FXM2000 (MAG-XM)

Converter 50XM2000
Field Mount Housing

Operating Instructions

D184B059U02 Rev. 04/05.2006

CE

For Flowmeter Primaries with
Pulsed DC Magnetic Field Excitation
Models: DM2_/DM4_F

Software Revisions A.3X
HART-Software X.3X

ABB

You have purchased a high quality, modern
Electromagnetic Flowmeter system from ABB Automation.
We appreciate your purchase and the confidence you have expressed in us.

This Instruction Bulletin contains information relating to the
assembly and installation of the instrument and its specifications.
ABB Automation reserves the right to make hardware and software
improvements without prior notice. Any questions which may arise
that are not specifically answered by these instructions should be
referred to our main plant in Göttingen, Germany or to
our Technical Service Department.

The instruments satisfy the general safety requirements per EN 61010-1 and the
EMC-Requirements per EN 61326 as well as the NAMUR-Recommendation NE21

Introductory Safety Notes for the EMF System

Regulated Usage

The Electromagnetic Flowmeter System (EMF), consisting of a flowmeter primary and a converter, is manufactured in state of the art designs and is safe to operate. The flowmeter is to be installed exclusively in applications which are in accord with the specifications.

Every usage which exceeds the specifications is considered to be non-specified. Any damages resulting therefrom are not the responsibility of the manufacturer.
The user assumes all risk for such usage.

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

Installation, Start-Up and Service Personnel

Please read this Instruction Bulletin 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 Bulletin.

Assure that the interconnections 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 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

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

b) 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). For two piece housings the housing screws are to be loosened. For flowmeter primaries ≥ 18"/DN 450 the drain plug at the bottom of the housing is to be removed in order to neutralize any hazardous material in the magnet coil and electrode areas.

c) For service and repairs **written confirmation** is required that the measures listed in a) and b) have been carried out. For this purpose, please use the declaration regarding contamination on page 51.

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

EG-Konformitätserklärung
EC-Certificate of Compliance

CE

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

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

Modell: *Model:*	50XM2000 DM4_F DM2_
Richtlinie: *Directive:*	EMV Richtlinie 89/336/EWG * EMC directive 89/336/EEC *
Europäische Norm: *European Standard:*	EN 61326, 5/2004 *
Richtlinie: *Directive:*	Niederspannungsrichtlinie 73/23/EWG * Low voltage directive 73/23/EEC *
Europäische Norm: *European Standard:*	EN 61010-1, 8/2002 *

* einschließlich Nachträge
including alterations

Göttingen, 06.03.2006

ppa.....
B.Kammann, Vice President PRU Flow

BZ-13-5110, Rev.2

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Technical Data
Electromagnetic Flowmeter FXM2000 (MAG-XM)
see Data Sheet D184S031U02 Rev. 05.

1. Functional Description

The converter processes the flowrate proportional signals from the electromagnetic flowmeter primary into frequency proportional pulse signals (scaled or unscaled output) and into a current output.

! Note:

- In every installation it is important to assure that only a flowmeter primary designed for pulsed DC magnetic field excitation is connected to the converter 50XM2000. The flowmeter primaries with the following Model Numbers are included in the pulsed DC family: 10DX2111, 10DX2112, DM_2, 10DX3111, DM_4, (10D31XY)10DX3112. The Model Numbers are recorded on the Instrument Tag mounted on the connection box of the flowmeter primary.

2. Assembly and Installation

2.1 Inspecting the Converter

Before installation check the converter for damage due to possible mishandling during shipping. All claims for damage are to be made promptly to the shipper before installation.

! Note:

- The ext. EEPROM data memory module. Before assembly and installation check that the correct coordination exists between the flowmeter primary and the converter. The end numbers for the flowmeter primary, A1, A2 or X001, X002 and those for the converter B1, B2 or Y001, Y002 are recorded on the Instrument Tags. The flowmeter primaries with A1 are associated with converter B1, A2 with B2, X001 with Y001, etc. These combinations together with the correct ext. EEPROM comprise a single metering entity.

2.2 Converter Installation

The installation site for the converter must be essentially free of vibration. The specified temperature limits of -25 °C and +60 °C must be observed. Consideration must be given to the max. signal cable length between the flowmeter primary and the converter which is limited to 200 m[1)]. For agency approved EMF designs (Volume Flow Integrators) the max. cable length is 100 m.

In addition the installation site of the converter should not be exposed to direct sunlight. If the ambient temperature limit of +60 °C is exceeded the readability of the LC-Display is affected. It will no longer to read the process information. If it in not possible to avoid direct sunlight, a sun shield should be installed.

Field Mount Housing

The converter housing is designed for Protection Class IP 67 (DIN VDE 0470T1/EN 60529). The lower gray housing section is to be mounted using 4 screws (see “Dimension Drawings” on Page 8).

[1)] Description see page 10

2.3 Dimension Drawings

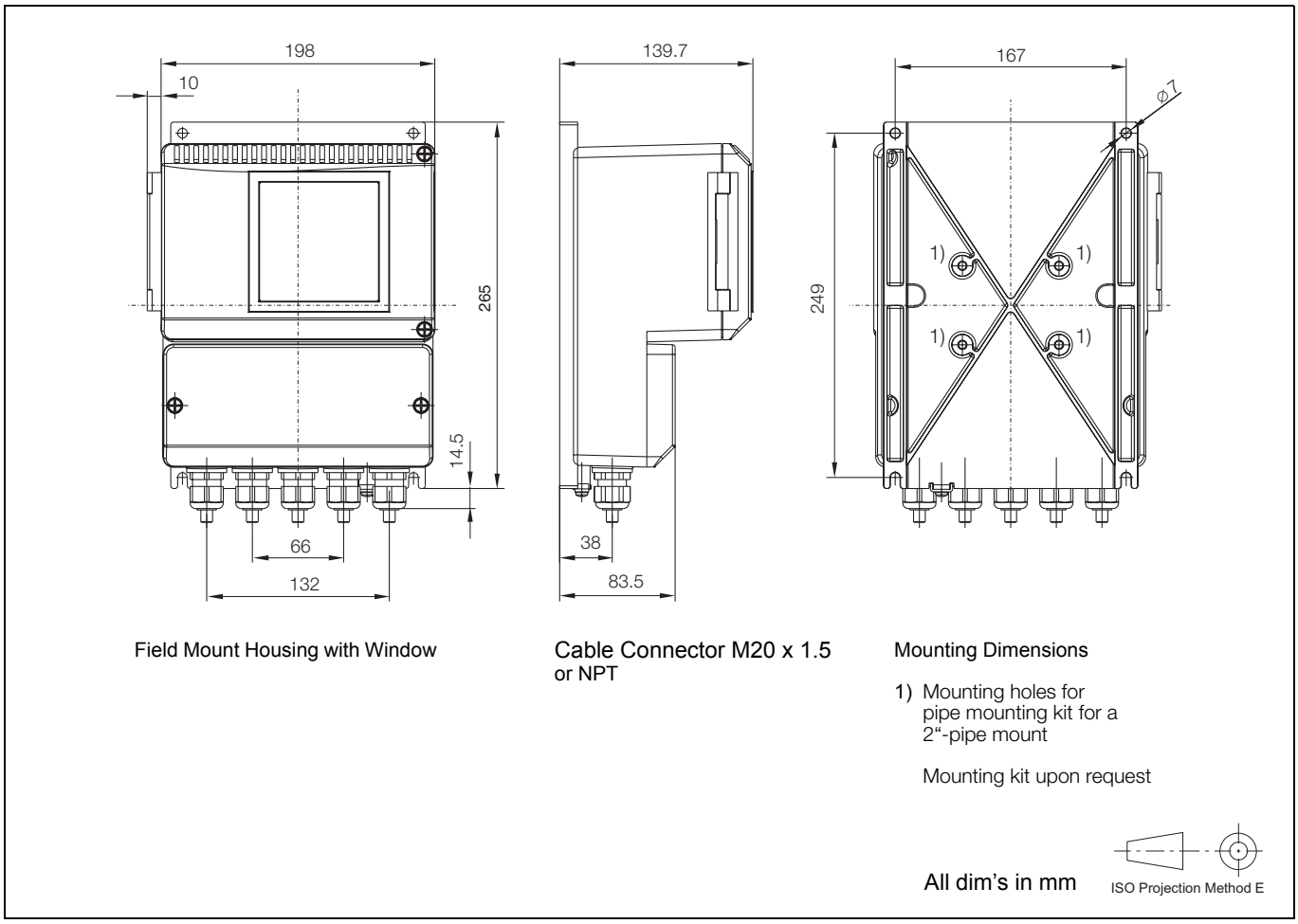


Fig. 1 Dimension Drawing, Field Mount Housing, Converter MAG-XM

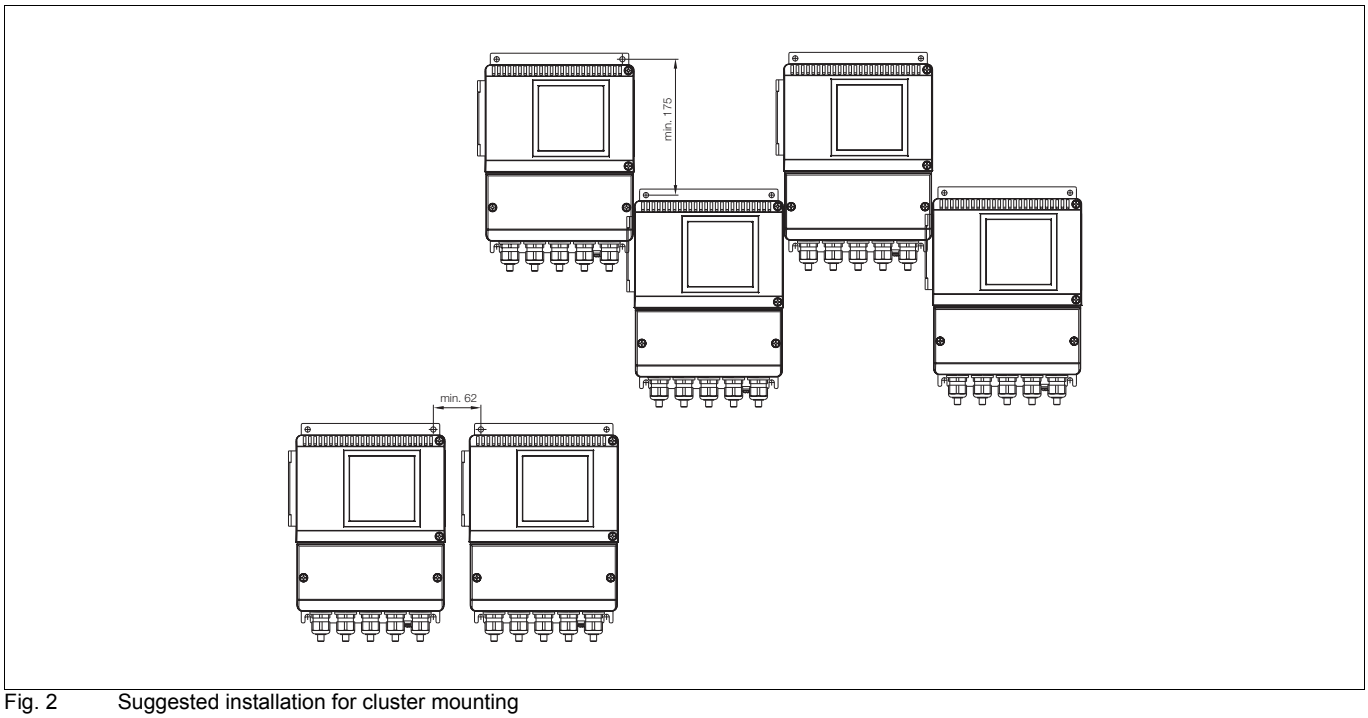


Fig. 2 Suggested installation for cluster mounting

2.4 Electrical Interconnections, Converter

2.4.1 Supply Power Connections

The supply power, which should conform to the specifications listed on the instrument tag, is connected to terminals L (Phase) and N (Neutral) or 1L1 and 1L2 over a mains fuse and a mains switch. The cable cross section of the supply power connections and the installed fuse size must be compatible (VDE 0100). The housing is grounded by connecting the **Terminal** ⏚ to ground.

Warning

Observe the supply power limits (values listed in the Specification Sheet). The voltage drop in the supply power leads for the 24/48 V AC design must be considered when long cables with small cross sections are installed.

The max. power is 23 VA (converter and flowmeter primary). The connections are to be made in accordance with the Interconnection Diagrams Page 11.

2.4.2 Magnet Coil Supply

The magnet coil supply voltage is supplied by the converter over Terminals M1/M3 with an excitation voltage ≤ 55 V DC. For maintaining the Radio Interference Grade B per VDE 0871 the magnet coil leads are to be shielded. If the flowmeter primary does not include a SE-Terminal then the shield is to be connected only at one end, at the converter.

2.4.3 Signal Cable Connections

The signal-/reference voltage cable is connected between the flowmeter primary and the converter in accordance with the Interconnection Diagrams. If the actual flow direction does not agree with the direction arrow on the flowmeter primary, then connections to 1 and 1S must be interchanged with those to 2 and 2S (MAG-XM).

For designs which include a preamplifier, only connections 1 and 2 are to be interchanged. The assignment of the flow direction can also be made using the parameter “Flow Direction **standard** or **oppsite“**.

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

The signal cable should be routed using the shortest path because the signal voltage in the cable is only a few millivolts. The maximum allowable signal cable length is 200 m[1)]. The cable should not be installed in close proximity to large electrical machinery and switch gear equipment which could induce stray fields, pulses and voltages. Valves and circuit breakers in proximity to the measurement system should include appropriate interference reduction measures such as protection diodes, varistors or RC-components (VDE 0580).

Volume Flow Integrator (Certified Design)

Note:

The maximum allowable signal length is 100 m.
Only available with converter MAG-XM

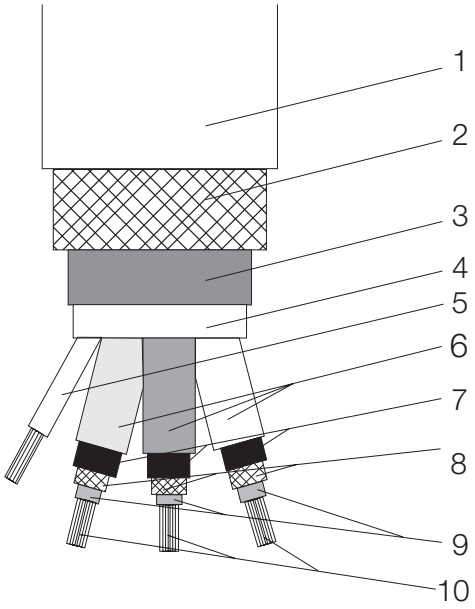
Note:

If, because of system conditions it is not possible to avoid proximity to electrical machinery and control elements it is desirable to route the signal cable in a grounded metal conduit.

1) Flowmeter primary with preamplifier for longer cable lengths upon request.

The voltage supply for the preamplifier is provided over U- and U+ instead of 1S and 2S.

2.5 Signal Cable Construction



1 PVC sheathing, white, Ø 10.3 ± 0.4 mm
2 Galvanized iron wire netting, Ø 0.2 mm, coverage 78 %
3 Aluminium-polyester film
4 PVC intermediate sheathing, white
5 Measuring dimensions, yellow, bare Cu., Ø 0.21 mm
6 Sheathing electrodes measuring signal:
Electrode 1: red; electrode 2: blue; reference voltage: white
7 Conductive filter layer, black
8 Shielding, braided from bare Cu. wire, Ø 0.1 mm
9 Isolation from polyolefin copolymer, natural colours
10 Copper wire conductors bare Cu., Ø 0.16 mm

Fig. 3 Signal Cable Construction D173D025U01

A shielded reference voltage cable is located within the cable parallel to the signal leads so that it is only necessary to install two cables (signal and supply power cables) between the converter and the flowmeter primary. The signal cable construction includes a copper shield which encloses the individually shielded signal leads and the shielded reference leads. This outer shield is connected to the terminal 3. An additional outer shield made of steel is connected to the common terminal in the converter housing. The shields for the signal leads also serve as the “Driven Shields” for the flow signal or as the voltage supply for the preamplifier.

! Note:

The shields for the signal leads are at signal potential and therefore may not contact each other (short circuit) or contact other shields.

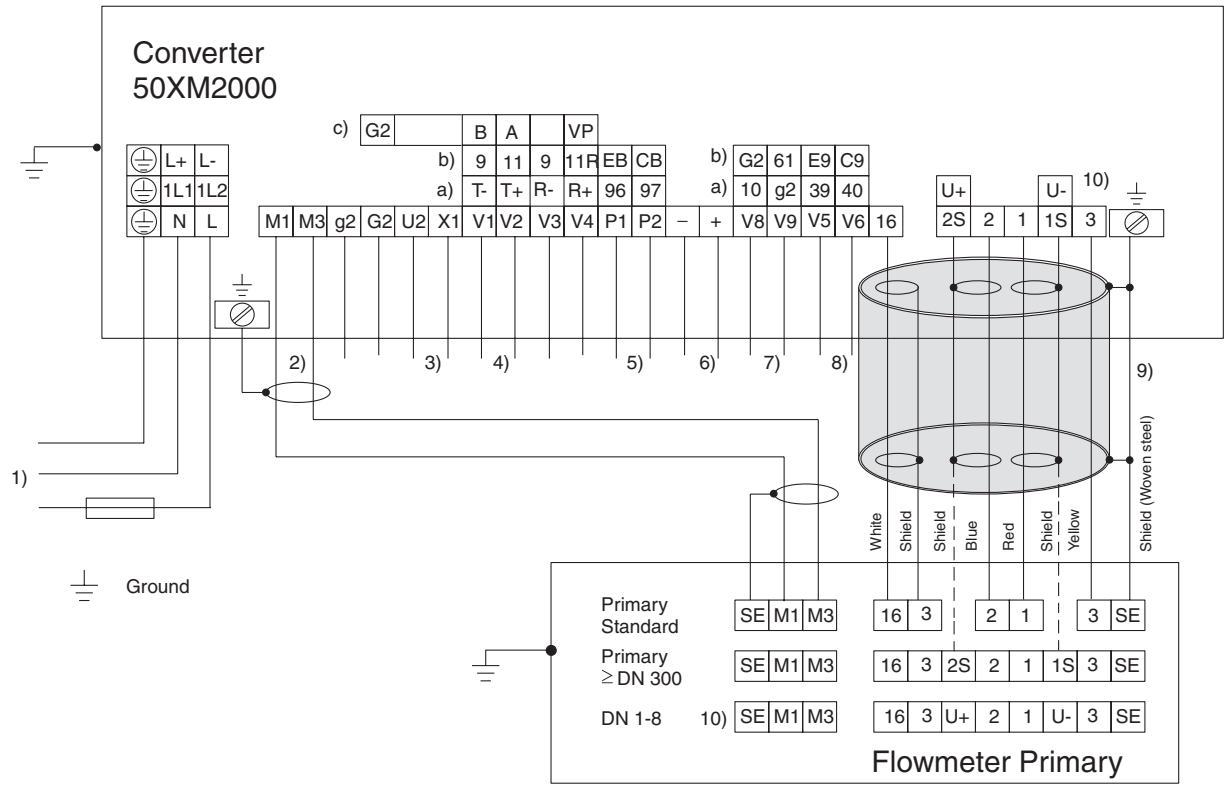
! Signal Cable Length for the “Detector Empty Pipe“ Design

Standard max. 50 m at ≥ 20 µS/cm ≥ 3/8" (DN 10)
“Detector Empty Pipe” design not available for instruments with preamplifiers.

