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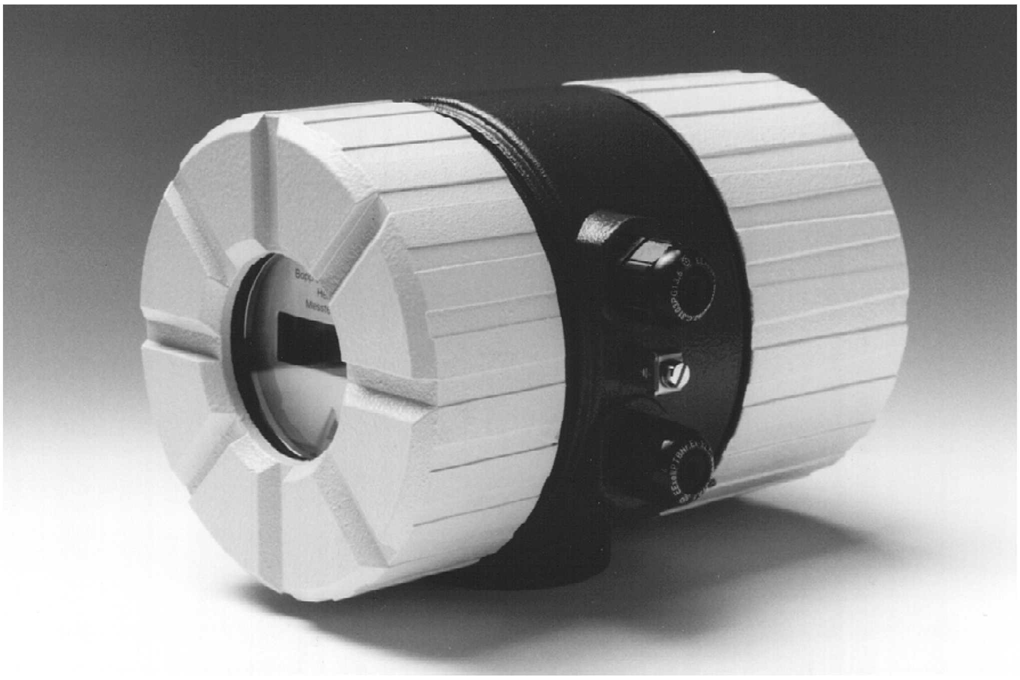
Heinrichs
Ein Unternehmen der IWKA Gruppe

Transmitter

for magnetic-inductive flowmeters

UMF

Operating Instructions



Read these Operating Instructions thoroughly and keep them available for reference

Subject to modifications of the dimensions, weights, and other technical data

Printed in Germany

Contens

Seite

1 Introduction

1.1 Technology

The UMF transmitter is controlled by a powerful state-of-the-art 16-bit microcontroller. Thanks to HART® functionality, the data can be transmitted to a hand-held terminal. The operation of the meter in a field bus system is made possible by a so-called communication module, which can be easily replaced or retrofitted. State-of-the-art communication modules (e.g. Profibus PA and Profibus DP/V1) are in preparation and can be retrofitted later.

Thanks to the EEx de [ia] II C/IIB T6 - T3 or EEx d [ia] II C/IIB T6 - T3 approvals, the transmitter is suitable for operation in hazardous areas. Several self-monitoring functions in hardware and software ensure error recognition. The operator interface is equipped with numerous software functions and has been optimized for easy operation. The separate operator terminal has a two-line LCD and an ergonomically optimized keypad. The terminal, which can be mounted in the connection compartment, can be rotated by the operator in 90-degree increments – depending on the mounting position of the meter – without opening the electronics housing. The operator terminal can also be positioned outside the transmitter if, for example, accessibility or operator convenience is not adequate. The terminal must be installed in a housing whose degree of protection is at least IP 20. The maximum distance between transmitter and operator terminal may be 200 m.

1.2 Transport, delivery, storage

Protect the packaged device against humidity, soiling, and strong mechanical influences during transport and storage.

Upon receipt, check the delivery for completeness and compare the data of the device with the data on the delivery note and in the order records.

Report any transport damage immediately after delivery. Damage reported later cannot be recognized.

1.3 Warranty

The meter has been manufactured at the factory based on high quality standards and tested carefully. If, however, there is cause for complaint, we are ready to provide quick service, provided that the meter has been used as prescribed.

For the scope and period of warranty, please refer to the contractual terms of delivery. Claims under warranty shall be conditional on expert installation and startup in compliance with the operating instructions for the device. The required mounting, startup, and maintenance work may be carried out by expert and authorized persons only.

1.4 Repairs and hazardous materials

The following measures must be taken before you send the flowmeter back to Heinrichs Messtechnik for repair.

- In any case, include with the equipment a note with a description of the failure, the application and the chemical and physical properties of the measured medium.
- Remove all residual fluid and carefully inspect all lining grooves and slots where residual fluid might be found. This is especially important if the medium is detrimental to health (e.g. corrosive, poisonous, carcinogenic or radioactive).

