over the bus

Submenu/Parameter	Entry Type	Comments
Submenu Function Test		C/CE Exit the menu
Function Test ENTER Function Test lout		Function test current output, enter data in mA. Function test pulse output. This menu has no function for PROFIBUS PA or for FOUNDATION Fieldbus FF
Function Test RAM (ASIC)		Function test int. subassemblies, autom. Test. RAM (ASIC), NVRAM, EPROM (program), EEPROM, ext. EEPROM. Display, HART-Command, Simulation and Test Mode.
Submenu Detector e. Pipe	from table/numeric	
Detector e. Pipe ENTER Detector e. Pipe on		off = detector not operational on = if the meter tube is empty, a message is displayed. The following menus are only displayed when the Detector e. Pipe is turned "on".
lout at e. Pipe 130 %		Current output during an error condition: This menu has no function for PROFIBUS PA or for FOUNDATION Fieldbus FF
Alarm e. Pipe on		on = when the meter tube is empty signal over contacts P7, G2 off = when the meter tube is empty , <u>no</u> signal over contacts.
Threshold 2300 Hz		Threshold 2,300 Hz
Adjust Detector e. Pipe		Fill pipeline with fluid. Set adjustment value to +2000 Hz . Empty pipeline, Adjustment value must exceed the threshold setting.

Submenu/Parameter	Entry Type	Comments
Submenu Totalizer	tabellarisch/numerisch	Exit the menu C/CE
ENTER	Totalizer → F reset	The forward totalizer is reset by pressing the ENTER-Key. If the overflow counter is >0, then reset Overflow >F is displayed.
	Totalizer → F 4697.00 m3	Preset totalizer (totalizer value can be set) 2nd display line = actual value
	Overflow → F 250	Overflow counter max. 250, 1 overflow = pulse totalizer > 9,999,999 units (display value is reset and the overflow counter is incremented by 1).
	Totalizer ← R reset	See Forward Totalizer
	Overflow ← R on	See Forward Overflow Counter
	Tot. Function Standard	Standard = separate totalization for the forward and reverse flow directions on individual counters in the display. Difference totalizer = forward and reverse direction flows are totalized on a single counter in the display.
	Mains Interrupt reset	Mains interrupt counter can be reset with ENTER. (only available in instruments with HART-Protocol).
Submenu Display	table	Exit the menu C/CE
ENTER	1st Line Q [%]	Select the values to be displayed in the 1st line: Flowrate in %, direct reading engineering units, totalizer, totalizer forward, totalizer reverse, TAG-Number or Bargraph
	2nd Line Totalizer	See 1st line
	1st Line multipl. Q [Bargraph]	In addition to the values displayed in the 1st line it is possible to display an additional value in the Multiplex Mode: Flowrate in %, direct reading engineering units, totalizer, totalizer forward, totalizer reverse, TAG-Number or Bargraph or off. Display switches every 10 Sec.,
	2nd Line multipl. off	See 1st line multiplex

Submenu/Parameter	Entry Type	Comments
Submenu Operating Mode	tabellarisch	C/CE Exit the menu
ENTER Operating Mode Standard		Standard/Fast Standard: continuous flowrate measurements Fast: accelerated measurement value processing (short batches or pulsating flows)
Flow Direction Forward/Reverse		Selection of the flow direction to be metered Forward-/Reverse or Forward only.
Direction Ind. normal		Normal/Inverse Reverse the flow direction indicators normal = standard indicators, inverse = reverse indicators
Load Data from ext. EEPROM	from table	When a converter is exchanged the data in the external EEPROM is automatically uploaded when the power is turned on. It is also possible to upload the data in the external EEPROM manually.
Store Data in ext. EEPROM	from table	After start-up the parameter settings should be stored in the external EEPROM.
Modellnummer 05/00 Part Number X.20		Identifies the installed software version. 09/2000 = date of the release X.23 = revision level
TAG Number		An alphanumeric TAG-Number with up to 8 characters to identify the meter location using upper and lower case letters, numbers. For HART-Protocol, the TAG-Number is limited to 8 characters. Lower case letters are automatically converted to upper case letters.
Service-Code	numeric	Only for ABB Service.

5 Electrical Connection Area

5.1 Electrical Connection Area for COPA-XE Type DE43F, DE43W oder DE23F, DE23 with PROFIBUS PA or FOUNDATION Fieldbus FF

The converter is mounted directly on the flowmeter primary.