2.5.1 Connections for the In- and Output Signals

To maintain the interference resistance per the NAMUR-Recommendations the in- and output leads should be shielded. Observe the Interconnection Diagram page 11 and the Interconnection Examples from page 12.

2.5.2 Interconnection Diagram, Flowmeter System



1) Supply power, see Instrument Tag
2) Excitation current cable for flowmeter primary (e.g. shielded 2 x 1.5 mm^2), Terminals M1, M3)
3) Contact input, function selected in the software as ext. zero return
or ext. totalizer reset or ext. flow range switching or start contact for preset totalizer, passive,
over contact (normally open), with ext. power supply, 16 V ≤ U_{CEH} ≤ 30 V DC, R_i = 2kΩ
Terminals X1, G2. Active, over contact (normally open), Terminals X2, U2, jumper Terminals g2/G2
4) a) Data link RS 485[1)], Terminals V1-V4, Function (T-, T+, R-, R+)
b) Option: scaled pulse output 2-channel
active, 24 V DC, load ≥ 150 Ω or passive relay contact (normally open), ≤ 3 W; ≤ 250 mA; ≤ 28 V DC,
f_{max} = 20 Hz or passive optocoupler, 5 V < U_{CE} < 28 V DC, 5 mA < I_{CE} < 30 mA; fmax 5 kHz
Terminals: V1, V2 forward; Function 9, 11
Terminals: V3, V4 reverse; Function 9, 11R
c) Data link Profibus DP, Terminals V1, V2, V4, G2, Function (RxD/TxD-P(B), RxD/TxD-N(A),
+5 V (VP), DGND (G2) for bus termination.
5) Contact output, function selected in the software as general alarm, alarm, empty pipe,
forward direction signal, 2 flow ranges or preset totalizer
over relay contact ≤ 3 W; ≤ 250 mA; ≤ 30 V DC, Terminals P1/P2, Function (96/97) or
over optocoupler 16 V ≤ U_{CEH} ≤ 30 V DC, 2 mA ≤ I_{CEL} < 15 mA, Terminals P1/P2, Function (EB/CB)
6) Current output selectable, 0/4-20 mA load ≤ 1000 Ω, 0/2-10 mA load ≤ 2000 Ω, 0-5 mA load ≤ 4000 Ω,
Terminals +/–)
7)[2)] Scaled pulse output forward / and reverse;
a) active, 24 V DC, load ≥ 150 Ω, f_{max} = 5 kHz, Terminals V8, V9, Function (g2/10)
b) passive, 5 mA ≤ I ≤ 250 mA, 5 V ≤ U ≤ 25 V DC, f_{max} = 5 kHz, Terminals V8/V9, Function (G2/61)
8) a) Alarm output, relay contact ≤ 3 W; ≤ 250 mA; ≤ 30 V DC, opens at alarm, Terminals V6/V6 Function (39/40)
b) Alarm output, optocoupler 16 V ≤ U_{CEH} ≤ 30 V DC, 2 mA ≤ I_{CEL} < 15 mA, I_{CE} ≤ 7.5 mA, Terminals V5/V6,
Function (E9, C9)
9) Shielded signal cable, Part No. D173D025U01, 10 m included with shipment.
10) Voltage supply for the preamplifiers in the flowmeter primary (1/25" - 5/16" (DN 1-8) and for flowmeter primaries with
a signal cable length ≥ 200 m, Terminals +U, –U.

1) A shielded data cable with individually twisted pairs is recommended for the data link RS 485.
2) Scaled pulse output, active or passive, pulse width can be set from 0.100 to 2000 ms.

Fig. 4 Interconnection Diagram MAG-XM

2.5.3 Interconnection Examples for Peripherals, Current Output and Pulse Output

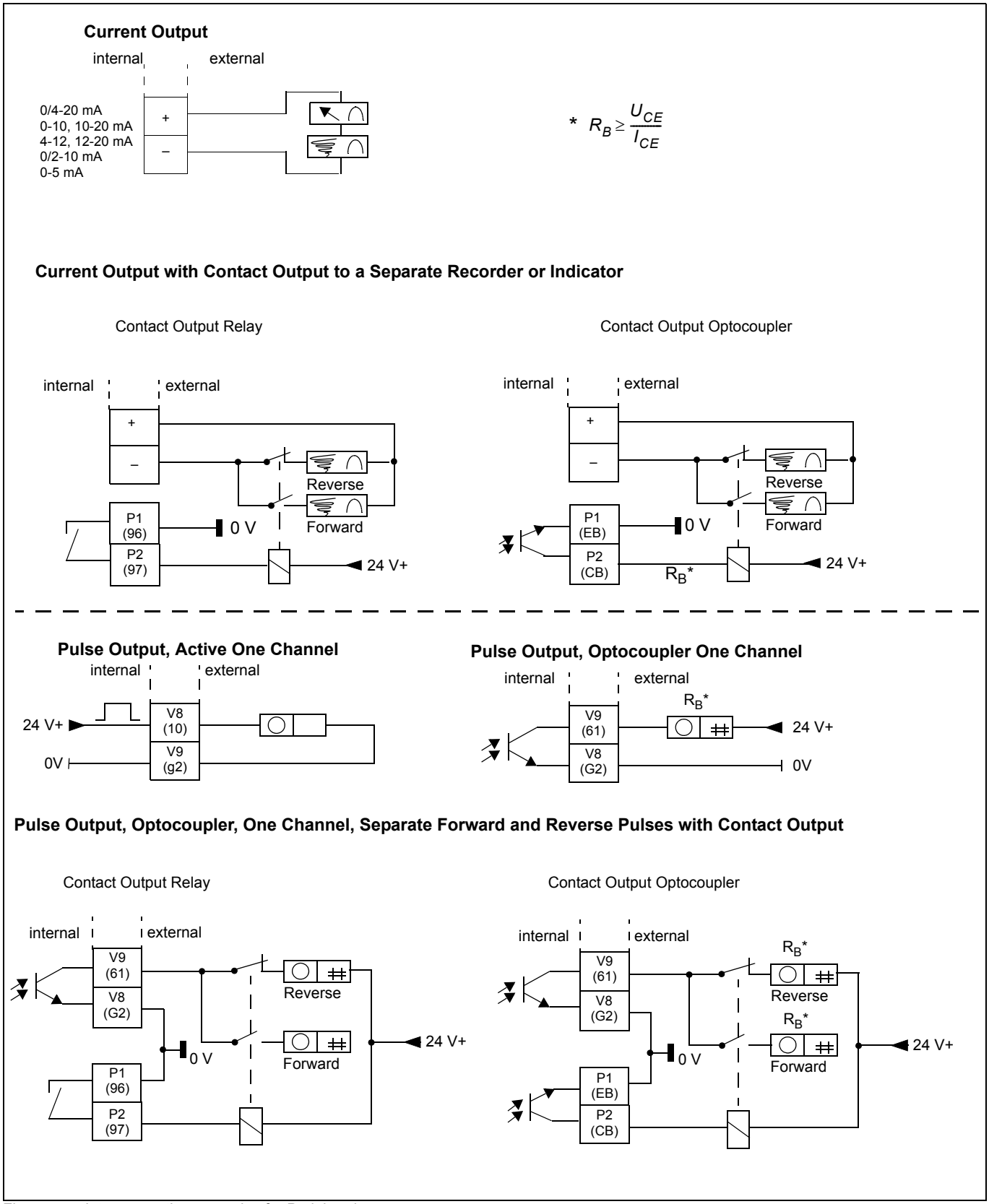
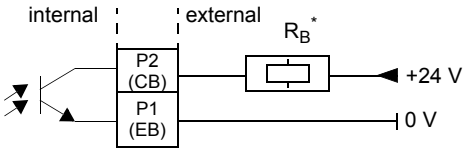


Fig. 5 Interconnection examples for Peripherals

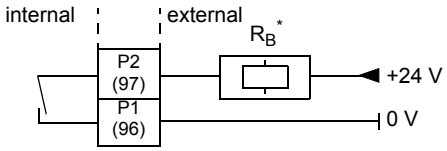
2.5.4 Interconnection Examples for Peripherals, Contact In-/Outputs, Data Link

Contact Output for general alarm, max-min-alarm, empty pipe, forward/reverse direction signal, flow range 1/2 or end contact (preset totalizer). Function can be selected in the software in Submenu „Prog. In/output“

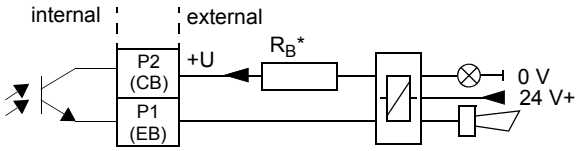
Contact Output Optocoupler



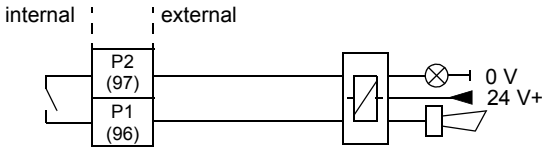
Contact Output Relay



Contact Output General Alarm Optocoupler

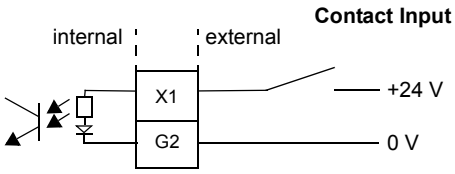


Contact Output General Alarm Relay

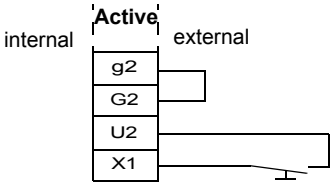


Contact Input for external zero return (undefined fill level when the pumps are shut off or repetitive cleaning or flushing cycles during which no measurements are to be made) or external totalizer reset, flow range switching FR2, or start/stop contact for function preset totalizer. Function can be selected in the Submenu „Prog. In/output“.

Contact Input Passive



Active



$$^{*}R_B \geq \frac{U_{CE}}{I_{CE}}$$

Profibus DP

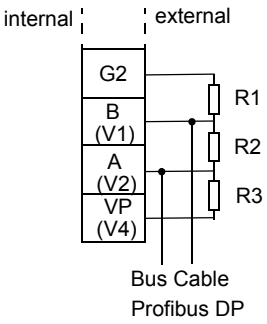
The resistors R1, R2, R3 are bus termination resistors. They are to be installed when the instrument is connected at either end of the bus cable.
R1 = 390Ω; R2 = 220Ω; R3 = 390Ω

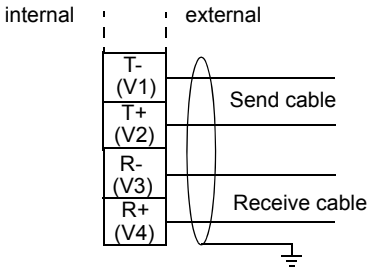
Data Link RS 485

Serial data transmission over data link RS 485:
Max. cable length: 1200m, max. 32 instruments in parallel on the bus, shielded data cable with individually twisted pairs.
Baudrate: 110-9600 Baud, 14400/28800 Baud selections.

HART-Protocol®

FSK-Modulation on the 4-20mA current output per Bell 202 Standard.
Max. cable length: 1500 m twisted cable
Baudrate: 1200 Baud
Min. load: 250 Ohm





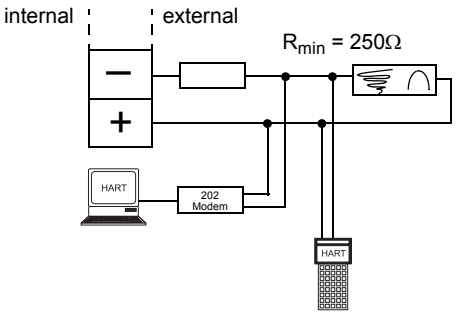


Fig. 6 Interconnection Examples for Peripherals

3. Start-Up

3.1 Checks

The start-up procedure is to be initiated after the flowmeter primary and converter have been installed.

The power supply is turned off!

- Check if the flow direction agrees with the direction indicated by the arrow on the flowmeter primary housing.
- Check if the grounds are correctly connected. (see Instruction Bulletin Flowmeter Primary)
- Check the interconnections per the Interconnection Diagram on page 11.
- Check that the supply power agrees with the specifications on the Instrument Tag.
- Check if the ambient temperature is within the limits listed in the Specification Sheet. See Instruction Bulletin, Flowmeter Primary and Converter.
- Check to assure that the coordination flowmeter primary/ converter is correct (it is important that the ext. EEPROM with the correct calibration data is installed). The flowmeter primaries with end numbers A1 , X001 are associated with converter end numbers B1, Y001 or A2 with B2, X002 with Y002, etc. The numbers may be found on the Instrument Tag.

Turn on the power!

- Check the contrast setting of the display. A small screw-driver can be used to adjust the “Contrast” potentiometer to the ambient conditions. Field Mount Housing design see Fig. 7.
- In order for the instrument to be operational it is necessary to first select or enter a few parameters. The flow range is automatically set to 10 m/s. Enter the desired flowrate values for the forward and reverse flow directions in the appropriate engineering units. Hydraulically ideal are flow range end values of approx. 2-3 m/s. In the “Submenu Current Output” select the desired current output range. If the converter includes a passive or active pulse output, select the pulses/unit for the selected units. The pulse width suitable for an external counter or for processing in the converter can be set between 0.100 and 2000 ms.
- When using a serial data link see the separate Document for the ASCII-Protocol or Profibus DP.
- Check the system zero (see 3.2 Zero Checks)

The data settings for the parameters and the options included in the instrument can be recorded on the last page of this Instruction Bulletin for service or repair purposes.

3.2 Zero Checks

The system zero of the measurement system is to be set at the converter. The fluid in the flowmeter primary must be at absolute zero flow. The meter tube must be guaranteed full. The parameter "System zero" can be used to manually or automatically adjust the system zero as follows: select the parameter with ENTER, use the DATA or STEP arrow keys to select either manual or automatic and press the ENTER key to initiate the adjustment. During the automatic adjustment the converter counts down from 256 to the actual zero value in the 2nd display line, after which the system zero adjustment is completed. The adjustment requires approx. 20 seconds, see on page 21.

3.3 Detector Empty Pipe

During start-up the Detector “Empty Pipe” module is to be adjusted to the existing flow conditions. Adjustment instructions see on page 27.

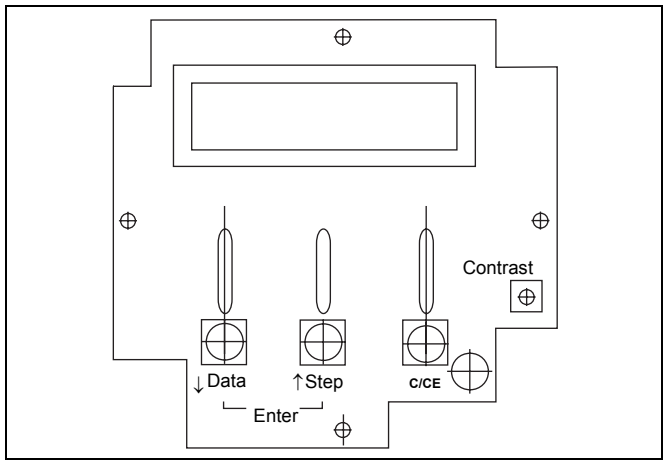


Fig. 7 Display Board with Entry Keypad and Contrast Adjustment

4. Operation - Data Entry and Configuration of the Converter

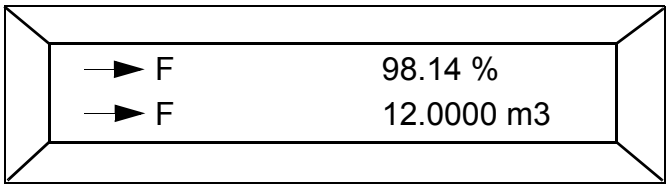
4.1 Display Formats

After the power is turned on the Model Number of the converter is displayed in the first line and the software version together with its revision level in the second line. Then the process information values are displayed.

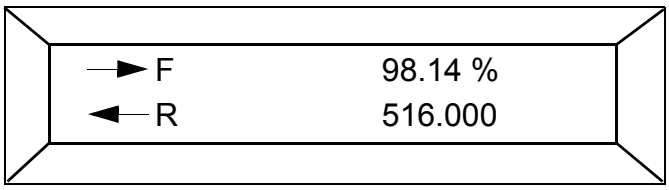
The present flow direction is indicated in the first line of the display (→F for forward or ←R for reverse) together with the instantaneous flow rate value in percent or in direct reading engineering units. In the second line the totalizer value for the present flow direction is displayed with a max.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

The totalizer value, in the appropriated units, always represents the actual value regardless of the pulse factor setting. This display combination is referred to in the text by the term process information.