Costs caused by the possible disposal of the device or by personal injuries (e.g. burns) because the unit had not been cleaned carefully will be borne by the plant operator.

1.5 Additional documentation for hazardous location devices

Meters that have been manufactured for the use in hazardous areas have a corresponding mark on the type plate. They are shipped with separate Safety Operating Instructions and the conformity certificate. The installation requirements and electrical data must be observed carefully.

2 Manufacturer

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Product type: Transmitter for magnetic-inductive flowmeters
Product name: UMF

Version no.: 1.1
Date: 26.02.2003

3 Applications

The microprocessor-controlled and programmable UMF transmitter for the sensors of the EPY/EPYE, PIT and PITY series analyzes and preprocesses measured data. The measurement results can be displayed and transmitted in different ways.

The UMF has been designed with communication capabilities and can be used with both the HART® protocol and Profibus (PA, DP/V1) after installing the corresponding communications module. The transmitter can be customized using an operator terminal. While the basic configuration is set at Heinrichs Messtechnik (e.g. calibrating the transmitter), additional settings can be made by the customer and modified if necessary (e.g. preprocessing and evaluating or displaying and printing out measured data). The customer settings are protected by a customer password. This password can be changed by the customer.

Important data that are indispensable for a correct operation of the transmitter (e.g. calibration values and basic settings) are protected by a service password.

4 Operational Mode and System Design

4.1 Measuring principle

It was back in 1832 that Faraday suggested utilizing the principle of electrodynamic induction for measuring flow velocities. His experiments in the Thames, though unsuccessful due to superimposed polarization effects, are nonetheless regarded as the first experiment in the field of magnetic-inductive flow measurement. According to Faraday's law of electromagnetic induction, an electrical field E is produced in a conductive liquid moving through a magnetic field B at a velocity v in accordance with the vector product E = [v x B].

Through a meter tube provided with an insulating lining flows a liquid at flow velocity v and a flow rate Q, producing a measuring-circuit voltage Um at the two electrodes at right angles to the direction of flow. The size of this measuring-circuit voltage is proportional to the mean flow velocity and the volume flow rate.

4.2 System design

The meter consists of a sensor (e.g. EPYE series) and a UMF transmitter. The EPY(E) transmitter is used for measuring liquid media. By selecting a transmitter material matching the medium, any conductive liquid media can be measured.

The UMF transmitter generates the inductive current necessary for the magnetic field and preprocesses the induced voltage at the electrodes. An analog 0/4–20 mA output is a standard feature and digital data transmission via HART® protocol or PROFIBUS (PA, DP/V1) an optional feature of the device.

4.2.1 Data memory module (DSM)

The data memory is a an exchangeable data memory module on a plug-in PCB. The module contains all characteristic data of the sensor (e.g. sensor constant, version or serial number).

After replacing the transmitter or its electronics, the DSB will be installed in the new transmitter. After the measuring system has been started, the measuring point will continue working with the characteristic values stored in the DSM. Thus, the DSM offers maximum safety and high comfort when exchanging device components.

4.2.2 Safety of operation

A comprehensive self-monitoring system ensures maximum safety of operation.

- Potential errors can be reported immediately via the configurable status output (binary output 2). The corresponding error messages will also be displayed on the transmitter display. A failure of the auxiliary power can also be detected via the binary output 2.
- When the auxiliary power fails, all data of the measuring system will remain in the DSM (without back-up battery).
- All outputs are electrically isolated from the auxiliary power, the sensor circuit and from one another.

5 Input

5.1 Measured variable

The measured variable is an induced voltage that represents the volume flow rate.

5.2 Measuring range

The measuring range depends on the connected EPY(E) sensor and is shown on the corresponding data sheet.

5.3 Additional input variables

A binary input is optional. Error messages can be reset using this input during custody transfer operation. In addition, the totalizers can be reset in an optional version.

As an option, up to two 0/4–20 mA current inputs can be used for reading in additional measured variables such as temperature, density or level. Due to the restricted number of terminals, there is no third binary output available when the first current input is used; when the first and the second binary output are used, there is not second binary output. Both current inputs are not electrically isolated.

5.4 Operating the PIT and PITY flow velocity sensors with the UMF

The PIT and PITY sensors are calibrated for flow velocity. In order to display the measured value in volume flow units, it must be converted using the flow velocity and the inside diameter of the tube. The following parameters must be set at the UMF:

1. At the functional level *Sensor Settings+UMF*, set the sensor type (PIT or PITY). The dimension of the sensor constants will be automatically set to m/s*mV.

2. Setting of the sensor constants in x.xxx m/s*mV

3. Inside diameter of the tube in xxx mm

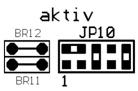
4. At the functional level *Flow*, set the desired unit of volume flow.

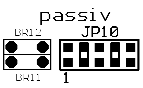
5. Using the function *Volume Flow Upper-Range Value*, set the upper-range value.