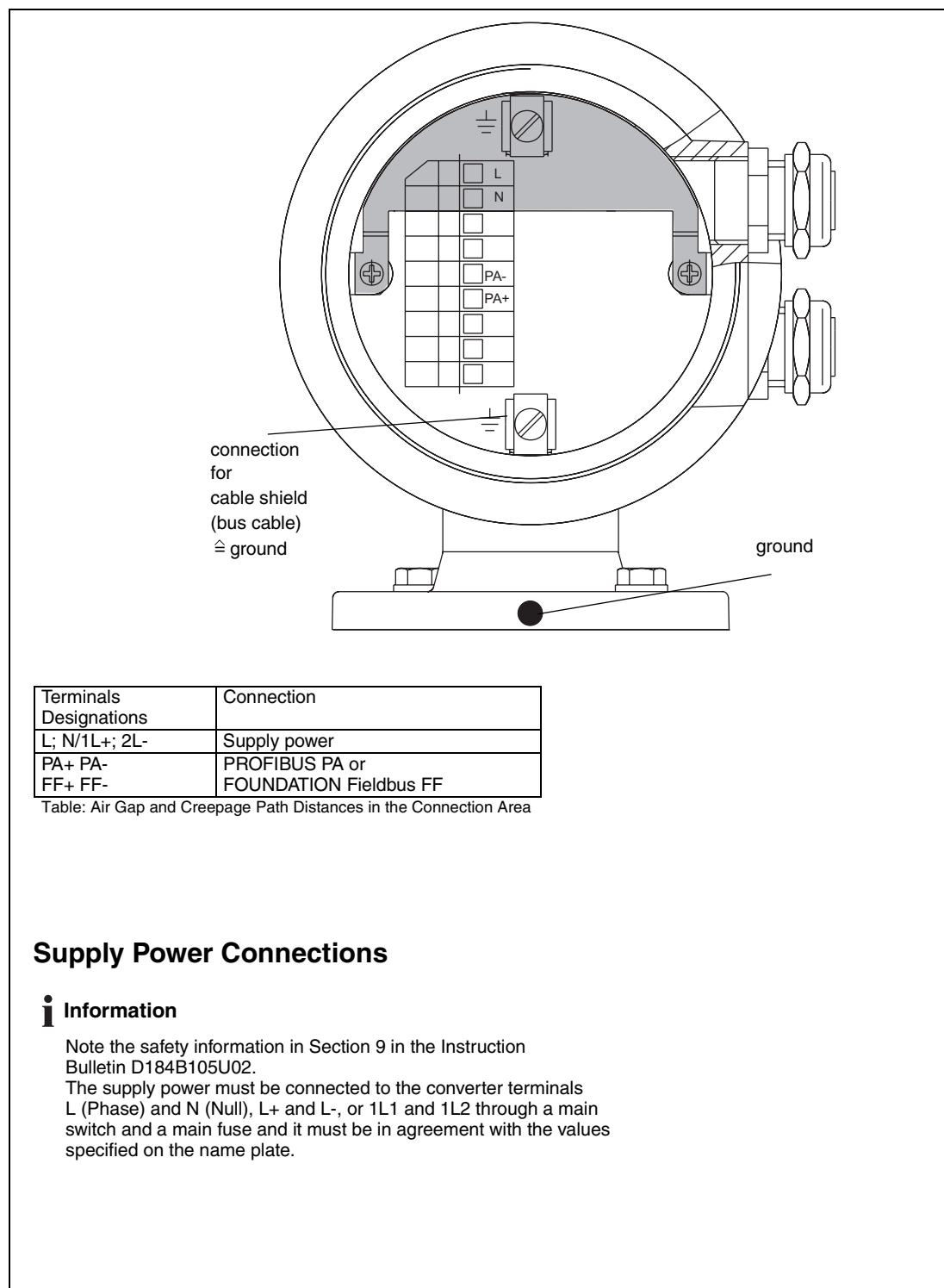
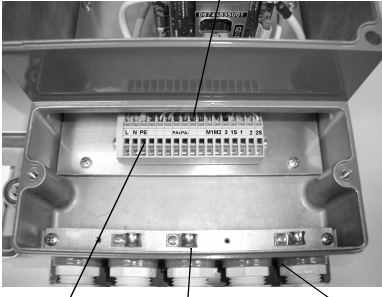


Fig. 6: Connection Area Type DE43/DE23

5.2 Electrical Connection Area for MAG-XE with Remote Converter Model E4



Connection for Bus

Earth

Connection for cable shield (bus cable)

Earth

Terminal Designation	Connection
L; N/1+, 2-	Supply Power
PA+ PA- FF+ FF-	PROFIBUS PA or FOUNDATION Fieldbus FF
1, 2	Flow signal leads (red and blue)
1S, 2S	Flow signal cable shield
M1, M2	Connections for magnetic field excitation (white)
3	Inner cable shield (Cooper)
⏏	Outer cable shield (Steel)