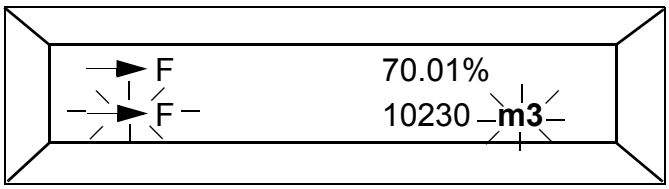
The totalizer value for the opposite flow direction can be displayed by pressing the STEP- or DATA key.



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



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



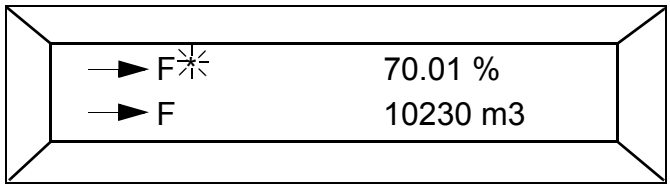
1st Line Forward direction instantaneous flowrate
2nd Line Totalizer overflow. → F and m3 blink.

A totalizer overflow occurs whenever the totalizer value reaches 9,999,999 units. When the totalizer value in one of the flow directions is greater than 9,999,999 units, the flow direction symbol (→ F or ← R) and the units (e.g. m3) blink in the 2nd line. A converter software counter can register a max. of 250 overflows. The overflow indication can be reset separately for each flow direction by pressing ENTER (see on page 28).

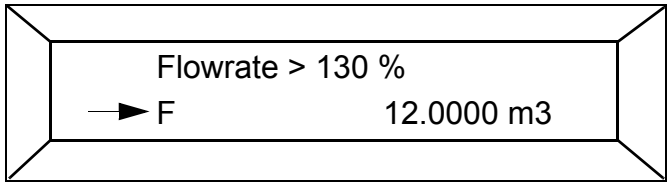
Volume Flow Integrator (Certified Design)

! Note:

In the Volume Flow Integrator MAG-XM a power interruption is indicated by a star "*"in the 1st display line. See page 29 Mains Interrupt Reset.



During an error condition a message is displayed in the 1st line.



This message is displayed alternately in clear text and then by its corresponding error code. The clear text message is only displayed for the error with the highest priority while all other detected errors are indicated by their error codes in the display (see Table or Section 6.3.1 Error Messages during data Entry).

Error Number	Clear Text / Cause
5 RAM defective NVRAM loaded	Data in RAM corrupted Automatic data exchange
4 Ext. Zero return	Ext. Zero return contact activated
0 Empty pipe	Pipeline not full
7 Urefp too large	Positive reference too large
8 Urefn too large	Negative reference too large
2 Uref too small	Pos. or neg. reference too small
1 A/D saturated	A/D-Converter saturated
3 Flowrate	Flowrate greater than 130%
6 Totalizer	Totalizer values corrupted
9 Excitation frequency	Supply power frequency or Digital-Signal board defective
A Max. Alarm	Max. alarm value exceeded
B Min. Alarm	Value below min. alarm value
C Primary data	Error in ext. EEPROM or it is not installed.

Error Code Table by Priority

In addition to the error message in the display an alarm signal is transmitted over a relay/optocoupler output and the current output is set to 0 %, 3.6 mA or 130 % (does not apply to Error Codes 6, A, B; for Error Code 3 the current output is always set to 26 mA). The totalization is always interrupted (except for Error Code 3).
For HART-Protocol see values in page 25 „Iout at Alarm".

4.2 Data Entry

The data is entered using the three keys Step ↑, Data ↓ and C/CE on the converter when the housing is open.

Fig. 8 Converter Keypad and Display

The Magnet Stick can be used to configure the converter with the housing cover closed (only Field Mount Housing).

During data entry the converter remains on-line, the current and pulse outputs continue to indicate the present operating values. The function of the individual keys is described below:

●	C/CE	The C/CE key is used to toggle back and forth between the operating mode and the menus.
●	STEP ↑	The STEP key is one of two arrow keys. **STEP** is used to scroll **forward** through the menus. All desired parameters can be accessed with the STEP key.
●	DATA ↓	The DATA key is one of two arrow keys. **DATA** is used to scroll **backward** through the menus. All desired parameters can be accessed with the DATA key.
	ENTER	The ENTER-Function requires that both arrow keys **STEP** and **DATA** be pressed simultaneously**.**
●	STEP ↑	ENTER is used to turn the program protection on and off. Additionally ENTER is utilized to access the values in the parameter to be changed and to accept the new values or selections.
●	DATA ↓	
		The ENTER function is only active for 10 seconds. If no entries are made during this 10 second period it must be activated again.

ENTER Function for Magnetic Stick Operation

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 after which changes can be made.

The are two types of data entry formats:

- Direct numeric entries
- Selections from a predefined table.

! Note:

During data entry the values entered are checked for plausibility and if necessary rejected with an appropriate message.
See Table Error Messages 6.3.1.

If no data is entered within a 20 second time interval, the converter displays the old value and after an additional 10 seconds displays the process information.

After the completing the configuration the parameter settings should be stored in the external EEPROM. The parameter settings for the specific design of the converter can be recorded on the last page of this Instruction Bulletin for service and repair purposes.

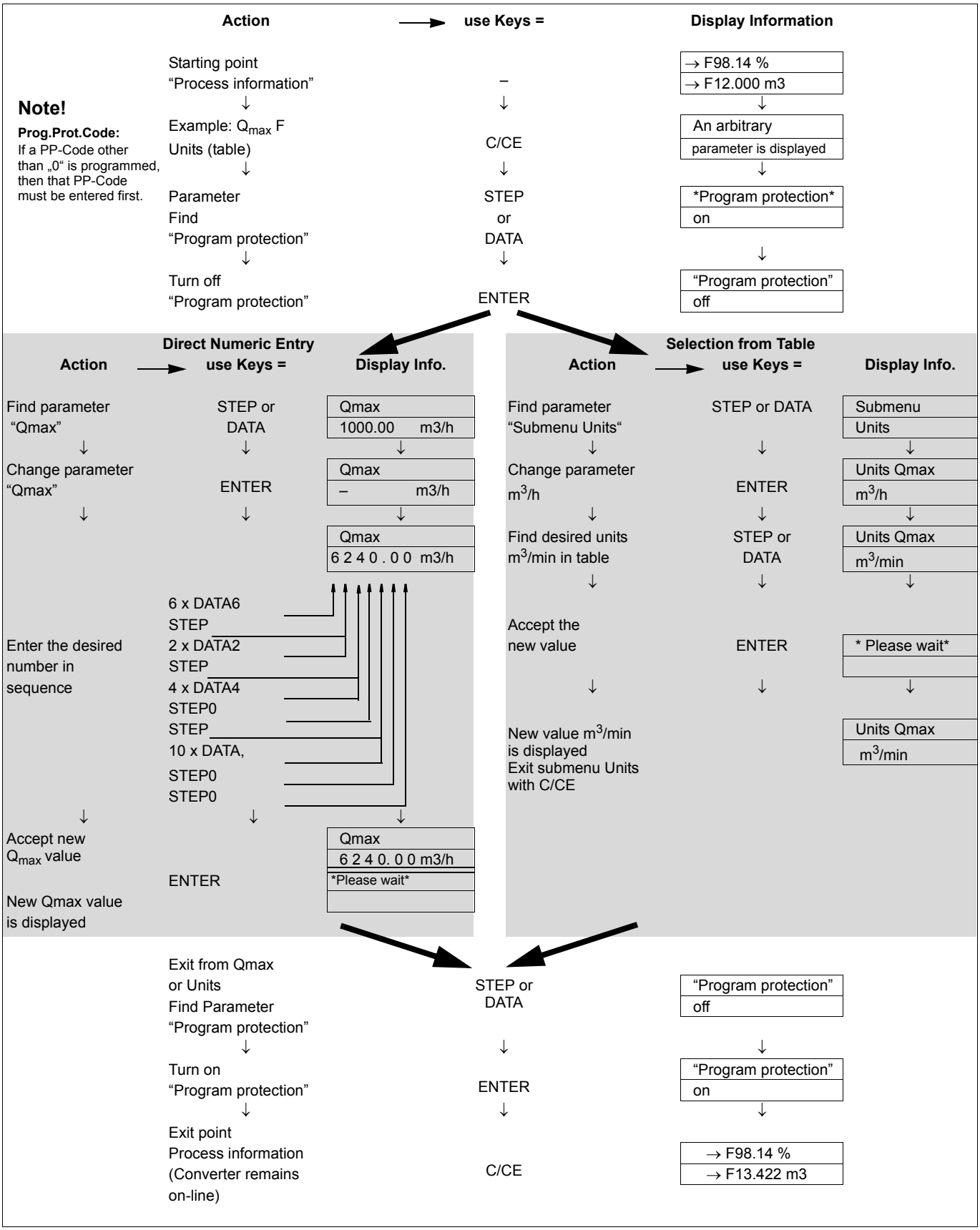
4.2.1 Data Security

All data is stored when the power is turned off or interrupted in a NV-RAM. The parameter settings, process information and flowmeter primary specific calibration data are stored in a serial EEPROM as well as in an external EEPROM. If a converter module exchange is necessary it is possible to upload all the data from the external EEPROM into the new converter module.

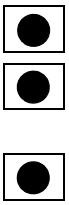
4.2.2 Data Storage Module ext. EEPROM

When the flowmeter is shipped an ext. EEPROM is installed in the socket provided on the connection board of the converter.

4.3 Data Entry Instructions "Condensed Form"



4.4 Parameter Overview and Data Entry



C/CE The C/CE key is used to toggle back and forth between the operating mode and the menu.

STEP ↑ Use **STEP** to scroll **forward** through the menu. Any desired parameter can be accessed.

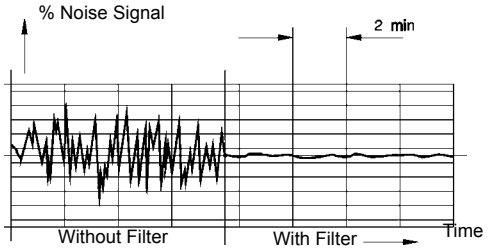
ENTER-Function requires both keys to pressed simultaneously

DATA ↓ Use **DATA** to scroll **backward** through the menu.

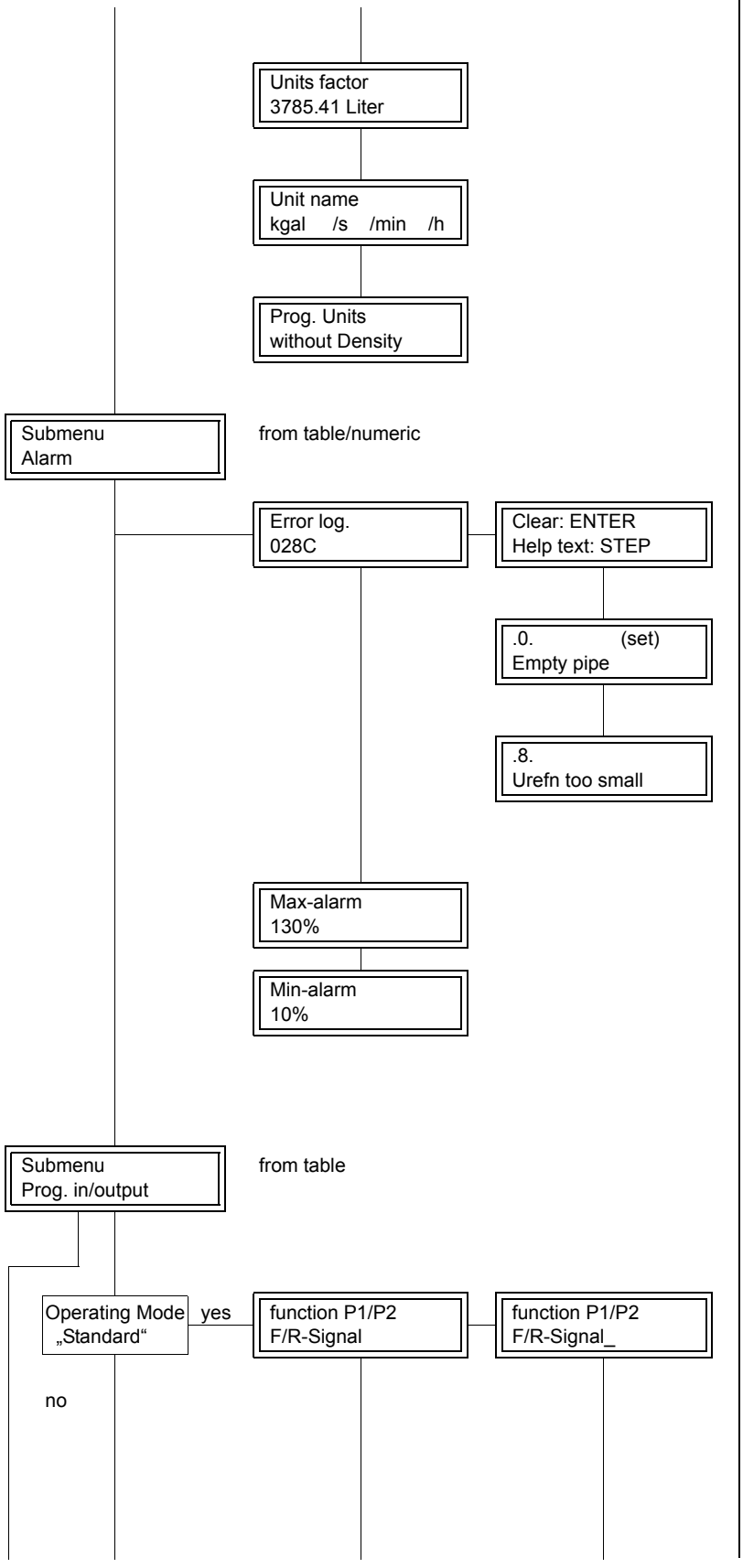
ENTER The ENTER-Function is used to turn the program protection on or off. For data entry scroll through the menu to the parameter to be changed and select it using the Enter-Function.

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
Prog. protection on	from table/numeric		Data can be entered only after the Program Protection has been turned off. on / off
	Prog. protection off		Parameters can only be changed after the Program Protection has been turned off. After the Program Protection is turned off it is also possible to change the PP-Code.
Prog. prot. code	numeric		If a number other than “0” (factory setting) has been programmed for the Program Protection Code, the Program Protection can only be turned off after the correct PP-Code (1-255) has been entered.
	Old PP-Code? 0		Enter old PP-Code 0 = Factory setting
	New PP-Code: 0		Enter new PP-Code (0-255)
Language English	from table		German, English, French, Finnish, Spanish, Italian, Dutch, Danish or Swedish can be selected for the display language.
Meter size 250 mm 10 in	from table Warning: Only in the 50XM/CM1000 Mode can the meter size be selected		1/25” - 94” / DN 1 - DN 2400. Select using the arrow keys. Size listed in mm and inches. When the meter size is changed the value of Qmax is automatically set to 10 m/s. The pulse factor is also set to a value of 1. A message “Warning! New meter size” is displayed when a size change occurs.

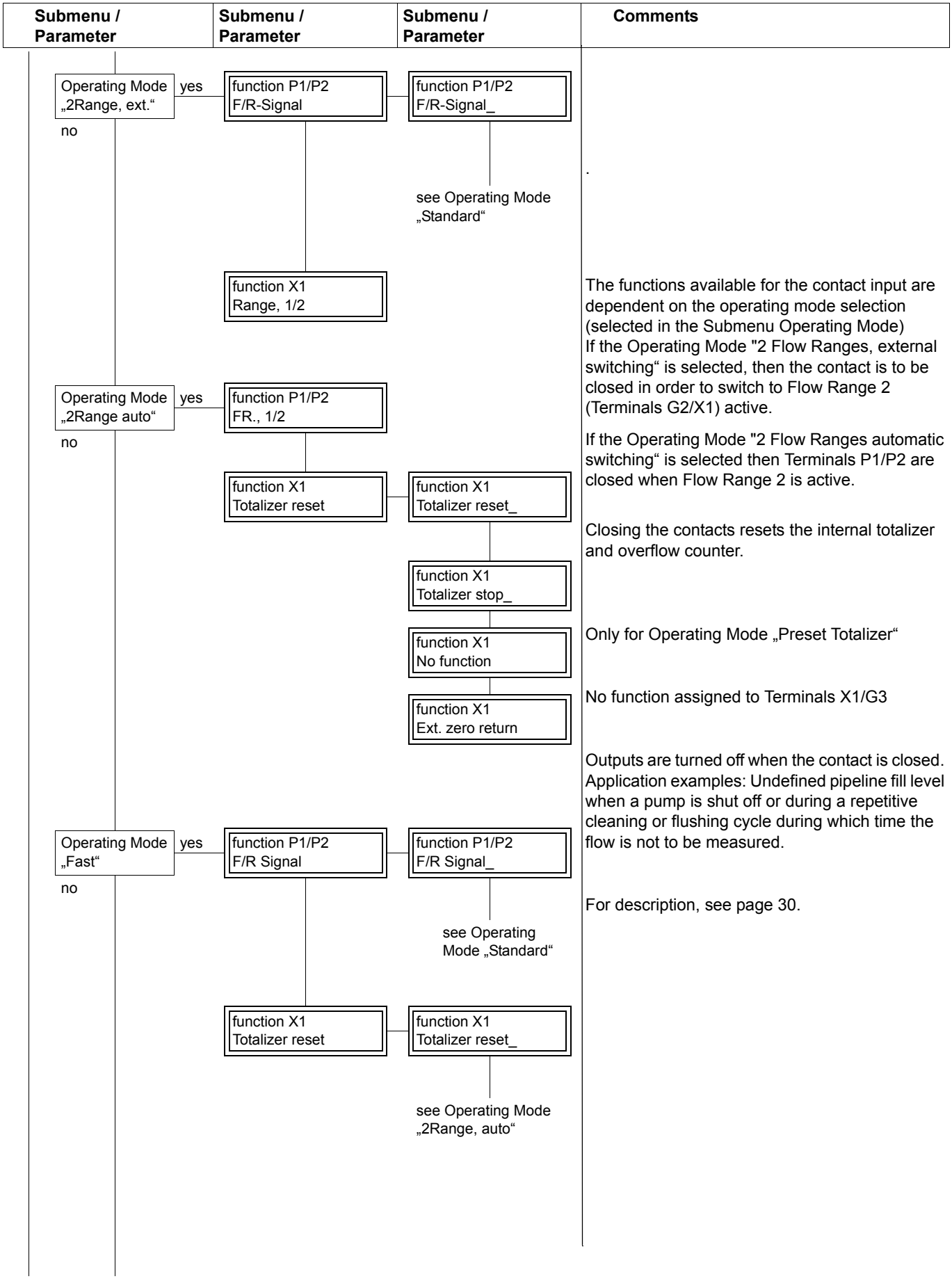
Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
Submenu Primary	from table		In the 50XM/CM2000 Mode the Submenu Primary is displayed instead of the parameter Meter Size.
	Meter size 250 mm 10 in		See Instrument Tag for the correct meter size.
	Span Cs 6.25 Hz 56.123%		Flowmeter span value Cs for the selected excitation frequency. See Instrument Tag.
	Zero Cz 6.25 Hz 0.1203%		Flowmeter zero value Cz for the selected excitation frequency. See Instrument Tag.
	Short model no. DM43		Short Model Number of the flowmeter primary.
	Order no. 000036116/X001		Flowmeter Order Number. This number is identical to the one on the Instrument Tag of the flowmeter primary and on the sticker on the external EEPROM.
	Preamplifier no		Information indicating if the flowmeter primary has a preamplifier installed or not. If the parameter is set to “yes“ then the Submenu “Detector empty pipe“ cannot be activated.
Cal-faot 10 m/s 1800.00 m3/h	-		Automatic setting based on the meter size selection.
Range 400.00 m3/h	numeric		Flow range for forward and reverse flow directions Min. flow range setting selections 0-0.5 m/s Max. flow range setting selections 0 -15 m/s. Flow range end value selections 0.5 to 15 m/s. **Note:** The Range display is a function of the operating mode. See Submenu Operating Mode page 30.
Preset totalizer 0.0000 m3	numeric		Only for Operating Mode „Preset Totalizer“
Preset totalizer start	from table		Only for Operating Mode „Preset Totalizer“
Pulse 1.0000 /m3	numeric		For int. and ext. flow totalization, range 0.001-1000 pulses per selected flow unit, max. count frequency 5 kHz. **Note:** The max. count frequency is checked by the software and the pulse width adjusted if required.