6 Outputs

6.1 Output signals

Analog output:	0/4–20 mA current output, electrically isolated with HART® protocol: Volume flow rate Types of protection EEx "i" or EEx "e"
Binary output 1: (Pulse/frequency output)	Pulse duration; default value 50 ms Pulse duration; adjustable range is 0.5– 2000 ms fmax = 1 kHz When programming the pulse duration, a plausibility check is carried out. If the selected pulse duration is too long for the set upper range value, an error message will be displayed. Passive, via optocoupler: Ui = 30 VDC, Ik = 200 mA, P = 3 W Active, potential-free: 24 VDC; max.200 mA or in accordance with NAMUR





The binary output 1 can be wired as a passive or an active output. For this, the plug-in jumpers of JP10 on the PCB UMF10 must be inserted accordingly. For the active output, the jumpers BR11 and BR12 must be closed in addition.

Binary output 2: (Status output)	For forward and reverse flow, MIN Q, MAX Q, status output or alarm Second pulse output (by 90° out of phase) Passive, via optocoupler: Ui = 30VDC, Ii = 200 mA, Pi = 3 W or in accordance with NAMUR
Binary output 3: (Option)	For forward and reverse flow, MIN Q, MAX Q, status output or alarm Passive, via optocoupler: Ui = 30 VDC, Ii = 200 mA, Pi = 3 W

6.2 Failure signal

A failure of the meter can be indicated via the current output or the status output. The current output can be set to a failure signal of 2 mA or 22 mA. The status output can be assigned the active or passive setting.

6.3 Load of the current output

Standard version:	≤500 ohms
Hazardous location version:	≤500 ohms
for HART® minimum load	>250 ohms

6.4 Damping

Programmable from 1 to 60 s, affects all signal outputs

6.5 Low-flow cut-off

The low-flow cut-off can be set to values between 0 and 10% using the software. The set value refers to the upper range value. If the measured value is lower than the set volume, the analog output will be set to 0/4 mA, and the pulse output will stop generating pulses.

7 Characteristic values

7.1 Reference conditions

In conformity with IEC 770:
temperature: 20°C, relative humidity: 65%, air pressure: 101.3 kPa

7.2 Measuring tolerance

See characteristic values of the corresponding sensor.

7.3 Repeatability

See characteristic values of the corresponding sensor.

7.4 Influence of ambient temperature

For the pulse output: ±0.05% per 10°K
For the current output: ±0.1% per 10°K

8 Operating conditions

8.1 Installation conditions

The UMF transmitter can be installed directly on the sensor (compact version) observing the Operating Conditions of the sensor or be mounted separately on the outside (separated version).

8.1.1 Compact version

For the compact version, the transmitter housing and the BE operator terminal can be rotated in 90-degree increments. Thus, the device can be adjusted to different mounting frames in the pipe. This allows for convenient viewing and operating in any position.

8.1.2 Separate version

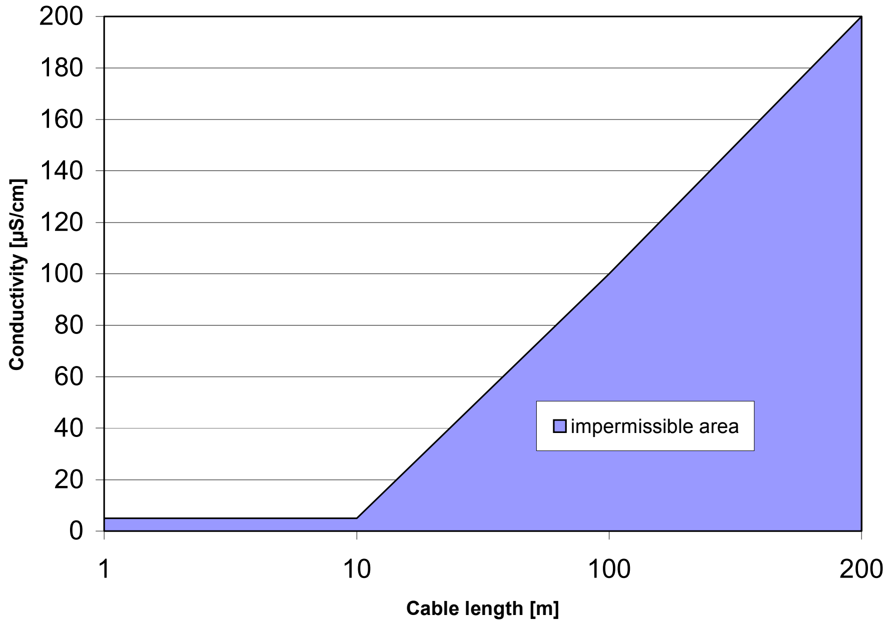
The transmitter needs to be mounted separately from the sensor if

- the mounting area is difficult to access
- there is a lack of space
- medium and ambient temperatures are extremely high
- there is strong vibration

Caution!

- For the separate version, the minimum permissible conductivity of the medium is determined by the distance between the sensor and the transmitter. The maximum cable length to ensure accuracy is 200 m. For the cable type, see 9.5 “Electrical connection.”
- The electrode cable must be fixed. If the conductivity of the medium is low, cable movements may change the capacity considerably and thus disturb the measuring signals.
- Do not lay the cables close to electrical machines and switching elements.
- Equipotential bonding must be ensured between sensor and transmitter.
- Do not connect or disconnect the field coil cable before the primary power of the meter has been disconnected.