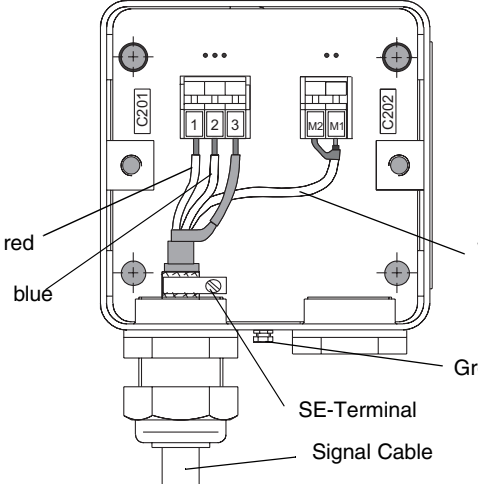
Supply Power Connection

i Information

Note the safety information in Section 9 in the Instruction Bulletin D184B105U02. The supply power must be connected to the converter terminals L (Phase) and N (Null), L+ and L-, or 1L1 and 1L2 through a main switch and a main fuse and it must be in agreement with the values specified on the name plate.

Fig. 7: Electrical Connection Area for MAG-XE

5.3 Flowmeter Primary Model DE21 or DE41 for Connection to Converter Model E4



red

blue

white

Ground Connection

SE-Terminal

Signal Cable

Terminal Designations	Connections
1, 2	Flow signal leads (red & blue)
M1 + M2	Magnetic field excitation connections
3	Inner cable shield (Cooper) Signal potential
SE	Outer cable shield (steel)