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
Pulse width 30.000 ms	numeric		For external pulse output. Pulse width can be set between 0.100 ms and 2000 ms in multiples of 0.100 ms. The max. allowable pulse width is checked by the software and adjusted if required.
Low flow cut off 1.000%	numeric		Range 0-10 % of the flow range setting, applies to the display indication and all outputs. The switching point for the low flow cut off incorporates a hysteresis of 0.5 %.
Damping 10.0000 s	numeric		Range 0.125 - 99.9999 s, response time for the current output to reach 99 % of a flowrate step change (5τ) as a function of the excitation frequency selection e.g. 6 ¼ Hz from 0.5 s 12 ½ Hz from 0.25 s 25 Hz from 0.125 s
Filter on	from table		 On/off. Standard is off. If the output signal is noisy, turn filter on and set damping to >2.4 s. For applications with piston or membrane pumps (pulsating flowrate) a special measurement algorithm is required. Faster measurements can be made using a higher excitation frequency (excitation frequency = 25 Hz, Operating Mode = fast) and, when necessary, using difference totalization to subtract any reverse flow from the totals, i.e. the totalizer counts backward. For pulsating flows the filter should be turned "on" (pulsation free output, see Additional Information in 7.4).
Density 2.54300 g/cm3	numeric		Range 0.01 - 5 g/cm^3. Mass flowrate for the display and the totalizers in g, kg, t, uton or pound.

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
System zero adj. 3.5 Hz	from table/numeric		Zero point monitor (required for use with older flowmeter primaries).
	System zero adj. manual		Manual entry, e.g. when a converter is replaced
	System zero adj. automatic?		Valve must be closed, flow must be at absolute zero. The automatic adjustment is initiated with ENTER. The limits for the zero value are ±50 Hz. If the value is outside of these limits, no adjustment is made.
Submenu Units	from table/numeric		Flowrate units available for selection ml/s, ml/min, ml/h, Ml/h, Ml/min, Ml/day, lbs/s, lbs/min, lbs/h, uton/min, uton/h, uton/day, l/s, l/min, l/h, hl/s, hl/min, hl/h, m^3/s, m^3/min, m^3/h, igps, igpm, igph, mgd, gpm, gph, bbl/s, bbl/min, bbl/h, bls/day, bls/min, bls/h, kg/s, kg/min, kg/h, t/s, t/min, t/h, g/s, g/min, g/h, kgal/s[1)], kgal/min[1)], kgal/h[1)].These units apply to RangeMax, Qmax forward, Qmax reverse and to the instantaneous display, when the display is to be in direct reading engineering units. [1)] User configurable units
	Range unit l/s		
	Units totalizer m3		ml, l, hl, igal, gal, mgal, bbl, bls, kg, t, g, Ml, lb, uton, kgal[1)]. The totalizer units selected are checked by the converter as a function of the flow range, the pulse factor (0.01 to 1000 pulses/unit), the pulse width (0,100ms to 2000 ms) and the density correction value when mass units (e.g. g, kg, t) have been selected. If any one of these parameters is changed, the pulse width may not exceed 50 % of the period of the output pulses at 100% flowrate (on/off ratio 1:1). If the pulse width is greater than 50% it is automatically reduced to 50 % of the period and a message "Warning: New pulse width" is displayed. Messages are also displayed if the output frequency is too high or too low and corrective measures initiated. (see “Additional Information for the Pulse Output” on Page 46)

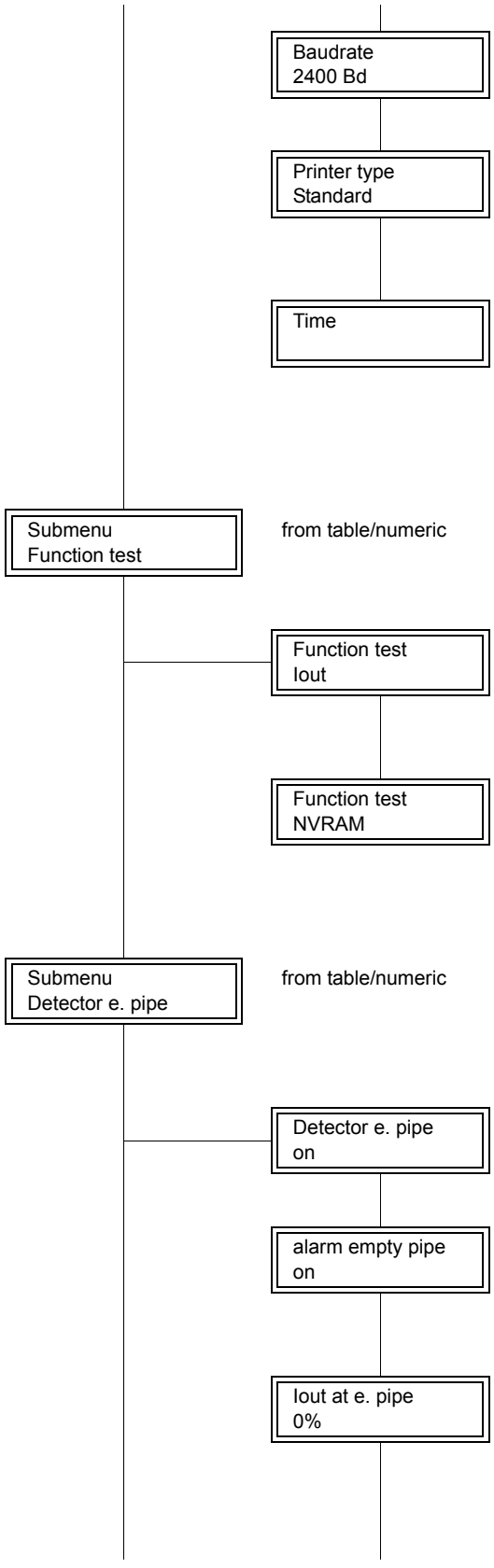

Submenu / Parameter
Submenu / Parameter
Submenu / Parameter
Comments
Units factor
3785.41 Liter
User programmable flowrate units based on liters; value shown is for kgal units (default setting).
For additional information see “User Programmable Units” on Page 32
Unit name
kgal /s /min /h
Four character name for the user programmable units.
Prog. Units
without Density
Programmable units for mass (with density) or volume (without density) flowrate
Submenu
Alarm
from table/numeric
Error log.
028C
Clear: ENTER
Help text: STEP
All detected errors (Errors 0-C) are stored. Use ENTER to clear the Error Register.
.0. (set)
Empty pipe
After pressing the STEP key the clear text message for each Error Code is displayed. Active errors are indicated by the text "(set)".
.8.
Urefn too small
Use the C/CE key to exit the help-text information display. Additional information about the error messages and remedies may be found under 6.3 Error Messages and Checks
Max-alarm
130%
Alarm, range 0 -130% of the flow range setting. Can be set in 1% steps.
Switching hysteresis 1%. The message is shown in the display by a blinking arrow "↑".
Min-alarm
10%
Alarm, range 0 -130% of the flow range setting. Can be set in 1% steps.
Switching hysteresis 1%. The message is shown in the display by a blinking arrow "↓".
If both errors nave been detected, a blinking double arrow is displayed.
Submenu
Prog. in/output
from table
The function of the contact input is defined by the operating mode selection (settings in „Submenu Operating Mode“).
Operating Mode
„Standard“
yes
function P1/P2
F/R-Signal
function P1/P2
F/R-Signal_
If the operating modes "Standard“, „2 flow ranges external selection“, „2 flow ranges F/R“ and the Operating Mode „Fast“ are selected the following menus are displayed. The operation of the contact can be selected as normally open or normally closed, except for the forward/reverse flow direction signal (see contact symbols in the display).
F/R-Signal for the flow direction (contact is closed for forward flow)
no

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
		function P1/P2 No function	No function assigned to Terminals P1/P2
		function P1/P2 MAX alarm	If a low flowrate is to be signalled over the terminals, select MIN-Alarm, shown as normally open. The low flow alarm limit is set in the parameter MIN-Alarm in the Submenu Alarm. Similarly the high flow alarm limit is set in the parameter MAX-Alarm. If the parameter MAX/ MIN-Alarm is selected then an alarm signal will be transmitted over the terminals when the flow exceeds the high alarm setting or drops below the low alarm setting.
		function P1/P2 MIN alarm	
		function P1/P2 MAX/MIN alarm	It is also possible in this mode to transmit a signal when the flowrate is between the two limits, MIN- and MAX-Alarm. For this function the MAX-Alarm limit must be set lower than the LOW-Alarm limit. If the flowrate is within this flow range an alarm indication is displayed and an alarm signal is transmitted over the terminals.
		function P1/P2 General Alarm	All detected errors (Errors 0 to 9, A, B) are signalled over the terminals.
		function P1/P2 Empty pipe	Output signal when the pipe is empty.
	function X1 Totalizer reset	function X1 Totalizer reset	Closing the contacts resets the internal totalizer and overflow counter.
		function X1 Totalizer stop	Only for Operating Mode „Preset Totalizer“
		function X1 No function	No function assigned to Terminals X1/G3
		function X1 ext. Zero return	Outputs are turned off when the contact is closed. Application examples: Undefined pipeline fill level when a pump is shut off or during a repetitive cleaning or flushing cycle during which time the flow is not to be measured.


Submenu / Parameter
Submenu / Parameter
Submenu / Parameter
Comments
Operating Mode „2Range, ext.“
yes
no
function P1/P2 F/R-Signal
function P1/P2 F/R-Signal_
see Operating Mode „Standard“
.
function X1 Range, 1/2
The functions available for the contact input are dependent on the operating mode selection (selected in the Submenu Operating Mode)
If the Operating Mode "2 Flow Ranges, external switching“ is selected, then the contact is to be closed in order to switch to Flow Range 2 (Terminals G2/X1) active.
Operating Mode „2Range auto“
yes
no
function P1/P2 FR., 1/2
If the Operating Mode "2 Flow Ranges automatic switching“ is selected then Terminals P1/P2 are closed when Flow Range 2 is active.
function X1 Totalizer reset
function X1 Totalizer reset_
Closing the contacts resets the internal totalizer and overflow counter.
function X1 Totalizer stop_
function X1 No function
Only for Operating Mode „Preset Totalizer“
function X1 Ext. zero return
No function assigned to Terminals X1/G3
Outputs are turned off when the contact is closed. Application examples: Undefined pipeline fill level when a pump is shut off or during a repetitive cleaning or flushing cycle during which time the flow is not to be measured.
Operating Mode „Fast“
yes
no
function P1/P2 F/R Signal
function P1/P2 F/R Signal_
see Operating Mode „Standard“
For description, see page 30.
function X1 Totalizer reset
function X1 Totalizer reset_
see Operating Mode „2Range, auto“

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
Operating Mode „Preset totalizer“	yes	function P1/P2 End contact	When the Operating Mode “Preset Totalizer“ is selected a contact is opened when the preset flow total is reached.
no		function X1 start/stop	
Operating Mode „2Range, F/R“	yes	function P1/P2 F/R-Signal	function P1/P2 F/R-Signal_ → see Operating Mode „Standard“ — For description see page 30.
		function X1 Totalizer reset	function X1 Totalizer reset_ → see Operat. Mode „Standard“
Submenu Current output	from table/numeric		The selections are: 0-20 mA / 4-20 mA, 0-10 mA / 2-10 mA, 0-5 mA / 0-10, 10-20 mA / 4-12, 12-20 mA.
		Current output 4-20 mA	
		Iout at alarm 130%	The current output during an alarm condition can be selected, 0/4 mA for 0% or 3.6 mA or 26 mA for 130%. For Error 3 Flowrate >130%, current output is always set to 26 mA . If Error 0 (empty pipe) is active the current output is set to the value selected in the Submenu “Detector empty pipe“ in the Parameter “Iout at empty pipe“ .
		Iout at alarm Low	For converters with HART-Protocol only Low or High can be selected. For the Low value a number between 3.00 and 4.00 mA can be selected and for the High value a number between 20.00 and 30.00 mA.

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
Submenu Data link	from table/numeric		**Note:** Automatic data link recognition These menus are only visible when a RS 485 module is installed in the converter and has been recognized. Details for ASCII- or Profibus DP communication may be found in the corresponding Instruction Bulletins. The Parameter Address is displayed only for HART-Protocol .
	Communication ASCII		Communications protocol ASCII, Print 5 batch, Print 6 continuous (Printer Protocols) or μDCI binary over data link RS 485.
	Communication ASCII 2w		The Protocol ACII 2w is for those designs with a 2-Wire data cable.
	Communication ASCII-Profib. DP		ASCII-Profibus DP
	Slave-Addr. 126		The Slave-Address must be entered as a three digit number, address range 000, 001, to 126. If a bus address is entered as a one or two digit number incorrect interpretation of the bus address by the converter will result.
	Function Param.-Profib. DP		This function is used to access the parameters from the Profibus DP-Module. See also Section 13 „Functions in the Data Link Menu“ in the Profibus Data Link Description, Part Number D184B093U05.
	Communication ASCII-XM1 mode		ASCII-XM1000-Mode In this protocol the contents of the Error Register can be transmitted bitwise.
	Instr. address 004		Instrument address: 0-99. (Not available with the selection Printer Protocol or Profibus DP). If more than one instrument is connected to a single bus (RS 485), each instrument must have a unique address. For instruments with HART-Protocol addresses between 0 - 15 can be selected. **Note:** If the address 0 is entered, the current output range for the flowrate is changed to 4 - 20 mA. If multiple instruments are connected and addresses between 1 and 15 are selected, the converter operates in the Multidrop-Mode. The current output value is fixed at 4 mA. The measurement of the output values is then only possible using the HART-Communication.



Baudrate: 110-28800 Baud selectable.
Not available with Profibus DP or HART-Protocol.

This parameter is only displayed when a Printer Protocol is selected. Selections available are a Standard Printer Type[1)] and the Report Printer ABB 55DE1000.

This parameter is only displayed when a Printer Protocol is selected and the corresponding printer type has been selected. Entry for Report Printer ABB 55DE1000: Year, Month, Day, Hour, Minutes

[1)] Minimum requirements for the Standard Printer Type:
40 characters/line, 1 Kbyte buffer, ASCII-character set

The converter functions can be tested independent of the actual flowrate. In the Function Test mode the converter is no longer on-line.

Function test Current Output: Enter data in mA.
Function test Pulse Output: (see “Submenu Function Test Numeric Entries only for Iout” on Page 32).

Function test internal component groups, automatic test
NVRAM, RAM (ASIC), EPROM (Program), EEPROM, ext. EEPROM. Additional functions: Alarm contact, Function P1/P2, Switch S401, Data Link HART-Transmitter, HART-Commands, Pulse Output, Display, Function X1, Simulation and Test Mode.

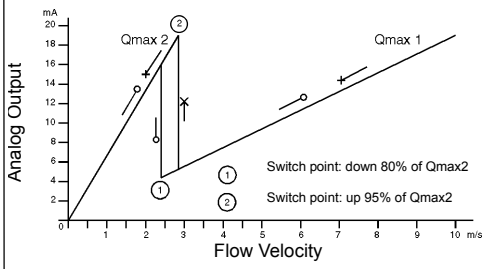
! Note:
For proper operation of the function "Detector empty pipe" the conductivity of the fluid must be greater than 20 μS/cm and the flowmeter size 3/8”/ DN 10 and up.

off = Detector not functional.
on = When the meter tube is empty an indication is displayed and a signal is sent to the terminals when the alarm setting is "on“.
off = When an "empty pipe" condition exists, no signal.
on = When the pipe is empty a signal over the General Alarm.

If the signal “Alarm empty pipe” is set to "on" then the outputs during an empty pipe condition can be set to 0 %, 130 % flowrate or to 3.6 mA.