Cable length for separate version



8.2 Environmental conditions

8.2.1 Ambient temperature

-10°C up to +50°C for the display function
-20°C up to +60°C for operation

In the case of an outdoor installation, the device must be protected against direct solar irradiation with a weather shield.

8.2.2 Storage temperature

-25°C up to +70°C

8.2.3 Degree of protection

SG 1 standard housing, IP 68

8.2.4 Type of protection for hazardous location version

EEx de [ia/ib] IIC T6–T3 or EEx d [ia/ib] IIC T6–T3
Electronics housing is explosion-proof
Connection compartment: “increased safety” or “explosion-proof enclosure” type of protection

8.2.5 Electromagnetic compatibility

The metering system is in compliance with the following standards and guidelines:

EMC Directives 89/336/EEC, 92/31/EEC, 93/68 EEC
EN 50 081 Part 1
EN 50 082 Teil 2
NAMUR recommendation NE21 (for entire measuring system)

Electromagnetic compatibility is only ensured when the electronics housing is closed. When the electronics housing is open, there may be electromagnetic interference.

8.3 Process conditions

8.3.1 Fluid temperature

See data sheet and certificate of conformity of the sensor

8.3.2 State of aggregation

Liquid

8.3.3 Viscosity

No restrictions

8.3.4 Flow rate limit

See data sheet of the sensor

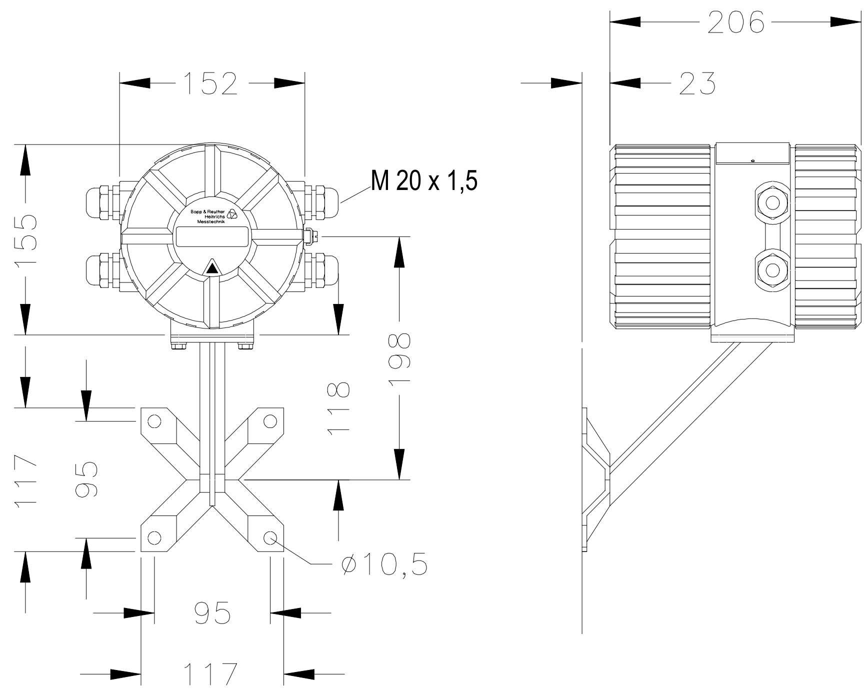
8.3.5 Pressure loss

See data sheet of the sensor

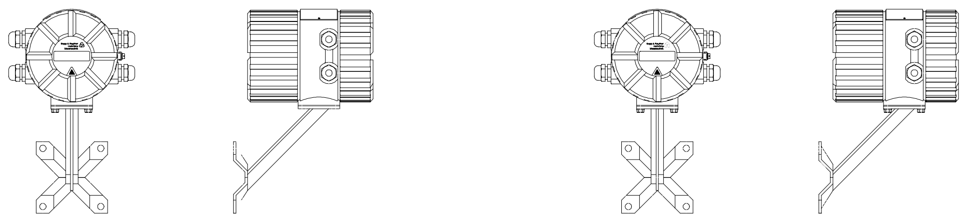
9 Construction details

9.1 Type of construction/dimensions

Wall mounting



Pipe mounting



9.2 Weight

4.5 kg (separate UMF transmitter)

9.3 Material

Housing: GK Al Si 12 MG wa, passivated in chromic acid before being varnished

9.4 Process connection

See data sheet of the sensor

9.5 Electrical connection

You can access the connection compartment after unscrewing the short cover and removing the operator terminal. The operator terminal is fastened in the connection compartment by means of a pluggable terminal and can therefore be removed completely.

For the EEx d version, the second screw securing the cover of the connection department must be removed.

Caution: **Compare the local mains voltage with the specification on the type plate. In addition, the national safe installation guidelines (e.g. VDE 0100 or VDE 0165 must be observed).**

To comply with the degree of protection, the following aspects must be observed.