Fig. 8: Flowmeter Primary Connection Area

6 Electrical Interconnection Diagram

6.1 Interconnection Diagram COPA-XE Model DE23.. or DE43..

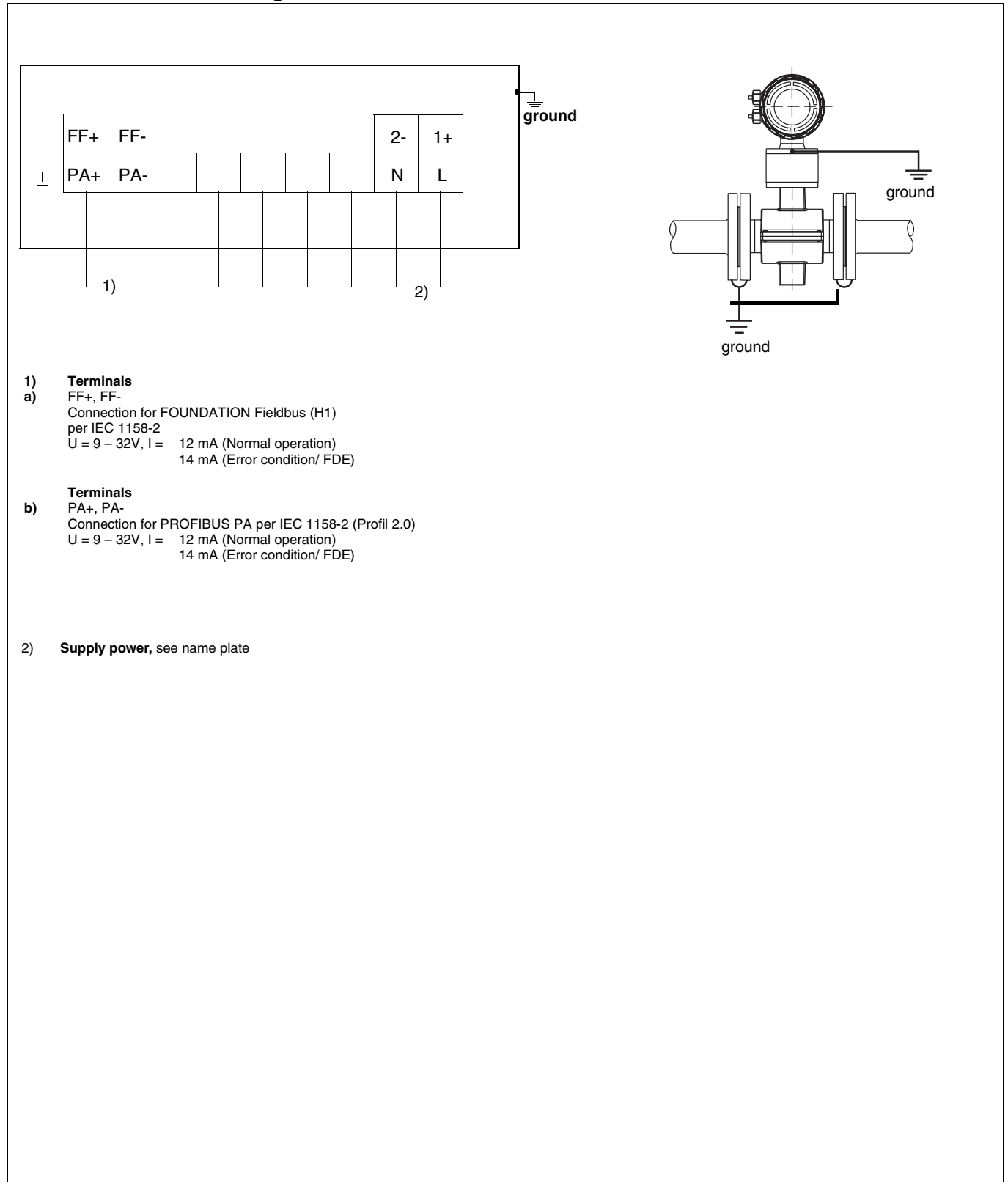
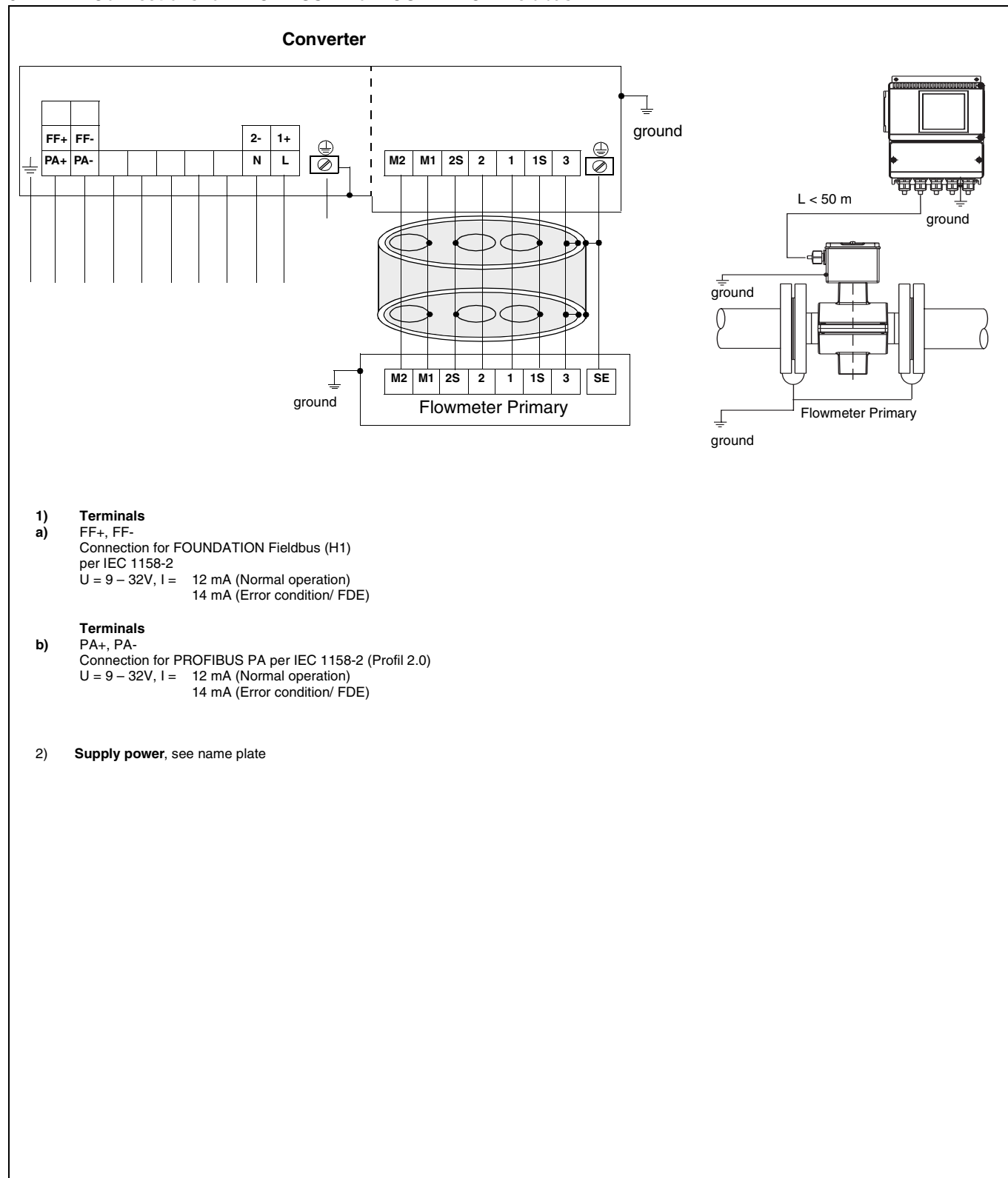


Fig. 9: Interconnection Diagram COPA-XE

6.2 Interconnection Diagram MAG-XE Model DE41 or DE21 with Remote Converter Model E4

6.2.1 Connections for PROFIBUS PA or FOUNDATION Fieldbus



1) Terminals

- a) FF+, FF-**
Connection for FOUNDATION Fieldbus (H1)
per IEC 1158-2
 $U = 9 - 32\text{V}$, $I = 12 \text{ mA}$ (Normal operation)
 14 mA (Error condition/ FDE)

Terminals

- b) PA+, PA-**
Connection for PROFIBUS PA per IEC 1158-2 (Profil 2.0)
 $U = 9 - 32\text{V}$, $I = 12 \text{ mA}$ (Normal operation)
 14 mA (Error condition/ FDE)

- 2) Supply power**, see name plate

Fig. 10: Interconnection Diagram for MAG-XE

7 Safety Information

7.1 General



Attention!