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
	Iout at e. pipe Low		For instruments with HART-Protocol only Low or High can be selected. For the Low value a number between 3.00 and 4.00 mA can be selected and for the High value a number between 20.00 and 30.00 mA..
	Iout at e. pipe High		
	Threshold 2400 Hz		Set Threshold to 2400 Hz. (default setting). The threshold should 400 Hz above the adjustment value with a full pipe.
	Adjust Detector e. pipe		The converter displays the adjustment value in the lower display line. The pipeline must be full. Use the arrow keys to adjust the value to 2000 Hz +/- 25 Hz. Accept the adjustment with "ENTER". Empty pipeline. Adjustment value must be over 2400 Hz (Threshold).
	Adjust 2000 Hz		
Submenu Totalizer	from table/numeric		The forward totalizer can be reset using ENTER. If the overflow counter >0, then the message reset Overflow >F is displayed. **Note:** If the totalizer function "Difference Totalizer" is selected, then the message reset Difference Totalizer is displayed.
	Totalizer → F reset		If the totalizer function “Preset Totalizer“ is selected, the message reset Difference Totalizer is displayed.
	Totalizer → F 250.0 m3		Preset the value of the totalizer, difference totalizer or preset totalizer 2nd display line = present value (e.g. after a converter replacement).
	Overflow → F 250		Overflow counter max. 250, 1 Overflow = pulse totalizer >9,999,999 units (display value is reset and the overflow counter incremented by 1). **Overflow Calculation Example** Overflow counter = 12 12 x 10,000,000 units = 120,000,000 units + 23,455 present totalizer value 120,023,455 units
	Totalizer ← R reset		See Forward Totalizer

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
	Totalizer ← R 625.000 m3		See Forward Totalizer
	Overflow ← R 004		See Forward Overflow Counter
	totalizer. function Standard		Standard: For the "Totalizer Function Standard" the totalizer pulses for the forward and reverse flows are integrated independently in two separate totalizers. If the forward flow direction only is selected, only the forward totalizer counts. The selection is made using the STEP and DATA keys and accepted using ENTER. Difference Totalizer: Only a single internal totalizer is used for integrating both flow directions. In the forward flow direction the totalizer adds the pulses while in the reverse flow direction the pulses are subtracted. The pulse output (active or passive) is not affected by this selection. Preset totalizer: Only a single internal totalizer is used for integrating both flow directions. In the forward flow direction the totals are increased and in the reverse flow direction they are decreased.
	Mains interrupt reset		Reset mains interrupt counter. Only available for Volume Flow Integrators (Certified Design). Reset using ENTER.
Submenu Display	from table		Process information: Various options can be selected for displaying the process information (independently for each display line): Q [%] Flowrate in % Q [Unit] Flowrate in direct reading engineering units Q [mA] Flowrate in mA Bargraph Flowrate as a bargraph Totalizer Totalized flow values for forward/reverse flow directions or only as a forward totalizer or a reverse totalizer or a difference totalizer (for totalizer function Diff. Tot.) Preset Totalizer Grand totalized flow value Qg and batch totalizer Q, TAG-No. Meter location identification number off no function Blank line only for 2nd display line
	1st Line Q[%]		
	2nd Line Totalizer		
	1st Line multiplex off		off/on

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
	2nd Line multiplex TAG Number		In the multiplex mode an additional value can be displayed in the 1st line. The display alternates every 10 s. For values which can be displayed see Display 1st Line above. See 1st Line Multiplex
Submenu Operating Mode	from table		
	Operating Mode Standard	Operating Mode Standard_	Operating Mode "Standard" should be selected for continuous flow metering.
		Operating Mode 2Range, ext._	The flow range is switched by closing a contact across input “X1” when “2 Flow ranges ext.” is selected. Flow ranges must be entered for Qmax 1 and Qmax 2. In the process display the active flow range is indicated by a "1" or "2" directly after the flow direction indicator. The limits for the MIN- and MAX-Alarms are always based on the active flow range.
		Operating Mode 2Range, auto_	For the automatic flow range change selection the output P1/P2 is used to signal the active flow range (open for flow range 1, closed for flow range 2). Flow ranges must be entered for Qmax 1 and Qmax 2. In the process display the active flow range is indicated by a "1" or "2" directly after the flow direction indicator. The limits for the MIN- and MAX-Alarms are always based on Qmax 1.  Example for Auto. Range Change Qmax 1 = 10 m/s; Qmax 2 = 3 m/s
		Operating Mode Fast	Operating Mode "Fast" is utilized for fast batch operations >3 s and for piston pump applications, when the converter operates at a higher excitation frequency. In this Operating Mode the accelerated measurement cycles improve the repeatability for short time flowrate measurements or for piston pump operation. See add. information on page 47.
		Operating Mode Preset totalizer	

Submenu / Parameter	Submenu / Parameter	Submenu / Parameter	Comments
		Operating Mode 2Range., F/R	In this Operating Mode the measurements are made similar to those in the Operating Mode “Fast“. The preset totalizer is started from the contact input X1. The batch totalizer is set to 0 and the contact output P1/P2 (end contact) is closed. When the preset value is reached the end contact is opened. Not available with HART-Protocol.
	Flow indication standard		In the Operating Mode "2 Flow Ranges Forward/ Reverse" different flow ranges can be set for the forward flow (Qmax F) and the reverse flow (Qmax R). The limits for the MIN- and MAX-Alarm are based on the active flow range. Not available with HART-Protocol.
	Direction Indic. normal		Flow direction selection: forward/reverse of forward only Standard/opposite reverses the flow direction (forward and reverse) indicators in the display.
Load data from external EEPROM			When a converter is replaced the meter location parameters can be uploaded into the new converter. The parameters do not have to be individually entered anew.
Store data in ext. EEPROM			After the start-up has been completed or a change has been made to the instrument settings the new parameter settings should be stored in the external EEPROM.
50XM2000 01/00 D699B123U01 A.31			Software Version The instrument identification is displayed in the first line together with the software revision date (01/00). In the second line the software identification (D699B123U01) and the software revision level (A.31) is displayed. Instruments with HART-Protocol 50XM2000 7/00 D699B138U01 X.33
TAG-Number			An alphanumeric TAG-Number can be entered with a max of 16 characters (upper case and lower case letters, numbers).
Code number			Only for ABB Service personnel.

5. Parameter Entry (additional Information)

5.1 User Programmable Units

With this function it is possible to program any desired units in the converter. The following three parameters are included in this function:

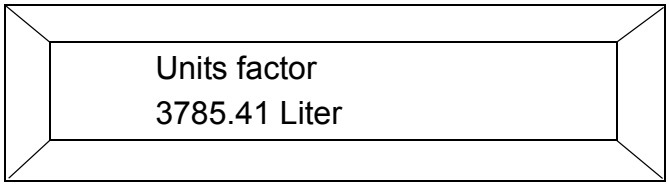
a) Units factor
b) Unit name
c) Programmable units with/without density

! Note:

- Entering data in the parameters a), b) and c) is only necessary if the desired direct reading engineering units are not listed in the Table integrated in the converter, see 4.4 Parameter Overview and Data Entry.

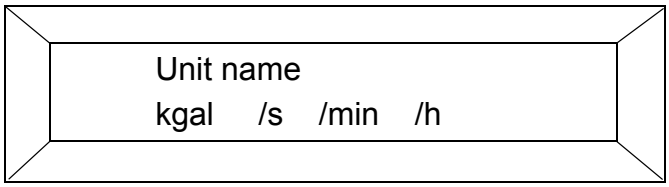
5.1.1 Units Factor Numeric Entry

The value in this parameter is equivalent to the number of liters in the new unit. Shown is kgal = 3785.41 Liter.



5.1.2 Unit Name Select from Table

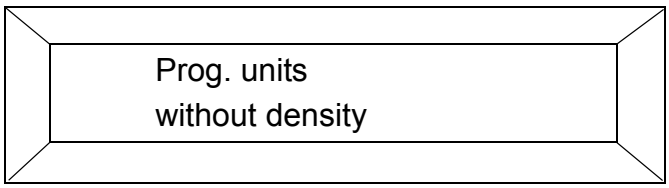
The selection is made with the STEP and DATA keys. Scroll forward through the alphabet with DATA. The lower case letters appear first followed by the upper case letters. Pressing the STEP key shifts the entry location. A maximum of four characters can be entered.



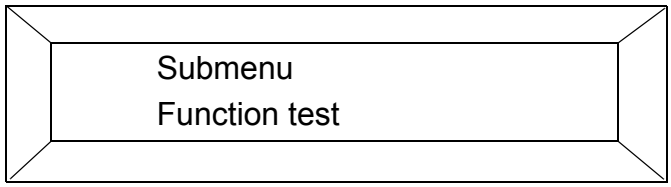
The time units /s, /min and /h can be assigned to the entered engineering unit.

5.1.3 Programmable Units Select from Table

This function is utilized to indicate whether the programmed units are mass units (with density) or volume units (without density). If “with Density” is selected (see 4.4 Parameter Overview and Data Entry).



5.2 Submenu Function Test Numeric Entries only for I_{out}



The Function Test offers 15 functions to test the instrument independent of the instantaneous flowrate.
In the Function Test mode the converter is no longer on-line (current and pulse outputs do **not** indicate the existing operating conditions). The individual test routines can be selected using the STEP and DATA keys.

I_{Out}, RAM (ASIC), NVRAM, EPROM (Program), EEPROM, external EEPROM, alarm contact, terminals P1/P7, switch S401 (not available for certified designs), data link, pulse output, display, terminal X1, Simulation and Test Mode.

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

Select **I_{out}** and press ENTER and enter the desired value in mA. Monitor the output value at terminals + and - with a digital multimeter (mA range) or with the process instrumentation.
Note: No automatic return to process metering. Terminate using C/CE key.

Select **RAM** (ASIC) and press ENTER. The converter automatically tests the RAM and displays its diagnosis.

Select **NVRAM** and press ENTER. The converter automatically tests the NVRAM and displays its diagnosis.

Select **EPROM** (Program) and press ENTER. The converter automatically tests the EPROM and displays its diagnosis.

Select **EEPROM** and press ENTER. The converter automatically tests the EEPROM and displays its diagnosis.

Select **Ext. EEPROM** and press ENTER. The converter automatically tests the ext. EEPROM and displays its diagnosis. This test is not available in the 50XM/CM1000 Mode.

Select **Alarm Contact** [1)] and press ENTER. The alarm contact can be toggled on and off using the STEP or DATA keys. Monitor terminals V5 and V6 with an ohmmeter (if a simulator is being used for the test; the operate LED on the simulator indicates on/off).

Select **Terminals P1/P2** [1)] and press ENTER. The contact can be toggled on and off using the STEP or DATA keys. Monitor terminals P1/P2 (if a simulator is being used for the test; the operate LED on the simulator indicates on/off).

Select **Switch S401** and press ENTER. The four positions of switch S401 can be individually activated (see Digital Signal Board page 42). The display indicates „on“ by a star „*“.

Note: No automatic return to process metering. Terminate using C/CE key.

Note:

- The Submenu „Function test“ is not available for the Certified Design!

  Only for converter MAG-XM.

Data Link Test
Before initiating the test connect the transmitter to the receiver at the connection terminals. The computer sends 1000 ASCII-Code 31 hex characters and monitors the received characters.On the left side of the display the number of characters sent is displayed. On the right side the number of characters received is displayed. After 1000 characters are transmitted the computer no longer monitors the received characters but continues to send the 31 Hex character until the C/CE key is pressed.

Select **Data Link** and press ENTER. The test runs automatically.
Note: No automatic return to process metering. Terminate using C/CE key.

Select **Pulse Output** and press ENTER. Use the STEP and DATA keys to output a test frequency (1 Hz, pulse width 500 ms) for forward or reverse flow and monitor at terminals V8,V9 (on the simulator, at sockets 9/11).
Note**:** No automatic return to process metering. Terminate using C/CE key.

Select **Display** and press ENTER. The converter writes the numbers 0 to 9 and the letters A to F in the 1st and 2nd lines of the display. Visually monitor for proper operation of the dot matrix.

Select **Terminal X1** and press ENTER. Connect terminals X1 and G2 together. The display indicates on/off.
Note: No automatic return to process metering. Terminate using C/CE key.

Select ****Simulation**** and press ENTER. Use the STEP or DATA key to turn simulation "on or off". When the simulation is turned on, press C/CE to return to process metering. Any desired flowrate value in steps of 1 % can be set using the STEP (+) and DATA (-) keys. The output values correspond to the values entered. The message **Simulation** is displayed in the 2nd line alternately with the totalizer value. After completion of the test program the parameter **Simulation** should be turned off.

Note: No automatic return to process metering. Terminate using C/CE key.

Test Mode If the converter is to be checked with a simulator, the parameter Test Mode must be turned on. The flowmeter primary span and zero values are set 100% and 0%. The system zero value is set to 0 Hz. After the test has been completed the parameter Test Mode should be turned off.

Note: No automatic return to process metering. Terminate using C/CE key.

6. Maintenance

6.1 General

Warning

The are electrostatic sensitive parts on the circuit boards (Observe ESD-Guidelines). Before touching the electronic components be sure that you are statically discharged.

6.2 Testing the Converter with the Flowmeter Primary Simulator 55XC4000

The test procedure is described in the Flowmeter Primary Simulator Instruction Bulletin. Part No. D184B049U01.

Warning

To test the converter the parameter “Test Mode“ must be turned on.

6.3 Error Messages and Checks

6.3.1 Error Messages During Data Entry

The following list of the error messages includes explanations for the Error Codes displayed.

Error Codes 0 to 9, A, B, C do not occur during data entry.

Error Code	Detected System Error	Corrective Measures
0	Pipeline not full.	Open shut off devices; fill pipeline; adjust Empty Pipe Detector
1	A/D-Converter	Reduce flowrate, throttle control devices.
2	Positive or negative reference too small.	Check connection board and converter;
3	Flowrate greater than 130 %.	Reduce flowrate, change flow range
4	External zero return contact activated.	Zero Return activated by pump or field contact.
5	RAM defective Function 1: Data in EEPROM corrupted Function 2: Data loaded in NVRAM	Start test program, reinitialize program if necessary; Request Customer Number from the Service department No corrective measures. Information: Incorrect data in NVRAM, the converter initiates an auto. reset and reloads the data from the EEPROM.
7	Positive reference too large	Check signal cable and magnetic field excitation, see Primary IB.
8	Negative reference too large	Check signal cable and magnetic field excitation, see Primary IB.
6	Error totalizer >F	Reset forward totalizer or preset new values in totalizer, see page 28.
	Error totalizer >R	Reset reverse totalizer or preset new values in totalizer, see page 28.
	Error totalizer	Forward, reverse or difference totalizer defective, Reset forward/reverse totalizer, see page 28.
9	Excitation frequency defective	For 50/60 Hz supply power, check line frequency or for AC/DC supply power, error in the digital-/signal board
A	MAX-Alarm limit value	Reduce flowrate
B	MIN-Alarm limit value	Increase flowrate
C	Primary data invalid (not available in 50XM/CM1000 Mode)	The data for the flowmeter primary in the external EEPROM is invalid Compare values in the Submenu “Primary“ with those on the Instrument Tag. If the values are identical the error message can be cleared by calling “Store data”. If they are not identical, the flowmeter primary data must be entered first and the procedure completed by calling ”Store primary”.
10	Entry >1.50 $Range_{max}$ >15 m/s	Reduce flow range Q_{max}
11	Entry < 0.05 $Range_{max}$ < 0.5 m/s	Increase flow range Q_{max}
13	$Range_{max} \leq 0$	Increase entry value
16	Entry > 10% low flow cut off	Decrease entry value
17	Entry < 0% low flow cut off	Increase entry value
20	Entry ≥ 100 s damping	Decrease entry value
21	Entry < 0.5/0.25 (0.125) s damping	Increase entry value (is a function of the excitation frequency) Values in brackets ( ) apply for 25 Hz excitation frequency.
22	Entry >99 Instrument address	Decrease entry value
38	Entry > 1000 pulses/unit	Decrease entry value
39	Entry < 0.001 pulses/unit	Increase entry value
40	Max. count frequency exceeded, scaled pulse output, value >5kHz	Reduce pulse factor
41	Below min. count frequency < 0.00016 Hz	Increase pulse factor
42	Entry > 2000 ms pulse width	Decrease entry value
43	Entry < 0.100 ms pulse width	Increase entry value
44	Entry > 5.0 g/cm^3 density	Decrease entry value
45	Entry < 0.01 g/cm^3 density	Increase entry value
46	Entry too large	Reduce pulse width entry value
54	Primary zero > ± 50 Hz	Check ground and electrode signals. Adjustment can only be made when the flowmeter is completely filled with fluid and the flowrate is absolutely zero.
56	Entry > 3000 threshold, detector empty pipe	Decrease entry value, check adjust Detector empty pipe.
58	Entry > ± 10.0% calibration correction factor	Reduce correction factor

Continued on the next page

Error Code	Detected System Error	Corrective Measured
74/76	Entry > 130% MAX- or MIN-Alarm	Decrease entry value
80	I > Pulse width recalculated	Check pulse width, pulse factor.
91	Data in EEPROM invalid	Data in internal EEPROM invalid, for corrective measures see Error Code 5.
92	Data in ext. EEPROM invalid	Data (e.g. Qmax, damping) in the ext. EEPROM invalid. Access possible. Occurs when function “Store data in ext. EEPROM“ was not called. To clear the error message, call the function “Store data in ext. EEPROM“.
93	Ext. EEPROM defective or not installed	Access not possible, EEPROM defective. If the EEPROM is not installed then the ext. EEPROM assigned to the flowmeter primary must be installed.
94	Ext. EEPROM version incorrect	The data base is not correct for the software version. Call the function “Load data from ext. EEPROM“ to automatically update the external data. The function “Store data in ext. EEPROM” clears the error message.
95	External primary data invalid	See Error Code C.
96	EEPROM version incorrect	Data base in the EEPROM has a different version than the installed software. Calling the function “Update“ clears the error message.
97	Primary data invalid	The flowmeter primary data in the internal EEPROM are invalid. Use the function “Load Primary“ to clear the error. (See Error Code C).
98	EEPROM defective or not installed	Access not possible, EEPROM defective. If the EEPROM is not installed then the ext. EEPROM assigned to the flowmeter primary must be installed.
99	Entry too large	Decrease entry value
99	Entry too small	Increase entry value

6.3.2 Checking the Measurement System

Warning

When the housing cover is removed and
the power is turned on the
contact protection and EMC protection is voided!

A check of the measurement system is made after the flowmeter primary and the converter have been installed.