- **The diameter of the cable must match the cable gland.**
- **Properly tighten the cable glands that are used.**
- **Close the cable glands that are not used with filler plugs.**
- **Make sure that the gasket for the screw-down housing cover is seated properly.**

Auxiliary power:	24 V AC; +10%, -15%; 50/60 Hz 230 V; +10%, -15%;50/60 Hz 115 V; +10%, -15%;50/60 Hz 24 V DC; +20%, -15%
Power input:	12 VA

9.5.1 Connections of the UMF

Terminal	Descriptor
	Mains
L	Conductor (L+)
N	Neutral conductor (L-)
PE	Protective conductor
	Sensor connections
Shield	
E1	Electrode 1
E2	Electrode 2
Shield	
FE	Functional ground (remote ground for measuring signal)
SP-	Field coil (-)
SP+	Field coil (+)
	Signal outputs
+	Operator terminal
-	Operator terminal
11	- Current output (HART®)
12	+ Current output (HART®)
15	- Binary output 1 active
16	- Binary output 1 passive (pulse)
17	+ Binary output 1 passive (pulse)
18	+ Binary output 1 active
19	- Binary output 2 (status/pulse)
20	+ Binary output 2 (status/pulse)
21	- Binary input
22	+ Binary input
33	- Binary output 3:
34	+ Binary output 3:
35	Profibus DP-V1
36	Profibus DP-V1
37	
38	
39	Profibus PA
40	Profibus PA

Due to the limited number of terminals, the signal outputs cannot be made available all at the same time. A maximum of 8 terminals can be used for the signal outputs (without operator terminal and Profibus PA). The signal outputs may only be connected to electric circuits that comply with the “extra-low voltage” degree of protection with a safe isolation from supply in accordance with DIN VDE 0100 Part 410.
The desired signal outputs must be defined according to your order details during order processing.

9.5.2 Cable specification for separate version

If the transmitter is mounted separately from the sensor, the following cables must be used:

Electrode cable:	Shielded twisted pair. In order to protect the cable from external interference, the twisted-pair wires are covered by an additional, overall shield. e.g. LiYCY-CY 1 x2 x 0.25 mm^2
Field coil cable :	3 x 0.75 mm^2 with a common shield e.g. (N)YLHCY-J 3 x 0.75 mm^2

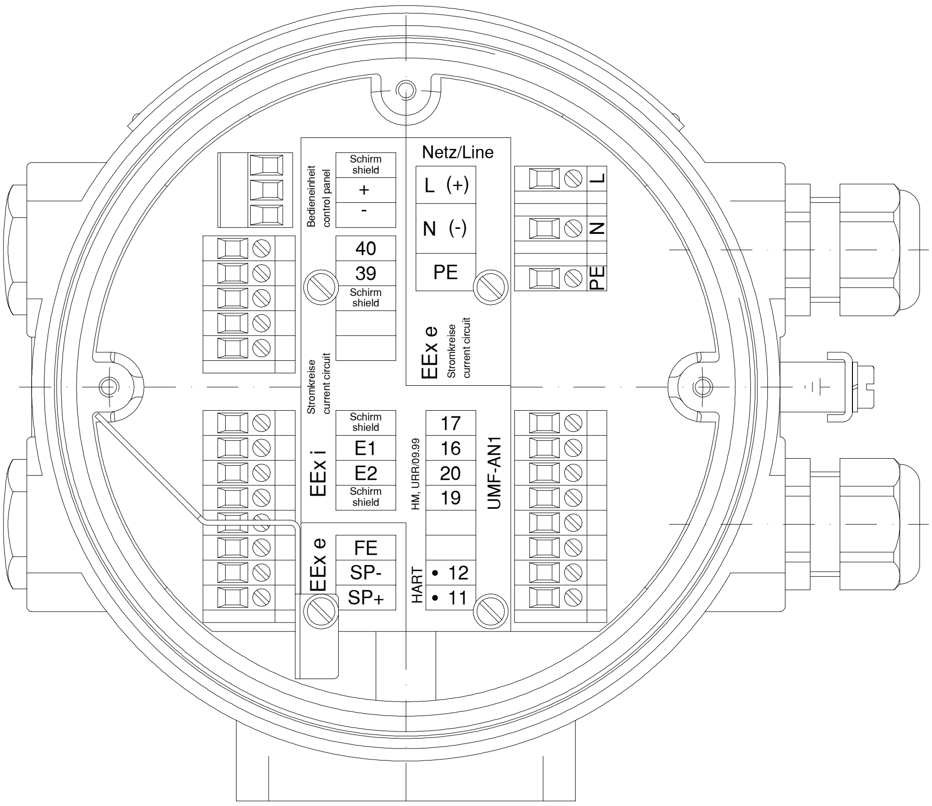
The outer shield is grounded by means of special EMC-compliant cable glands.