There are personnel contact hazardous circuits in the flowmeter primary and the converter. Therefore the supply power should be turned off before opening the housing. Only trained personnel should operate the instrument when the housing is opened.

- The converter and the flowmeter primary are to be connected in accordance to Interconnection Diagram.
- The line supply connections must be sized for the current required by the flowmeter primary. The cable must correspond to IEC227 or IEC245.
- In indoor installations a switch or circuit breaker should be installed in the supply power line to the flowmeter and should be located near the flowmeter and be appropriately identified.
- The electrical interconnection between the flowmeter primary and the converter may only be made with the signal cable supplied by ABB. The connections are to be made as shown in Section 6.
- For safe operation the instrument must be installed as described in this Instruction Bulletin.

The sections identified by the symbol  must be observed!



Attention

With the exception of the supply power the remaining circuits have voltages which are non-hazardous to personnel contact.

7.2 Specification on the Flowmeter Primary Plate

A typical flowmeter primary name plate is shown in Fig. 11.

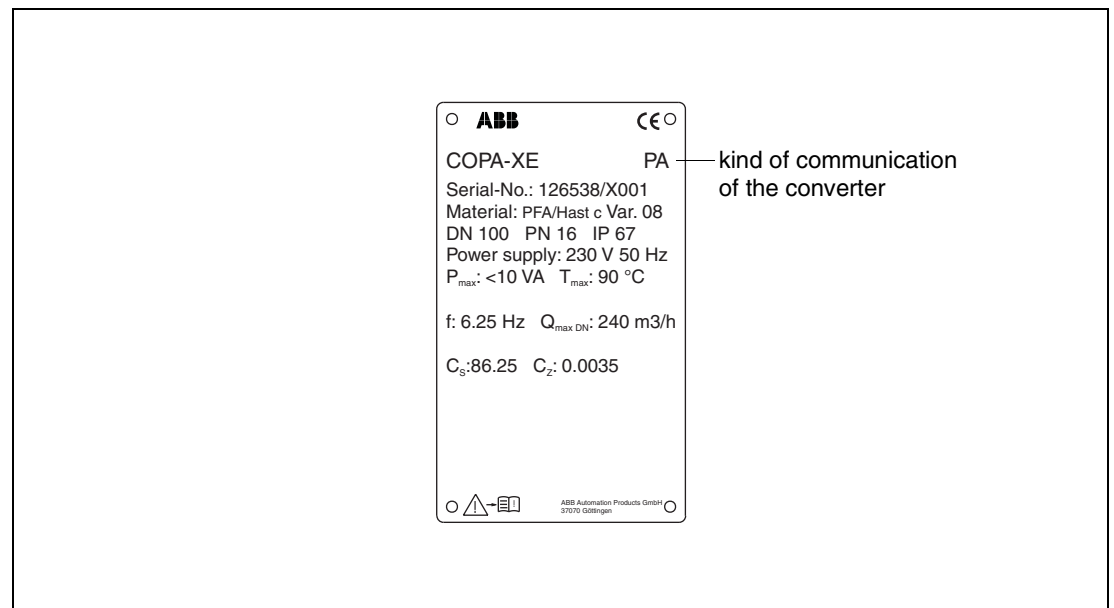


Fig. 11: Typical Flowmeter Primary Name Plate

8 Ordering Information

Flanged Flowmeters Model DE43F and DE41F

In addition to the Ordering number please supply the following information: Fluid, fluid temperature, operating pressure, flow range, pipeline type (grounding plate, grounding electrode)