Does the supply power agree with the values listed on the converter Instrument Tag?	no	Install required solder jumpers for the supply power specified on the Instrument Tag. See Fig. 11.
yes		
Is the meter installed in a proper location? (Primary: Protection Class, temperature, vibration):	no	Check allowable installation conditions, temperature, Protection Class, vibration, interconnections per ID.
yes		
Are the ground connections to the flowmeter primary made correctly?	no	See Instruction Flowmeter Primary Bulletin .
yes		
Is the supply power at the terminals within the limits for the specified nominal voltage >	no	Provide correct supply power.
yes		
Is the flowmeter primary filled with fluid?	no	Fill pipeline.
yes		
Is the correct flow range set? Units Qmax and totalizer units selected?	no	Set flow range and select units, also see Data Entry Converter.
yes		
Under flow do the direction indicators in the display (→ F for forward, ← R for reverse) agree with the actual flow direction and is the flowrate displayed, percent or direct reading engineering units? Does the output signal agree with the flowrate displayed?	no	Fuse defective, conductivity < 5 μS/cm Defective flowmeter primary or converter. Check per 6.3.3 or 6.3.4 or Flowmeter Primary Instruction Bulletin.
yes		
Measurement system operational.		

Term.	Supply Power	Limits
L N	230, 115, 110 V AC	-15% + 10%
1L1 1L2	24/48 V AC	-15% + 10%
L+ L-	24/48 V AC	-25% + 30%

6.3.3 Checking the Converter

The check procedure for the flowmeter primary may be found in the Checking the Measurement System description in 6.3.2.

Warning

When the housing cover is removed and the power is turned on the contact protection and EMC protection is voided!

Note:

- In order to test the span and zero of the converter with the simulator the parameter “Test Mode“ in the Submenu “Function Test“ must be turned on.

Does the converter conform to the specifications? (Supply power, current output, serial data link). Flowmeter primary and converter are identified by A1 and B1 or X001 and Y001. Is the coordination correct?	no	Exchange instrument. Make sure that the coordination of the external EEPROM is correct.
yes		yes
Plug convertor into Flowmeter Primary Simulator Turn power on, does the “Phase” lamp light?	no	Reverse supply power plug to the simulator. (Not required for low voltage supply power 24 V AC/DC).
yes		yes
Do the green “operate” LEDs blink at a frequency of 6 1/4 (7 1/2), 12.5 (15) or 25 Hz?	no	Possible error sources: Defective fuse. Driver circuit defect. If an error message is displayed, see the Error Table (6.3.1)
yes		yes
Set the flip switches to “Operate” and select the desired flow direction using the appropriate switch. Set the digital flow switches to 0 m/s. Is the indication in the display < 0.04% of max. flow range? Is the current output for 0/4 to 20 mA, < 0.01 mA or 4 mA?	no	For indications > 0.04% check data entries.
yes		yes
Set converter for RangeMax and Flowmeter Primary Simulator to 99.9%? Is the current output value 20 mA?	no	Possible error sources: a) Indication difference: check flow range, converter and simulator. b) Current output: check span and zero. (Pulse output and current output can be checked using the Function Test parameter from 0 to 100% and the instrumentation connected to the outputs.).
yes		
Converter is operational.		

Note

- Turn off parameter Test Mode.

6.4 Maintenance

The converter is maintenance free.

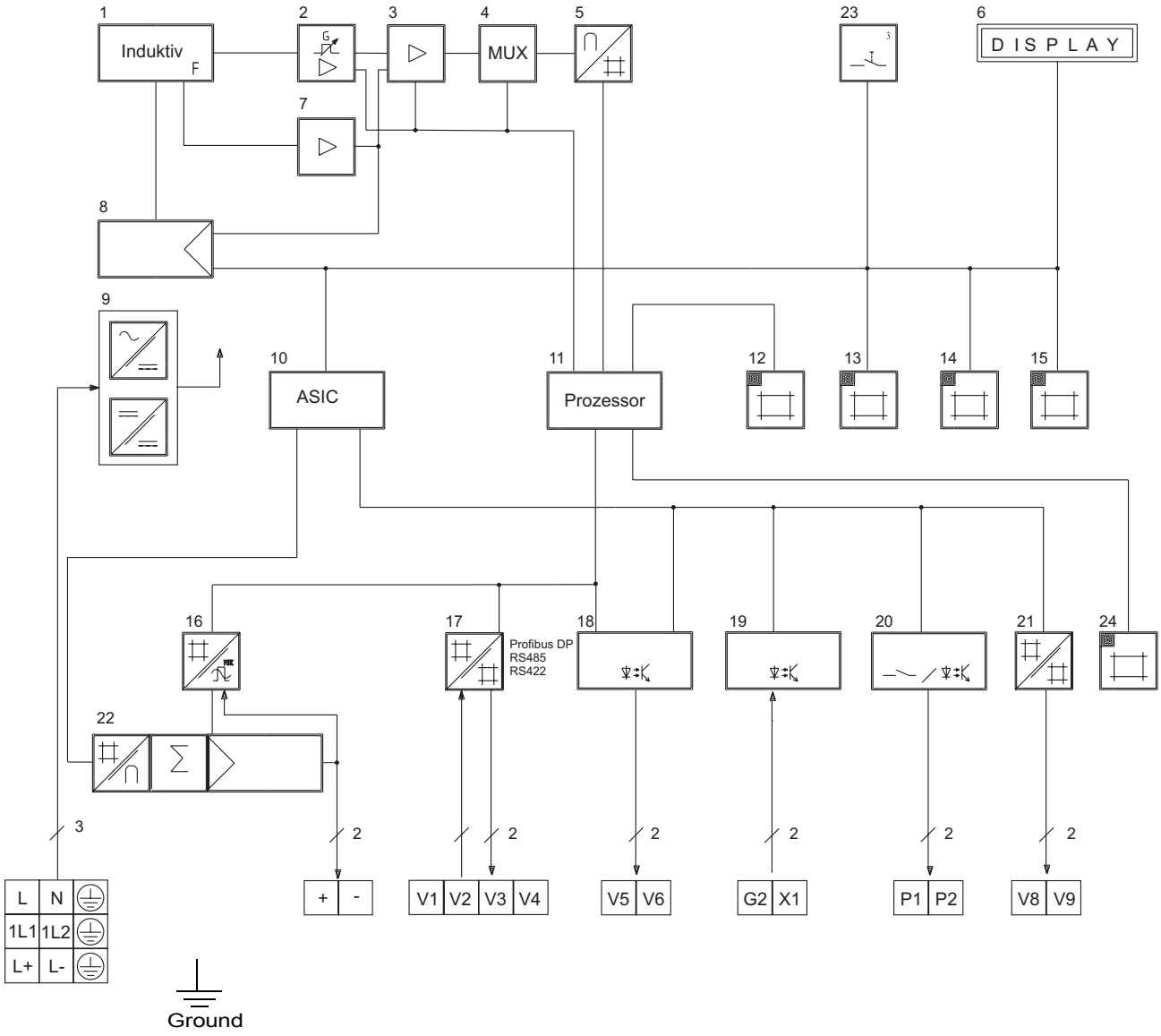
Note:

- Please observe the “Introductory Safety Notes for the EMF System” if a converter must be returned to the factory for repairs.

Service Note:

- For replacement or repair, only original replacement parts should be used.

6.5 Block Diagram



1	Flowmeter primary	14	Memory - totalizer values
2	Input signal amplifier and empty pipe circuit	15	Program memory
3	Signal conditioning	16	HART® Interface
4	Signal multiplexer	17	Data link RS232 / RS485 / RS422
5	Analog / Digital converter	18	Alarm output
6	2x16 character display	19	Contact input
7	Reference amplifier	20	Contact output
8	Driver / current controller	21	Scaled pulse output
9	Power supply AC/DC or DC/DC	22	Current output
10	Digital ASIC	23	Operator keys
11	Processor	24	Ext. EEPROM
12	Memory - customer parameters		
13	Parameter memory		

Fig. 9 Block Diagram

6.6 Circuit Boards

6.6.1 Connection Circuit Board, Field Mount Hsg.

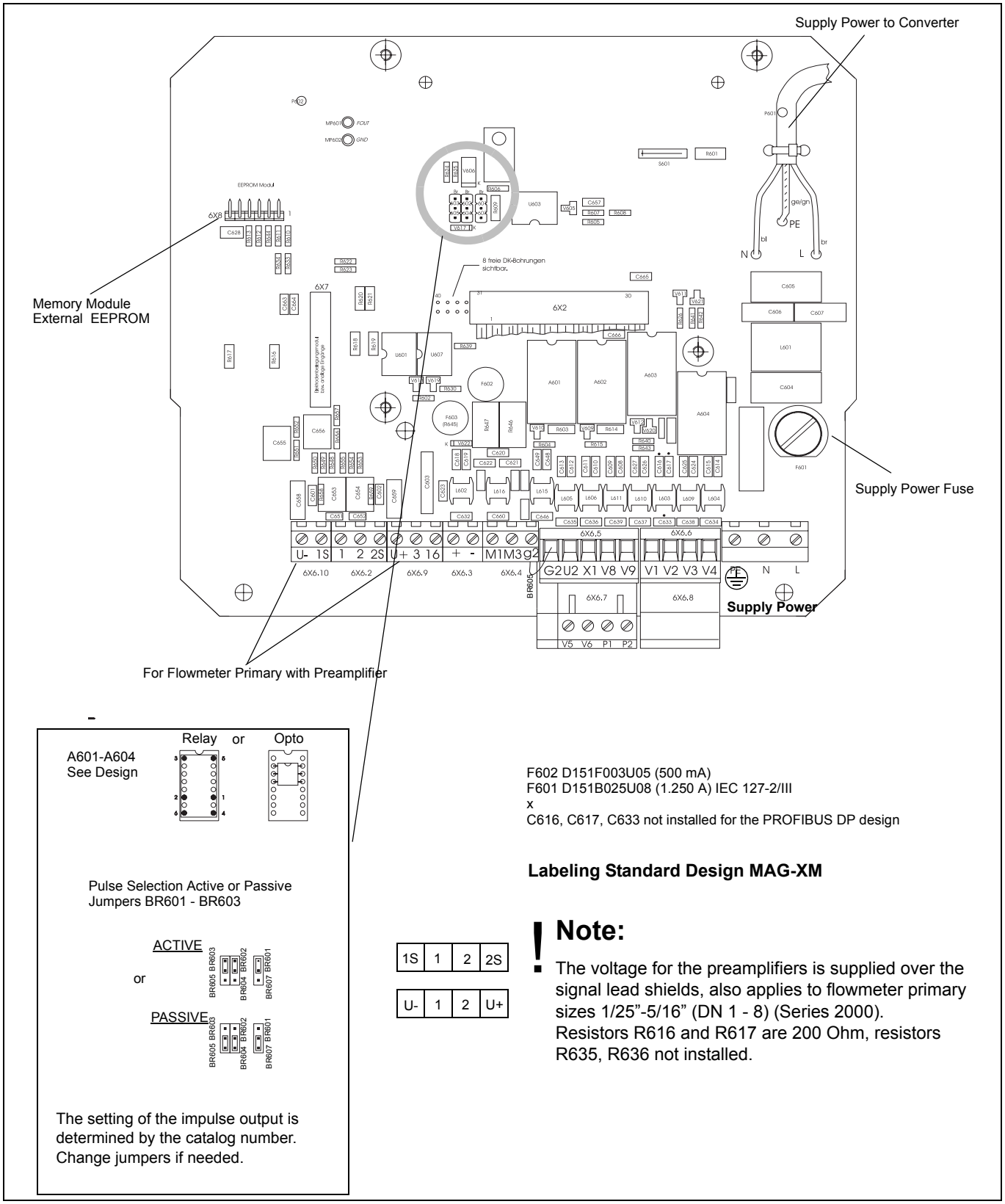
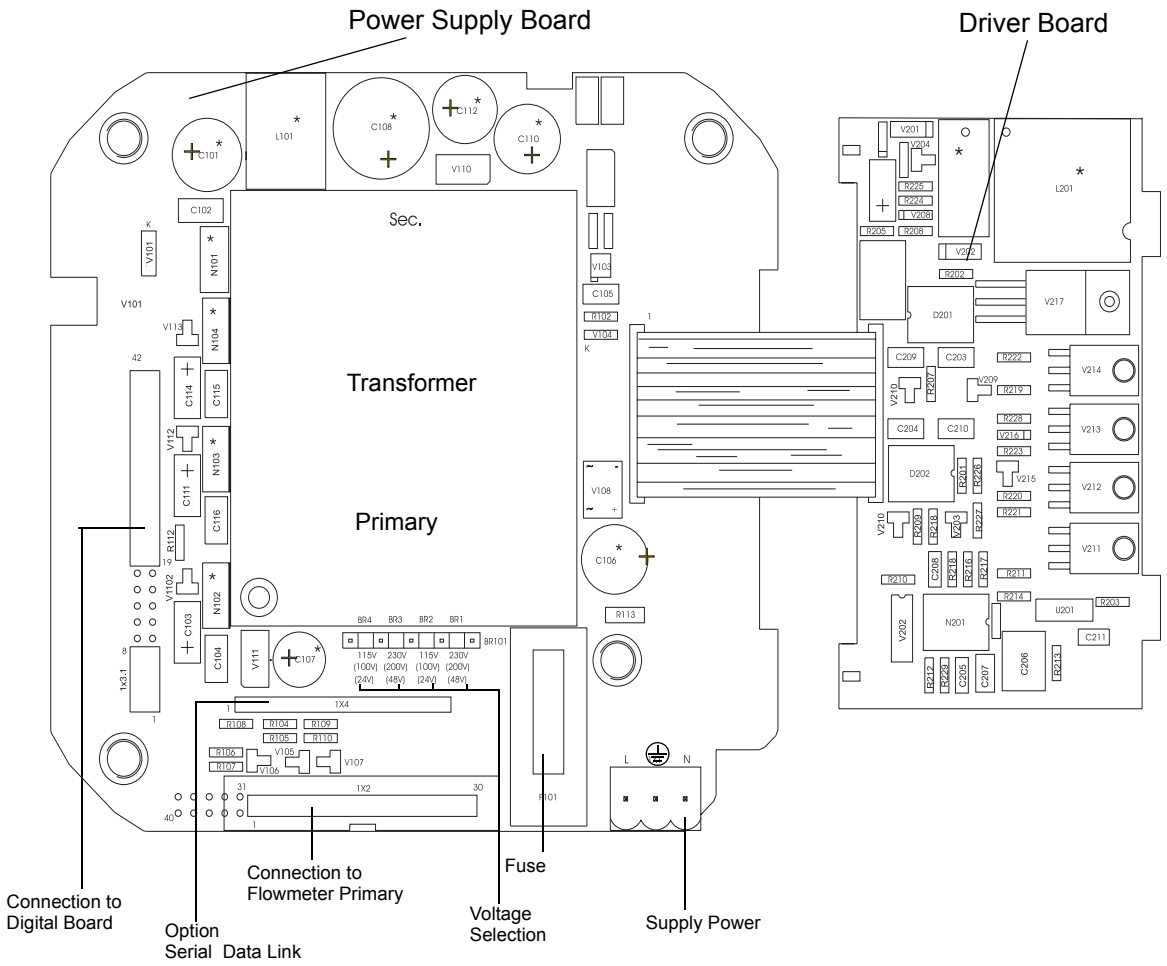


Fig. 10 Connection Circuit Board, Field Mount Housing

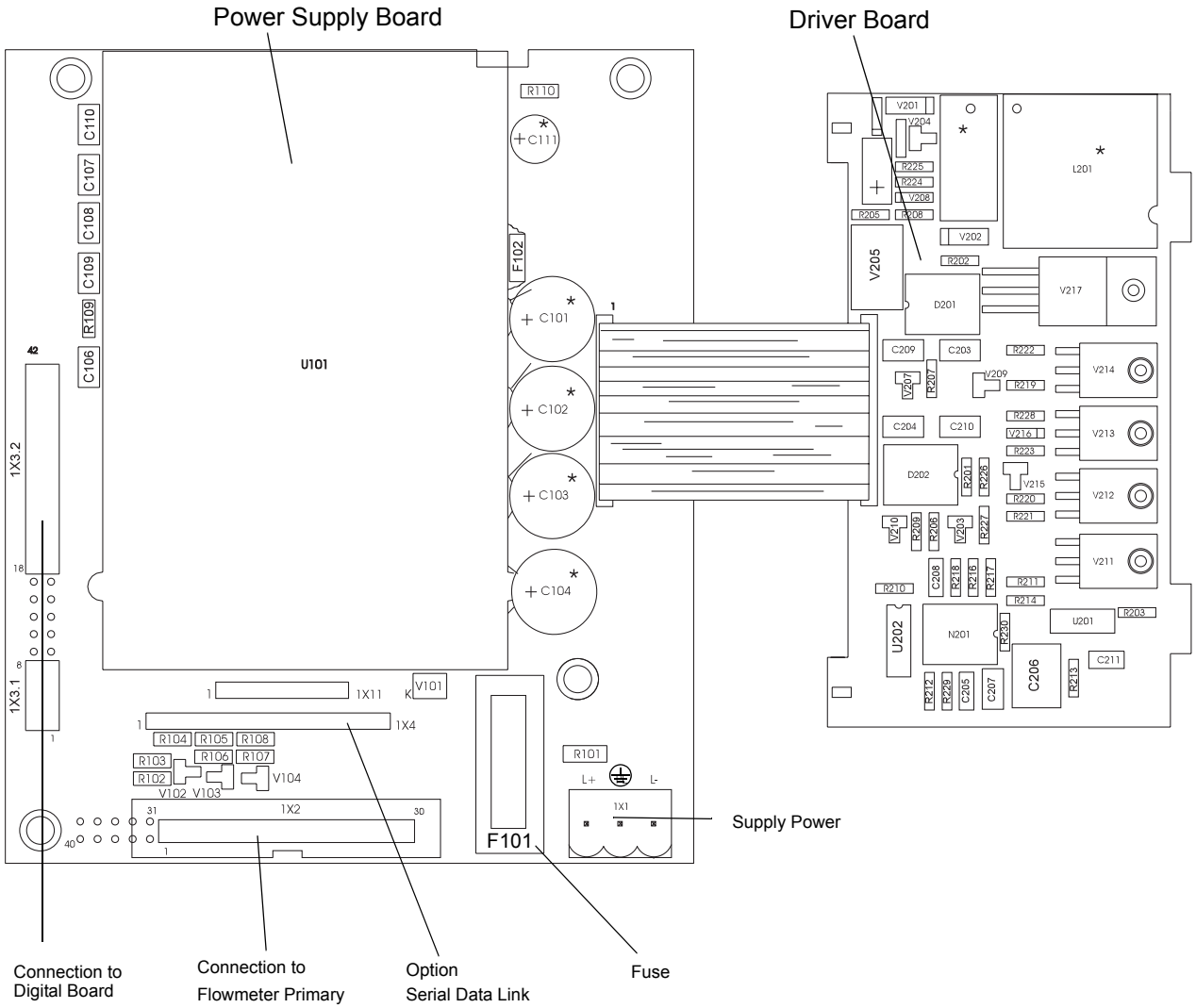
6.6.2 Assembled Power Supply/Driver Board AC Field Mount Housing