9.5.3 Wiring diagrams

9.5.3.1 Wiring diagram for the mounted version of sensor and UMF

Connection compartment for mounted UMF transmitter

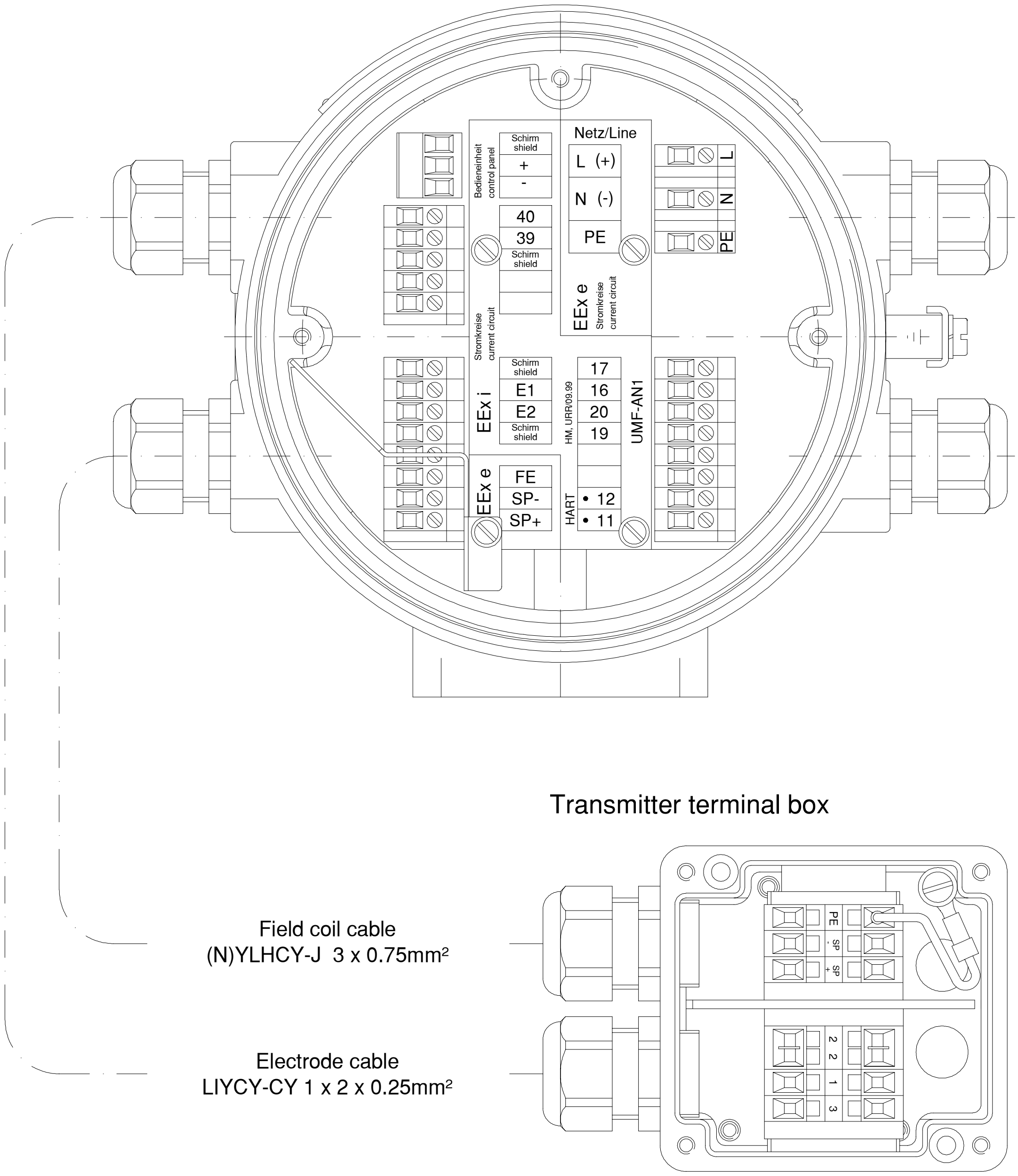
Type of protection for signal outputs: EEx ia IIC/IIB



9.5.3.2 Wiring diagram for the separate version of sensor and UMF

Connection compartment for separate UMF transmitter

Type of protection for signal outputs: EEx ia IIC/IIB



9.5.4 HART® connection

There are several connections for HART® communication. However, the loop resistance must meet the load specifications of section 6.3. HART® interface is connected to terminals 11 and 12 or terminals 41 and 42.

9.5.5 SensorPort2 connection

SensorPort 2 is the configuration software of Bopp & Reuther Heinrichs Messtechnik for operating devices compatible with HART® or PROFIBUS PA. In order to connect the UMF to SensorPort 2, an interface for HART® or Profibus PA is needed. The stationary installation of the interface in a system is also possible.

10 Display and operator interface

10.1 General information

The UMF transmitter can be operated using the operator terminal, a PC or laptop equipped with the SensorPort 2 configuration software or a HART communicator.

10.2 Display

The UMF operator terminal has a two-line alphanumeric display sized 16 x 60 mm with 16 characters each. Here the measured data and settings are displayed.