COPA-XE

Ordering Number		DE43F				
Liner						
Hard rubber	1/2"-40" [DN 15 - 1000]	H				
Soft rubber	2"-40" [DN 50 - 1000]	S				
PTFE	3/8"-32" [DN 10 - 600]	T				
PFA	1/8"-10" [DN 3 - 100]	P				
Meter Size						
1/8" DN 3		03				
5/32" DN 4		04				
1/4" DN 6		06				
5/16" DN 8		08				
3/8" DN 10		10				
1/2" DN 15		15				
3/4" DN 20		20				
1" DN 25		25				
1-1/4" DN 32		32				
1-1/2" DN 40		40				
2" DN 50		50				
2-1/2" DN 65		65				
3" DN 80		80				
4" DN 100		1H				
5" DN 125		1Q				
6" DN 150		1F				
8" DN 200		2H				
10" DN 250		2F				
12" DN 300		3H				
14" DN 350		3F				
16" DN 400		4H				
20" DN 500		5H				
24" DN 600		6H				
28" DN 700		7H				
32" DN 800		8H				
36" DN 900		9H				
40" DN1000		1T				
Signal /Ground Electrode Material 1)						
SS 316Ti/No. 1.4571	/ none (Standard)	S				
Hastelloy B-2	/ none	B				
Hastelloy C-4	/ none (Standard)	H				
Titanium	/ none	M				
Tantalum	/ none	T				
SS No. 1.4539	/ none	F				
Platinum-Iridium	/ none	P				
SS 316Ti/No. 1.4571	/ with	E				
Hastelloy B-2	/ with	N				
Hastelloy C-4	/ with	O				
Titanium	/ with	I				
Tantalum	/ with	Q				
SS No. 1.4539	/ with	R				
Platinum-Iridium	/ with	G				
Pressure Rating						
PN 10		C				
PN 16		D				
PN 25		E				
PN 40		F				
JIS K10 (bis DN 100)		K				
ANSI 150 lb (Series 1000 length)		P				
ANSI 300 lb (Series 1000 length)		Q				
Flange Material						
Steel	(std. ≥ 3/4" ab [DN 20])	1				
SS316Ti/1.4571	(std. 1/8"-1/2" [DN 3- 15]) (opt. ≥ 3/4" [DN 20])	3				

MAG-XE

Ordering Number		DE41F				
Liner						
		H				
		S				
		T				
		P				
Meter Size						
		03				
		04				
		06				
		08				
		10				
		15				
		20				
		25				
		32				
		40				
		50				
		65				
		80				
		1H				
		1Q				
		1F				
		2H				
		2F				
		3H				
		3F				
		4H				
		5H				
		6H				
		7H				
		8H				
		9H				
		1T				
Signal /Ground Electrode Material 1)						
		S				
		B				
		H				
		M				
		T				
		F				
		P				
		E				
		N				
		O				
		I				
		Q				
		R				
		G				
Pressure Rating						
		C				
		D				
		E				
		F				
		K				
		P				
		Q				
Flange Material						
		1				
		3				

Continued on next page

Flanged Flowmeters

COPA-XE

[illegible]

- 1) Ground electrodes available in flowmeter sizes 1/8" to 12" [DN 3 to 300]
For flowmeters with hard/soft rubber liners 5"-40" [DN 125-1000] a conductive section in integrated as standard in the liner eliminating the need for a grounding electrode.
- 2) Ground plate mounted on one flange (only for flowmeter primaries $\leq 12"$ [DN 300])
- 3) Only in combination with ANSI -Flanges
- 4) Certificates for meter tube and process connections

MAG-XE

DE41F										
					A					
					B					
					C					
					D					
					S					
					A					
					D					
					A					
					B					
					C					
IP 67 (threads for cable connector M20 x1,5), standard										2
IP 68										3
IP 67 (threads for cable connector NPT 1/2")										4
IP 67 (threads for cable connector PF 1/2")										5

Additional ordering information may be furnished in writing.

Instrument Tag	Excitation Frequency	Electrode Design
German	6 1/4 Hz	Standard
English	12 1/2 Hz	HU (removable), from 14" [DN 350], only with hard/soft rubber liners
French	7 1/2 Hz (60 Hz line)	Pointed head (from 3/8" [DN 10], SS No. 1.4539), e. g. high fat content fluids
	15 Hz (60 Hz line)	

Wafer Design Flowmeeter Models DE43W and DE41W

COPA-XE									
Ordering Number		DE43W							
Liner									
PTFE									
PFA									
Meter Size									
1/8"	DN	3							
5/32"	DN	4							
1/4"	DN	6							
5/16"	DN	8							
3/8"	DN	10							
1/2"	DN	15							
1"	DN	25							
1-1/4"	DN	32							
1-1/2"	DN	40							
2"	DN	50							
2-1/2"	DN	65							
3"	DN	80							
4"	DN	100							
Signal		/Ground Electrode Material 1)							
SS 316Ti/No. 1.4571		/none (standard)							
Hastelloy B-2		/none							
Hastelloy C-4		/none (standard)							
Titanium		/none							
Tantalum		/none							
SS No. 1.4539		/none							
Platinum-Iridium		/none							
SS 316Ti/No. 1.4571		/with							
Hastelloy B-2		/with							
Hastelloy C-4		/with							
Titanium		/with							
Tantalum		/with							
SS No. 1.4539		/with							
Platinum-Iridium		/with							
Pressure Rating		PN 16							
		PN 40							
		ANSI CL 150							
		ANSI CL 300							
Material of Process Connection		without							
Certifications		none							
		Inspection Certificate per EN 10204 3.1 B 2)							
Calibration Certifications		none							
		Certified Cold-/Waste Water (1"-4"[DN 25 - 100])							
		Certified Liquids other than water							
Protection Class		IP 67 (Thread size see Section Application)							
Supply Power		High voltage 85 - 253Vac							
		Low voltage 16.8 - 26.4Vac/16. - 31.2 Vdc							
Display		Magnet Stick operation and lighted display							
In-/output option		Pulse output passive+							
PROFIBUS PA (Profil 2.0)		Contact output + Profibus DP with plug							
FOUNDATION Fieldbus									
PROFIBUS PA (Profil 2.0) with plug									
Application		Converter housing with threads for cable connector M20 x 1.5							
		Converter housing with threads for cable connector NPT 1/2"							
		Converter housing with threads for cable connector PF 1/2"							