AC	BR 101				Transformer	F101	Fuse
	Br. 1	Br. 2	Br. 3	Br. 4	T101		ABB Part Number
230 V	X		X		D692B071U01	0.160 A	D151B025U02
115 V		X		X		0.315 A	D151B025U04
48 V	X		X		D692B071U02	0.630 A	D151B025U06
24 V		X		X		1.250 A	D151B025U08

Fig. 11 Assembled Power Supply/Driver Board AC Field Mount Housing

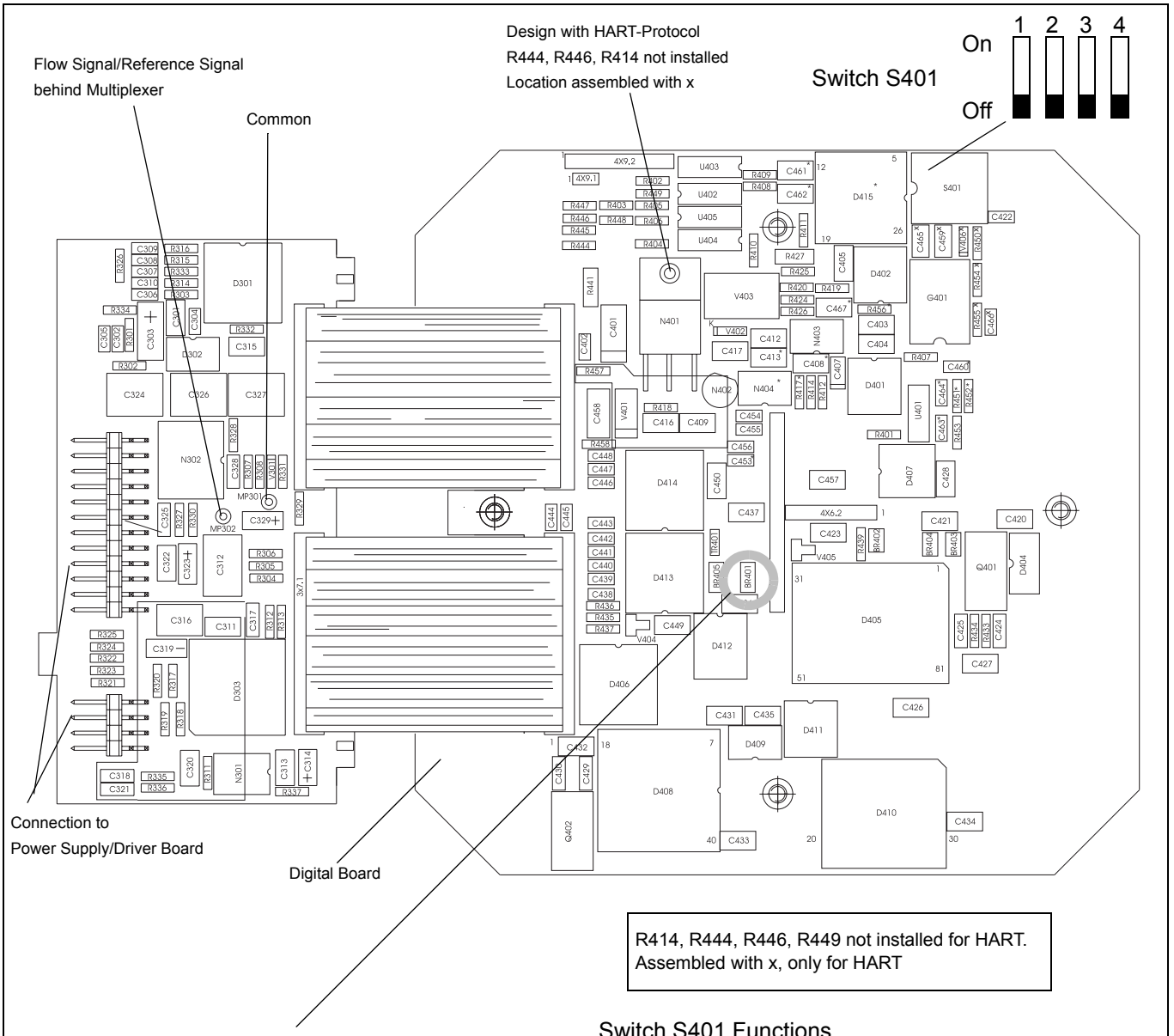
6.6.3 Assembled Power Supply/Driver Board Field Mount Housing



DC	F101	Fuse ABB Part Number
24 V	1.250 A	D151B025U08

Fig. 12 Power Supply/Driver Board DC Field Mount Housing

6.6.4 Assembled Digital-/Signal Board



Output for Pulses	BR 401	TR 401	BR 405
Standard over pulse output	open	closed	open
Over alarm contact (with Serial Data Link)	closed	open	open
Frequency for testing MP 601, MB 602 Connection Board	open	closed	open
Frequency over Alarm Output	open	open	closed

Switch S401 Functions

Switch	On	Off
1	-	-
2	50XM/CM1000 Mode	Standard 50XM/CM2000 Mode
3	-	-
4	Program protection (Certified) active	No Certified protection

Fig. 13 Assembled Digital-/Signal Board

6.6.5 Assembled Modules for Options

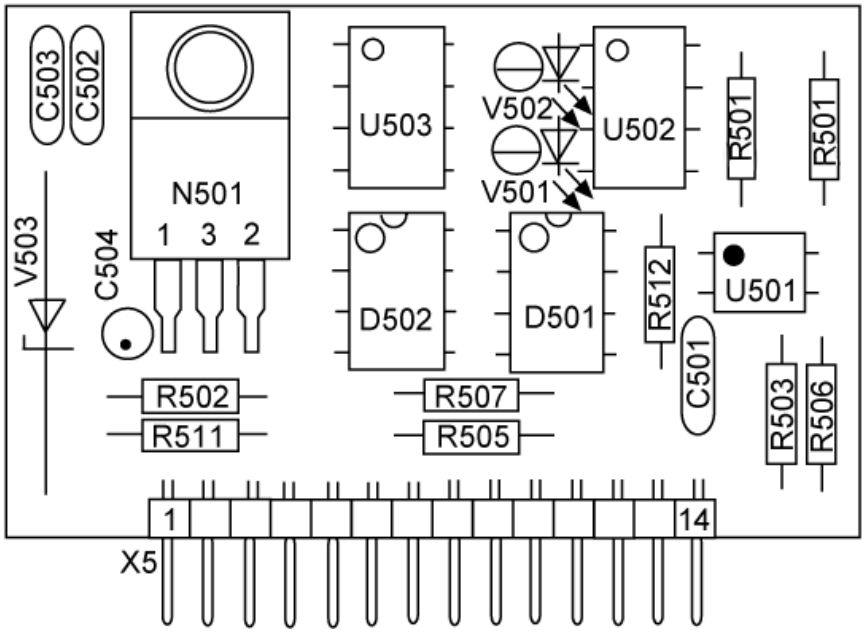


Fig. 14 Serial Data Link RS 485 (RS 422)

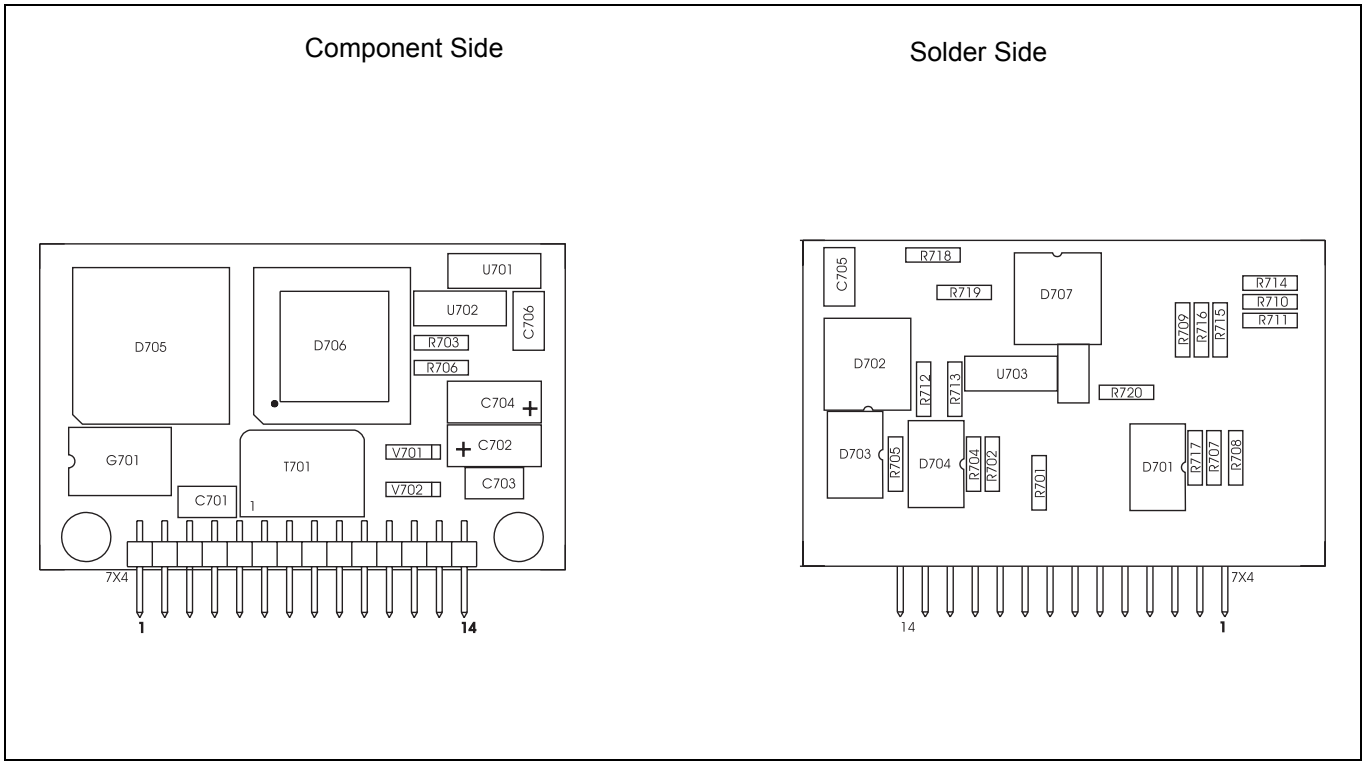


Fig. 15 PROFIBUS DP

6.6.6 Field Mount Housing Replaceable Parts List

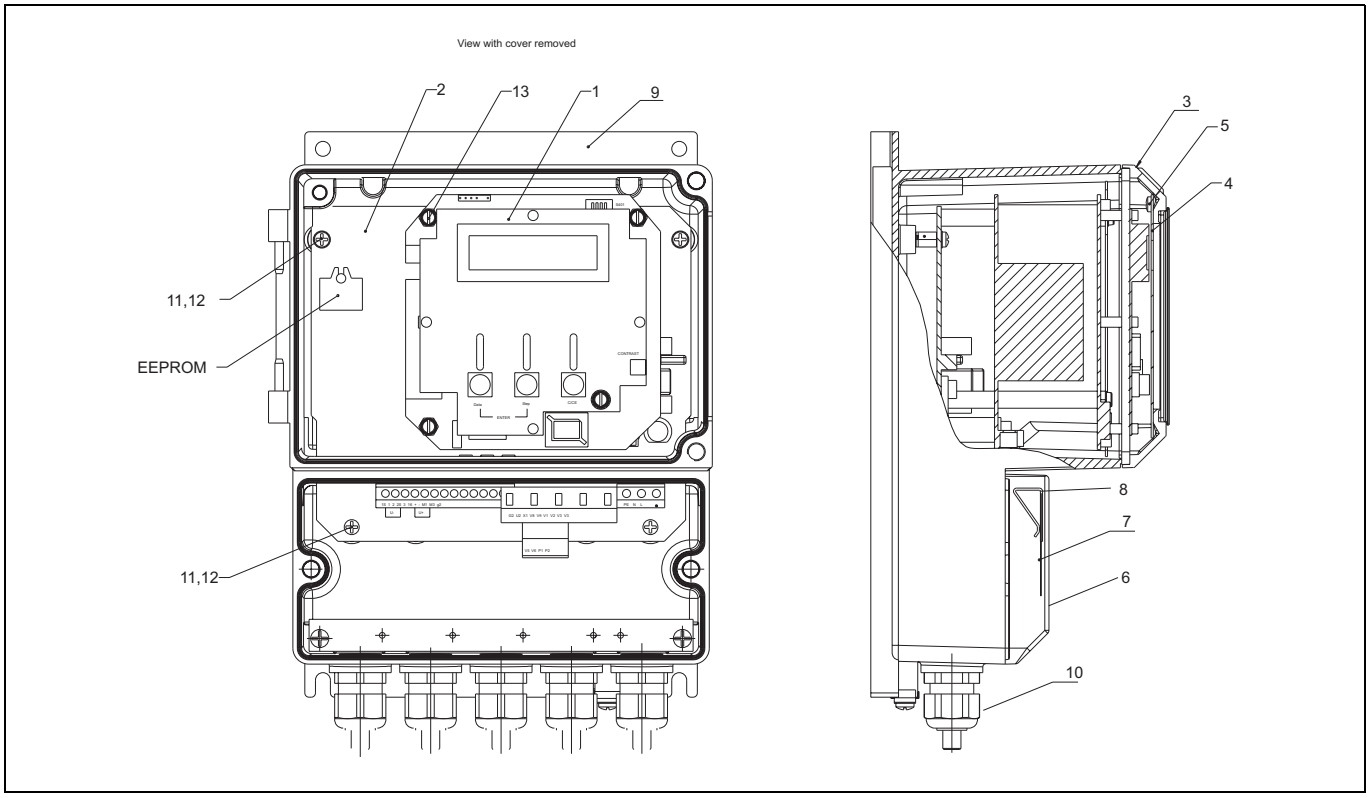


Fig. 16

No.	Description	Catalog No.
1	Converter plugin-unit	on request
2	Connection board Standard Connection board with relais Connection board with optocoupler	D685A769U02 D685A769U03 D685A769U04
3	Cover large, complete	D641A030U01
4	PVC protection cover	D626A006U01
5	Mach. screw, Phillps, phillister head M3 x 5, DIN 7985 Niro	D004F105AU20
6	Cover, small	D641A029U01
7	Interconnection diagram	D338D154U01
8	Flat cable clamp	D174D002U03
9	Field Mount Housing empty	D641A033U01
10	Cable connector M20 x 1.5	D150A008U15
11	Mach. screw, Phillps, phillister head M4 x 10, steel galv.	D004G108AU01
12	Spring washer A 4.0 DIN 137 SS	D085D020AU20
13	Mach. screw, Phillps, phillister head M4 x 60, DIN 7985 SST	D004G124AU01
14	Serial data link RS485 (RS422)	D685A299U01
15	Datalink PROFIBUS DP	D685A835U03
Accessories	Mounting hardware Magnet Stick operation, common parts Fuses and small items 110...230 V AC 24/48 V AC/DC	D614L306U01 D614L537U01 D614L281U06 D614L281U07

7. Additional Information

7.1 PROFIBUS DP

A converter option is available which includes communication utilizing the PROFIBUS DP Protocol. The digital communication uses the RS 485 Data Link.

Transmission technology	RS 485 Data Link
Communication speed	9.6 to 1500 KBit/s
Protocol	per EN 50170
Ident-No.	6666 HEX

Cyclic (For output variables see separate Data Link Description for COPA/MAG-XM, Part No. D184B093U05)

Cable

Terminal	Function	Reference
+VD	VP	Supply voltage +5V
A	RxD/TxD-N	Receive/Send-Data-N
B	RxD/TxD-P	Receive/Send-Data-P
GND	C DGND	Data reference potential M5V

A twisted shielded data cable is recommended.
Max. cable length 1200 m (Cable Type A)
Characteristic impedance 135-165Ω
Max. 32 instruments on a single bus
Baudrate: 9.6-1500 kbit/s
Distributed capacitance <30 pF/m, loop resistance 110 Ω/km
Tap line max. length 1 m.
Incoming and outgoing signals on the same terminal.

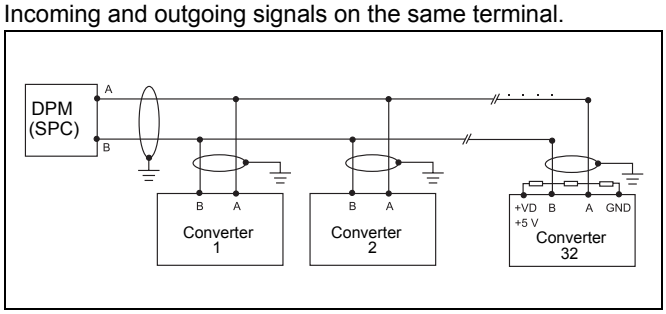


Fig. 17 Communication PROFIBUS DP

Bus Terminations for PROFIBUS DP
Both ends of the bus cable must be provided with a bus terminator (Fig. 18). In addition to the bus terminator resistor R2 specified in the EIA-RS-485 Standard an additional resistor R1 (Pull-down) must be connected to the data reference potential GND and a resistor R3 (Pull-up) connected to VP (plus supply voltage). These two resistors are used to define a specific idle potential on the bus when no participant is transmitting (idle time between telegrams, the so called idle-status). For values see DIN 19245 Part 1 and Part 3.

Cable Type A: R1 = 390 Ω, R2 = 220 Ω , R3 = 390 Ω.