10.3 Operator interface

10.3.1 Operator terminal

The name of the functional classes is displayed in capital letters. The functions within the functional classes are displayed in capital and lower-case letters. The functional classes and its functions are described in section 10.3.5 (Functional classes) and 10.3.6 (Functions).

Examples of information and data displayed in the lower line:

- Information texts
- Yes/no answers
- Alternative values
- Numerical values (and dimension, if applicable)

If you try to change values without entering a valid password, the message “access denied !” will be displayed.

10.3.2 Keys and their function

There are six keys to change the settings.
Do not press these keys with sharp or sharp-edged objects such as pencils or screwdrivers.

Cursor keys: Using the cursor keys, you can change numerical values, give yes/no answers and select parameters.
Each key is assigned a symbol in the following table.

Descriptor	Symbol
Cursor key, arrow to the right	▶
Cursor key, arrow to the left	◀
Cursor key, arrow to the top	▲
Cursor key, arrow to the bottom	▼

“Esc” key: The “Esc” key allows you to cancel the current action. Pressing “Esc” moves you directly to the functional class MEASURED VALUES.

ENTER key: Pressing ↵ (ENTER key) moves you from the menu level to the parameter level. You confirm all entries with the ↵ key.

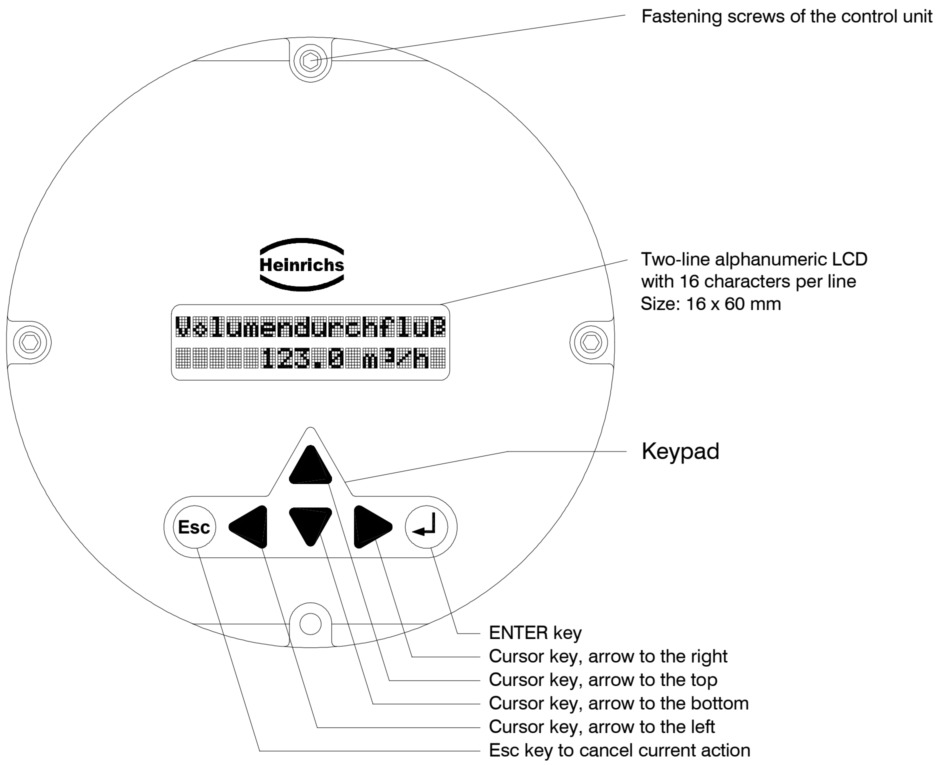
Moving the decimal point to the right:

Assign the zero on the left a figure between 1 and 9. By pressing ↵ you save the value and exit the menu item. When you return to the menu item, the decimal point has moved one digit to the right. On the left, a zero will be displayed that can again be assigned a figure.

Moving the decimal point to the left:

Set the most significant digit to zero. By pressing ↵ you save the new value and exit the menu item. When you return to the menu item, the decimal point has moved one digit to the left. On the left, a new zero will be displayed.

Control unit BE



10.3.2.1 Operating modes

The UMF transmitter can be operated in the following modes:

1. Display mode: Different combinations of the measured values and the UMF settings can be displayed. It is not possible to change parameters.

2. Programming mode: The UMF parameters can be programmed. After entering the password, either the functions that can be changed by the customer (customer password) or all functions are released for modification (service password).

10.3.2.2 Passwords

Access passwords protect the programming mode against unauthorized access. All functions that may be changed by the customer may be released with the customer password. This password can be changed by the customer after the device has been commissioned for the first time. Keep the new password in a safe place.