2) Certificates for meter tube

Instrument Tag	Excitation Frequency	Electrode Design
German	6 1/4 Hz	Standard
English	12 1/2 Hz	Pointed head (from 3/8" [DN 10], SS No. 1.4539), e. g. high fat content fluids
French	7 1/2 Hz (60 Hz line)	
	15 Hz (60 Hz line)	

MAG-XE							
DE41W							
	T P						
	03						
	04						
	06						
	08						
	10						
	15						
	25						
	32						
	40						
	50						
	65						
	80						
	1H						
	S B H						
	M T F						
	P E N O						
	I Q R G						
	D						
	P Q						
	0						
	A D						
	A B C						
IP 67 (threads for cable connector M20 x1,5), standard							2
IP 68							3
IP 67 (threads for cable connector NPT 1/2")							4
IP 67 (threads for cable connector PF 1/2")							4

Flanged Flowmeters, Stainless Steel Design 1/8"–4" [DN 3 – DN 100]

COPA-XE													MAG-XE												
Compact COPA-XE													DE21F												
Liner MaterialPFA													P												
Meter Sizes													03 04 06 08 10 15 20 25 32 40 50 65 80 1H												
Signal Electrode Material													S												
SS 316Ti/No.1.4571													B												
Hastelloy B-2													H												
Hastelloy C-4													M												
Titanium													T												
Tantalum													F												
SS No. 1.4539													P												
Platinum-Iridium													E												
SS 316Ti/No.1.4571													N												
Hastelloy B-2													O												
Hastelloy C-4													I												
Titanium													Q												
Tantalum													R												
SS No. 1.4539													G												
Platinum-Iridium													S												
Pressure Rating													D												
PN 16													F												
PN 40													K												
JIS K10													P												
ANSI CL 150													Q												
ANSI CL 300													3												
Process Connection Material													3												
SS 316Ti / 1.4571													3												
Accessories													A												
none													B												
Protection plate 316Ti/1.4571 (both sides)													C												
Grounding plate 316Ti/1.4571 (one side)													S												
Temperature Range:													A												
Standard temperature < 130 °C													D												
Certificates:													A												
none													D												
Inspection Certificate per EN 10204 3.1 B 2)													A												
Calibration Certificates													B												
none													C												
Certified Cold-/Waste Water (1"-4" [DN 25 - 100])													A												
Certified Liquids other than Water													B												
Protection Class													C												
IP 67 (Thread size see Section Application)													2												
Supply Power													G												
High voltage 85 - 253Vac													K												
Low voltage 16.8 - 26.4Vac/16. - 31.2 Vdc													D												
Display													D												
Magnet Stick operation and lighted display													D												
In-/output option													09												
Pulse output passive+													11												
Contact output + Profibus DP with plug													12												
PROFIBUS PA (Profil 2.0)													13												
FOUNDATION Fieldbus													0												
PROFIBUS PA (Profil 2.0) with plug													2												
Application													3												
Aluminum converter housing with threads for cable connector M20 x 1.5													0												
Aluminum converter housing with threads for cable connector NPT 1/2"													2												
Aluminum converter housing with threads for cable connector PF 1/2"													3												

2) Certificates for meter tube and process connection adapters

Ordering Information

Stainless Steel Flowmeter 1/8"–4" [DN 3 – DN 100]