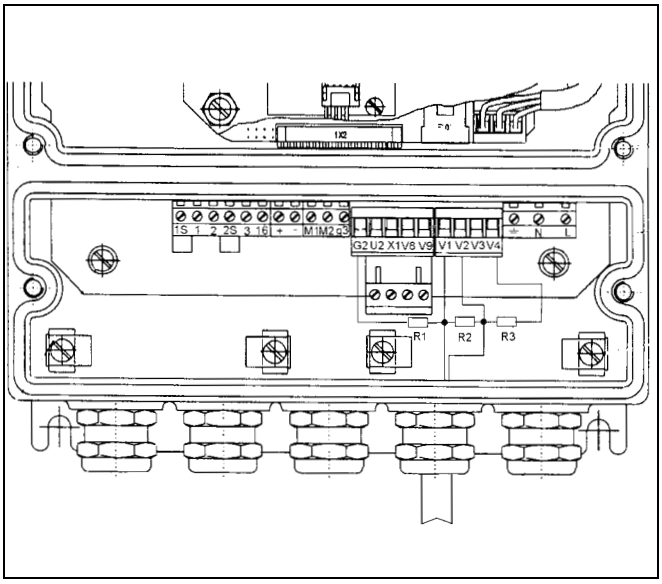
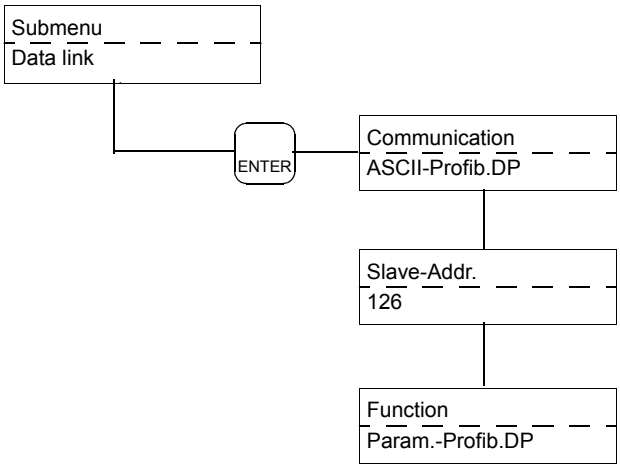


Fig. 18 Bus Termination for PROFIBUS DP, when the Instrument is Connected at the End of the Bus

GSD File (Instrument Data Base)- File Name FP6666, GSD, Included with Shipment



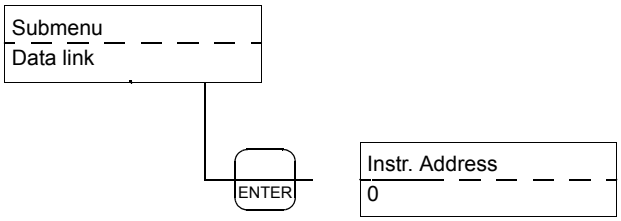
The communication mode PROFIBUS DP is selected in the Submenu Data Link.

The Slave-Address must always have 3 digits, Address-Range 000, 001 to 126.
If a one or two digit bus address is entered, an incorrect interpretation of the bus address will be made by the converter.

This function can be used to access the parameters in the PROFIBUS DP-Module. See also Point 13 „Data Link Functions" Part No.D184B093U05.

7.2 Additional Information for Connecting to the HART-Protocol®

The converter Instrument Tag includes the term HART-Protocol. The appropriate software can be recognized by the label attached to the EPROM with the identification, e.g. D699B138U01 X.33, abbreviated as B138U01 X.33. There are a number of parameter functions pre-installed in this software. The current output is set to 4-20 mA, the min. load is 250 Ohm. Not all standard settings are available in HART. Please observe the note in Section 4.2 Parameter Overview and Data Entry.



The instrument address can be set between 0 and 15.
If the Address is set to 0, then the current output value for the flowrate is changed to the range from 4.00 to 20.00 mA. If additional instruments are connected to the bus and an Address 1-15 is set, then the converter operates in the Multidrop-Mode. The current output is then set to a fixed 4.00 mA value. The evaluation of the measurement values is only possible over the HART-Communication.

7.3 Additional Information for the Pulse Output

The scaled pulse output function can be changed from active to passive at any time by changing the jumpers on the calibration board (see Fig. 13). The pulse output for both flow directions uses a single channel. An option is available for a 2-channel pulse output, one each for forward and for reverse flow. When configuring the parameter the following parameter settings must be observed.

Pulse
1.0000 / m^3

Pulse Factor
The pulse factor is the number of output pulses for one measured flowrate unit. When the pulse factor is changed, the totalizer value in the selected units remains unchanged. The pulse factor can be selected in the range from 0.001 to 1000 pulses/unit.
The selected pulse factor is checked by the converter as a function of the flow range, the pulse width, the volume (e.g. ml, l, m3) or mass (e.g. g, kg, t) units. If any one of these parameters is changed the pulse width cannot exceed 50% of the period of the output frequency at 100% flowrate (on/off ratio 1:1). If the pulse width exceeds this limit it is automatically reduced to 50% of the period and the message **Warning! New pulse width** is displayed.

Pulse width
230 ms

Pulse Width
The pulse width (length of the pulses) for the selected pulse output can be set between 0.1 and 2000ms. The pulse width must be sufficiently short so that at a maximum output frequency (flowrate max. 100% = 5 kHz) there is no overlapping of the pulses. On the other hand, the pulse width must be long enough to assure that it can be measured by the connected instrumentation (SPC).

Totalizer units
m^3

Example:
Flow range = 100 l/min (Qmax = 100 % flow range end value)
Totalizer = 1 pulse/l

$$f = \frac{100\,\text{pulses/min}}{60\,s} = 1.666\ \text{Hz}$$

To allow for a 30% over range

$$f = 1.666\ \text{Hz} \times 1.3 = 2.166\ \text{Hz (1/s)}$$

On/off ratio of 1:1 (pulse width = pause width)

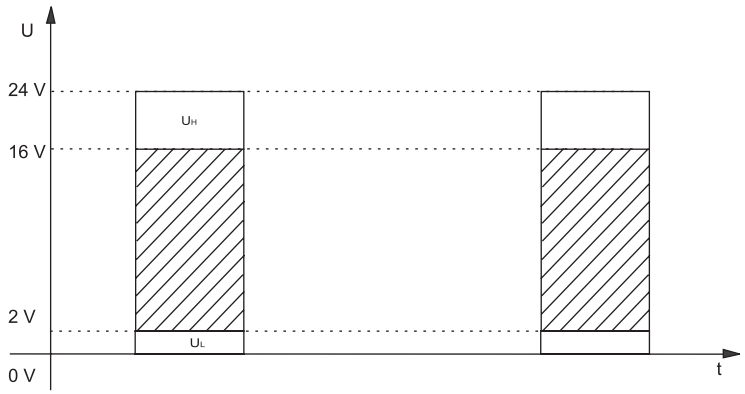
$$t_p = \frac{1}{2{,}166\,s^{-1}} \times 0.5 = 230\ \text{ms}$$

Any value < 230 ms can be set. Counters usually require a pulse width ≥ 30 ms.
The converter automatically checks the pulse width setting. Its maximum value may be 80 % of the output frequency at 130 % flowrate. If this limit is exceeded, the new value will not be accepted and the message entry too large will be displayed.

Observe current and frequency values.

When connecting an active or passive counter the max. allowable current and frequency values must be considered.

Example:
When a passive 24 V counter is connected:
The max. allowable output frequency is 5 kHz



Voltage

$0\ V \leq U_L \leq 2\ V$; $16V \leq U_H \leq 24\ V$

Current

$20\ mA \leq I \leq 220\ mA$

7.4 Additional Information for Piston Pump/Pulsating Flows

Submenu
Primary

Span CS 25 Hz
-79.8 %

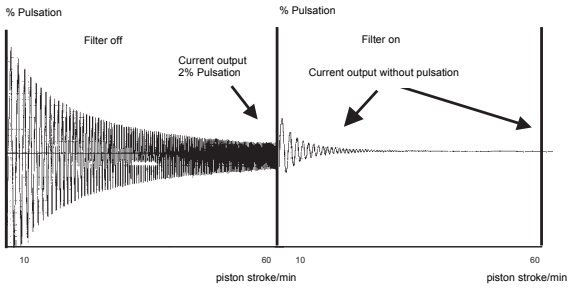
Damping
5.0000 s

Filter
on

Operating mode
Fast

The primary application for the pulsed DC field is the metering of continuous flows. When pulsation dampers are used for pulsating flow conditions it is also possible to take advantage of the pulse DC field technology. If the use of pulsation dampers is undesirable or impossible, then instruments with higher magnetic field excitation frequencies must be employed. For metering the flow after single stage piston, hose and membrane pumps the converter must be able to correctly process the peak flowrates. These peaks seldom reach more than three times the average flowrate. As long as the converter can linearly process these flowrate peaks and sufficient samples are measured, the accuracy for longer totalizer periods of the measurement system is unaffected.
Exact knowledge of the type and operating characteristics of the pump must be available. Then, based on established criteria, a decision can be made if the application can utilize a pulsed DC system or if a AC system is required. The pulsed DC system can accurately measure constantly rising piston pump flows with a max. cycle frequency of 120 strokes/minute. The magnetic field excitation must be 25 Hz, the filter must be turned on and a damping value >2.4s should be set. In the Submenu Operating Mode the parameter “Fast” should be selected.
A digital filter is incorporated in the converter especially for pulsating flows or noisy signals. It smooths the instantaneous display indications and a noisy output current. The damping value can be reduced when the filter is turned on. The response time of the converter is not affected.
There is no relationship between the HART-Protocol and the filter and the damping.

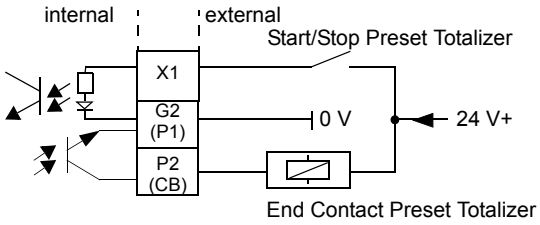
! Warning ! Not all flowmeter primaries can be operated at an excitation frequency of 25 Hz. Please contact ABB .



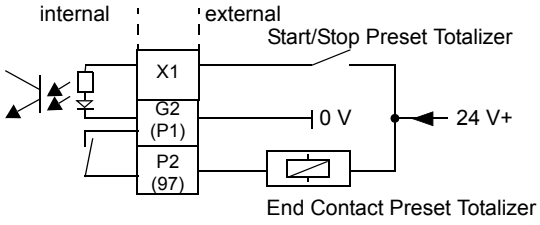
7.5 Additional Information for the Preset Totalizer

Submenu Operating mode	A batch with a specific quantity can be configured in the software. The minimum batch time, which is a function of the excitation frequency, is 3 min. (for 12.5 or 25 Hz excitation frequencies). The preset totalizer can be started from the keypad or from an external contact (Terminal G2/X1). At the start, the contact (Terminal P1/P2) is closed. When the preset quantity is reached (batch quantity) the contact is opened.
Operating mode Preset totalizer	Turn off the program protection and in the Submenu Operating Mode select the function „Preset Totalizer". Accept the selection and exit the Submenu and enter the desired batch quantity in the parameter „Preset Totalizer".
Submenu Units	To select the units for the preset totalizer; scroll to the Submenu Units and select the desired totalizer units.
Units totalizer l (Liter)	The pulse factor/selected units affect the batch accuracy. Calculation of the total pulses for a batch: Pulse total = pulse factor / units setting x batch quantity Example: 10 [pulses/l] x 300 [l] = 3000 [pulses]
Pulse 10.000 /l	
Preset totalizer 300 l (Liter)	The desired preset quantity for the batch can be set in the parameter „Preset Totalizer".
Preset totalizer Start	The Preset Totalizer can be started from the keypad or from an external contact (Terminals G2/X1). A DC voltage source must be connected to the optocoupler input G2/X1 for an external start (see Preset Totalizer Connections, Page 48). At the start the batch the contact (Terminals P1/P2) must be closed. When the preset batch quantity is reached the contact opens. **! Note !** The time interval during which the contact input Start/Stop contact should be closed is > 350 ms, but may not exceed 1.5 s.
Submenu Prog. in/output	Before the batch system can be used, the appropriate function selections for the contact input and the contact output in the Submenu Prog. must be made.
Terminals P1/P2 End contact	
Terminal X1 Start/stop	
–> F 42.00 l/h Qg E 5890 l	Qg is the grand totalizer value, the sum of the individual batch quantities. “E” indicates if a batch cycle has been started and is presently active. When the batch cycle has been completed, the “E” disappears from the display.
–> F 42.00 l/h Q E 250 l	Q indicates the actual totalizer value for the batch. This totalizer integrates the flow during the batch cycle. This counter is reset to zero at the start of each batch cycle.

Contact In-/Output Optocoupler



Contact Input Optocoupler
Contact Output Relay



7.6 Additional Information for External Zero Return

Submenu
Prog. in/output

Terminal X1
Ext. zero return

Passive over a contact input (normally open). When actuated the instantaneous flowrate display is set to "zero", the output signals are turned off and the totalization interrupted. The messages “Error Code 4” and “External zero return” are alternately displayed.
Can be used, for example, when the fluid level in the pipe line is undefined after a pump is shut off or for repetitive cleaning procedures (CIP cleaning) during which measurements are not to be made.
Terminals G2/X1.

Safety Information

! Note

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

The converter and the flowmeter primary are to be grounded in accordance with the applicable International Standards.

The line supply cables must be sized for the current in the flowmeter primary. The cable must correspond to IEC227 or IEC245.

A switch or circuit breaker should be installed in the supply power line to the converter which should be located near the converter and be appropriately identified.

8. Parameter Setting Overview and Flowmeter Design Options

Meter Location:		TAG-No.:	
Primary Type:		Converter Type	
Order No.:	Instrument No.:	Order No.:	Instrument No.:
Fluid Temp.:		Voltage Supply:	
Liner:	Electrodes:	Excitation Frequency:	Hz
C_{Zero}:	C_{Span}:	System Zero:	

Parameter		Setting Range
Prog. Protection Code		0–255 (0 = factory setting)
Language		German, English, French, Finnish, Spanish, Italian, Dutch, Danish, Swedish
Meter Size:		1/25" – 94" (DN 1 – 2400)
Q_{max}:		0.05 $Range_{max}$ to 1.5 $Range_{max}$
Pulse Factor:		0.01 to 1000 pulses/Eng'g unit
Pulse Width:		0.100 – 2000 ms
Low Flow Cutoff:		0 – 10 % of flow range end value
Damping:		0.125 – 99.99 seconds
Filter:		ON/OFF
Density:		0.01 g/cm^3 – 5.0 g/cm^3
Units Q_{max}:		l/s, l/min, l/h, hl/s, hl/min, hl/h, m^3/s, m^3/min, m^3/h, igps, igpm ,igph, mdg, gpm, gph, bbl/s, bbl/min, bbl/h, bls/day, bls/min, bls/h, kg/s, kg/min, kg/h, t/s, t/min, t/h, g/s, g/min, g/h, ml/s, ml/min, ml/h, Ml/min, Ml/h, Ml/day, lb/s, lb/min, lb/h, uton/min, uton/h, uton/day, kgal/s, kgal/min, kgal/h
Units Totalizer:		l, hl, m^3, igal, gal, mgal, bbl, bls, kg, t, g, ml, Ml, lb, uton, kgal
Max. Alarm		%
Min. Alarm		%
Terminals P1/P2:		Max. Alarm, Min Alarm, Max./Min. Alarm, General Alarm, Empty Pipe, F/R-Signal, No Function, End Contact, FR 1/2
Terminals X1/G2:		External Zero Return, Totalizer Reset, No Function, Start/Stop, FR 1/2
Current Output:		0/4–20 mA, 0/2–10 mA, 0–5 mA, 0–10–20 mA, 4–12–20 mA
I_{out} at Alarm:		0 %, 130 %, 3.6 mA
Detector e. Pipe:		ON/OFF
Alarm e. Pipe:		ON/OFF
I_{out} at e. Pipe:		0 %, 130 %, 3.6 mA
Threshold:		2400 Hz
Adjust e. Pipe:		Software potentiometer value
Totalizer Function		Standard, Difference Totalizer
1st Display Line:		Q (%), Q (Units), Q (mA), Totalizer F/R, Difference Totalizer, Grand Totalizer Qg, Batch Totalizer Q, TAG-Number, Bargraph
2nd Display Line:		Q (%), Q (Units), Q (mA), Totalizer F/R, Difference Totalizer, Grand Totalizer Qg, Batch Totalizer Q, TAG-Number, Bargraph
1st Line Multiplex:		ON/OFF
2nd Line Multiplex:		ON/OFF
Operating Mode:		Standard/Fast, 2 FR auto., 2 FR ext., 2 FR F/R, Preset Totalizer
Flow Direction:		Forward/reverse, forward
Direction Indication:		Standard, opposite,
Store data in ext. EEPROM		Yes/No

FR = Flow Range

Contact In-/Output:	❑ Yes	❑ No	
Detector Empty Pipe:	❑ Yes	❑ No	
Communication:	❑ HART-Protocol	❑ RS 485	❑ PROFIBUS DP
Pulse output:	❑ Active	❑ Passive	
Alarm:	❑ Yes	❑ No	
Agency Approved:	❑ Yes	❑ No	

9. Declaration regarding the contamination of units and components

Unit and component repair and/or service will be carried out only after a fully completely declaration is submitted.

Otherwise the consignment can be rejected. The present declaration may be completed and signed only by authorised and qualified personnel of the operating company.

Customer details:

Company:	
Address:	
Contact person:	Phone:
Fax:	E-Mail:

Unit details:

Type:	Serial no.:
Reason for returning the unit/Description of defect:	

Has this unit been used for working with substances susceptible of causing a hazard or a health risk?

❒ Yes ❒ No

If yes, please specify type of contamination (tick where appropriate).

biologic	❒	caustic/irritating	❒	flammable (highly flammable)	❒
toxic	❒	explosive	❒	other noxious substances	❒
radioactive	❒				

Which substances did the unit come in contact with?

1.

2.

3.

We herewith confirm that the units / parts returned were cleaned and are free from any hazardous and/or noxious substances in accordance with the Hazardous Materials Decree.

Place, Date	Signature and company stamp

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The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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