COPA-XE									
Compact COPA-XE				DE23					
Process Connections:						W V P Q R S T U D A L E I G H Z			
Wafer design									
Without adapter (e. g. replacement part)									
Weld stubs per ISO 2037 (only 1"-4" [DN25-100])									
Weld stubs per DIN 2463									
Weld stubs per DIN 11850									
Food Industry Fitting per DIN 11851									
Tri-Clamp per DIN 32676									
Tri-Clamp per ISO 2852 (only 1"-4"[DN25-100], except 1-1/4"[DN32])									
Pipe connection per SMS 1145 (only 1"-4"[DN25-100])									
Aseptic connection per DIN 11864-1									
Flange Type APV FAB1 per DIN 11864 (3/8"-4" [DN10-100], except 1-1/4"[DN32])									
Male threads ISO 228 (only 1/8"-1" [DN3 - 25])									
Female threads ISO 228 (only 1/8"-1" [DN3 - 25])									
PVC-Cement sleeve ¹⁾ (only 1/8"-1" [DN3 - 25])									
Hose connector (only 1/8"-1/2" [DN3 - 15])									
Others									
Liner Material				PFA		P			
Meter Sizes		1/8"	DN	3	03				
		5/32"	DN	4	04				
		1/4"	DN	6	06				
		5/16"	DN	8	08				
		3/8"	DN	10	10				
		1/2"	DN	15	15				
		3/4"	DN	20	20				
		1"	DN	25	25				
		1-1/4"	DN	32	32				
		1-1/2"	DN	40	40				
		2"	DN	50	50				
		2-1/2"	DN	65	65				
		3"	DN	80	80				
		4"	DN	100	1H				
Signal ELectrode Material				/Ground Electrode²⁾				S B H	
SS 316Ti / 1.4571				/none					
Hastelloy B-2				/none					
Hastelloy C-4				/none (standard)				M T F	
Titanium				/none					
Tantalum				/none					
SS No. 1.4539				/none (for Food Ind. applications)				P E N O	
Platinum-Iridium				/none					
SS 316Ti / 1.4571				/with					
Hastelloy B-2				/with					
Hastelloy C-4				/with (standard)				I Q R	
Titanium				/with					
Tantalum				/with					
SS No. 1.4539				/with (for Food Ind. applications)				G	
Platinum-Iridium									
Pressure Rating									
PN 10				Standard for Tri-Clamp, external/internal threads, PVC-cement sleeve, hose connector					

Continued on next page

MAG-XE						
DE21						
						</

Ordering Information
Stainless Steel Flowmeter 1/8"–4" [DN 3 – DN 100]
COPA-E

Compact COPA-XE DE23											
Process Connection Material⁵⁾											
None	(Wafer Design only)	0									
SS 316Ti/No. 1.4404		4									
SS 316Ti/No. 1.4301		6									
PVC	(PVC-Cemant sleeve only)	7									
Others		9									
Accessories											
None			A								
with mounting bracket			C								
Temperature Range											
Standard temperature < 130 °C				S							
Certificates											
None					A						
Inspection Certificate per EN 10204 3.1 B ³⁾					D						
Calibration Certificates³⁾											
None						A					
Certified Cold-/Waste Water (DN 25 - 100)						B					
Certified Liquids other than Water						C					
Protection Class											
IP 67 (Gewinde siehe Abschnitt "Applikation")							2				
Hilfsenergie											
High voltage 85 - 253VAC								G			
Low voltage 16,8 - 26,4V AC/16,8-31,2V DC								K			
Display											
Magnet Stick operation and lighted display									D		
In-/output option											
Pulse output passive+ Contact output + Profibus DP with plug										09	
PROFIBUS PA (Profil 2.0)										11	
FOUNDATION Fieldbus										12	
PROFIBUS PA (Profil 2.0) with plug										13	
Application											
Aluminum Converter housing with threads for cable connector M20 x 1.5											0
Aluminum Converter housing with threads for cable connector NPT 1/2"											2
Aluminum Converter housing with threads for cable connector PF 1/2"											3

MAG-XE

DE21											
		0									
		4									
		6									
		7									
		9									
			A								
			C								
				S							
									A		
									D		
										A	
										B	
										C	
IP 67 (threads for cable connector)											2
IP 68 (PG 13,5) standard											3

3) Certificates for meter tube

Additional ordering information may be furnished in writing:
Instrument Tag:

German
English
French

Excitation Frequency:

12 1/2 Hz
15 Hz (60 Hz line)
25 Hz
30 Hz(60 Hz line)

Electrode Design:

Standard
Pointed head (from 3/8" [DN10]
SS No. 1.4539)
e. g. high fat content fluids

Gasket Material:

a) EPDM with FDA -Approval
b) Silicone with FDA-Approval

Accuracy: $\leq 0,5$ % of rate

Shielded signal/excitation cable (part No. D173D018U02), (10 m included with shipment)

9 EC-Certificate of Compliance

**EG-Konformitätserklärung
EC-Certificate of Compliance**


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

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

Modell: 50XE4... / E4...
Model: 10DE2... / DE2...
10DX4... / DE4...

Richtlinie: EMV Richtlinie 89/336/EWG *
Directive: EMC directive 89/336/EEC *

Europäische Norm: EN 50081-1, 3/93 *
European Standard: EN 50082-2, 2/96 *

Richtlinie: Niederspannungsrichtlinie 73/23/EWG *
Directive: Low voltage directive 73/23/EEC *

Europäische Norm: EN 61010-1, 3/94 *
European Standard:

* einschließlich Nachträge
including alterations

Göttingen, 10.05.2000

.....
Unterschrift / Signature

BZ-13-5108, Rev.1, 1699

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