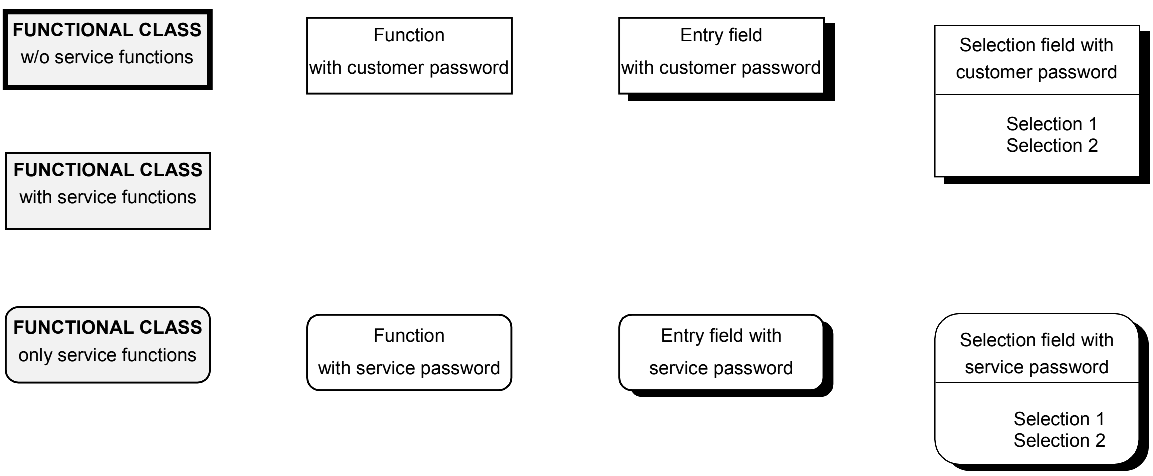
When shipping the UMF from the factory, the password is **0002**.

With the service password, important settings (e.g. factory settings) can be changed. This password is reserved for the HM Service and will not be given to the customer.

10.3.3 Software structure

The software functions of the UMF are divided into functional classes. These functional classes are arranged in the form of a ring.

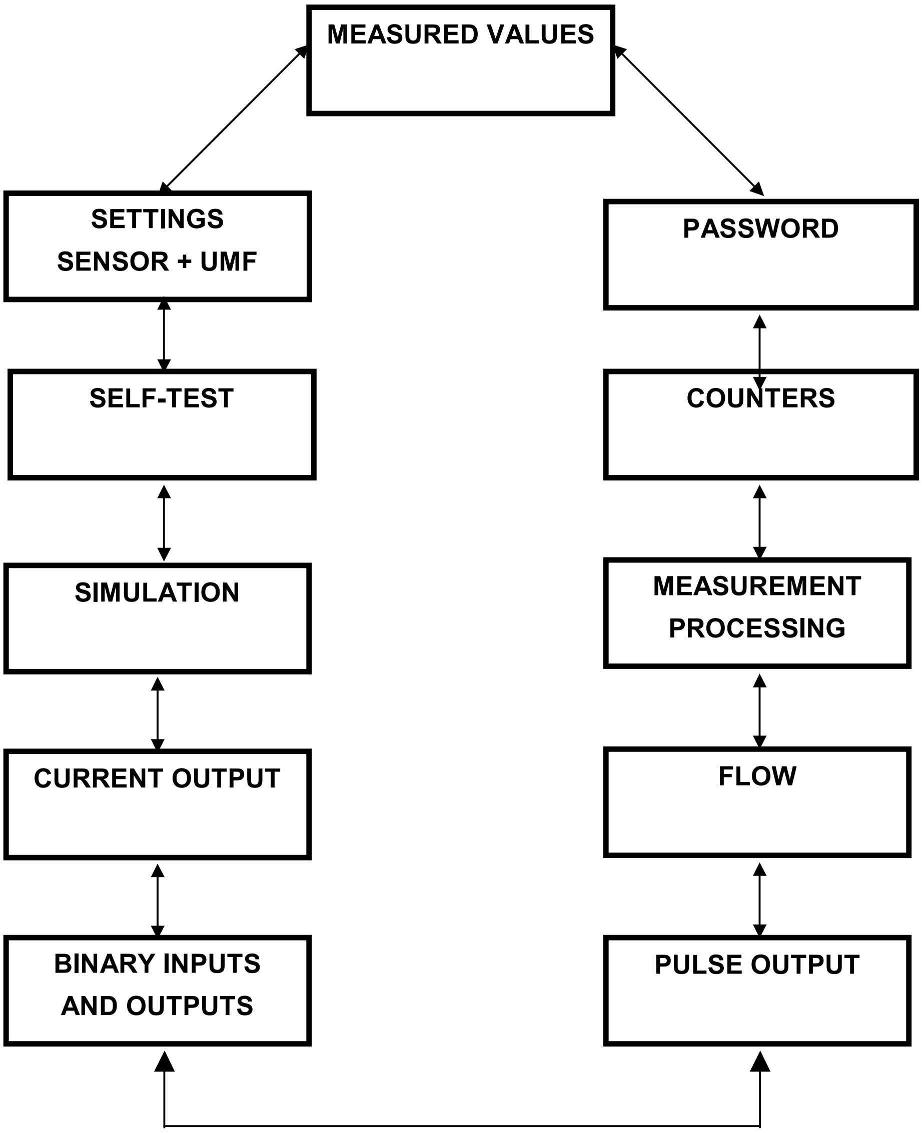
10.3.3.1 Legend

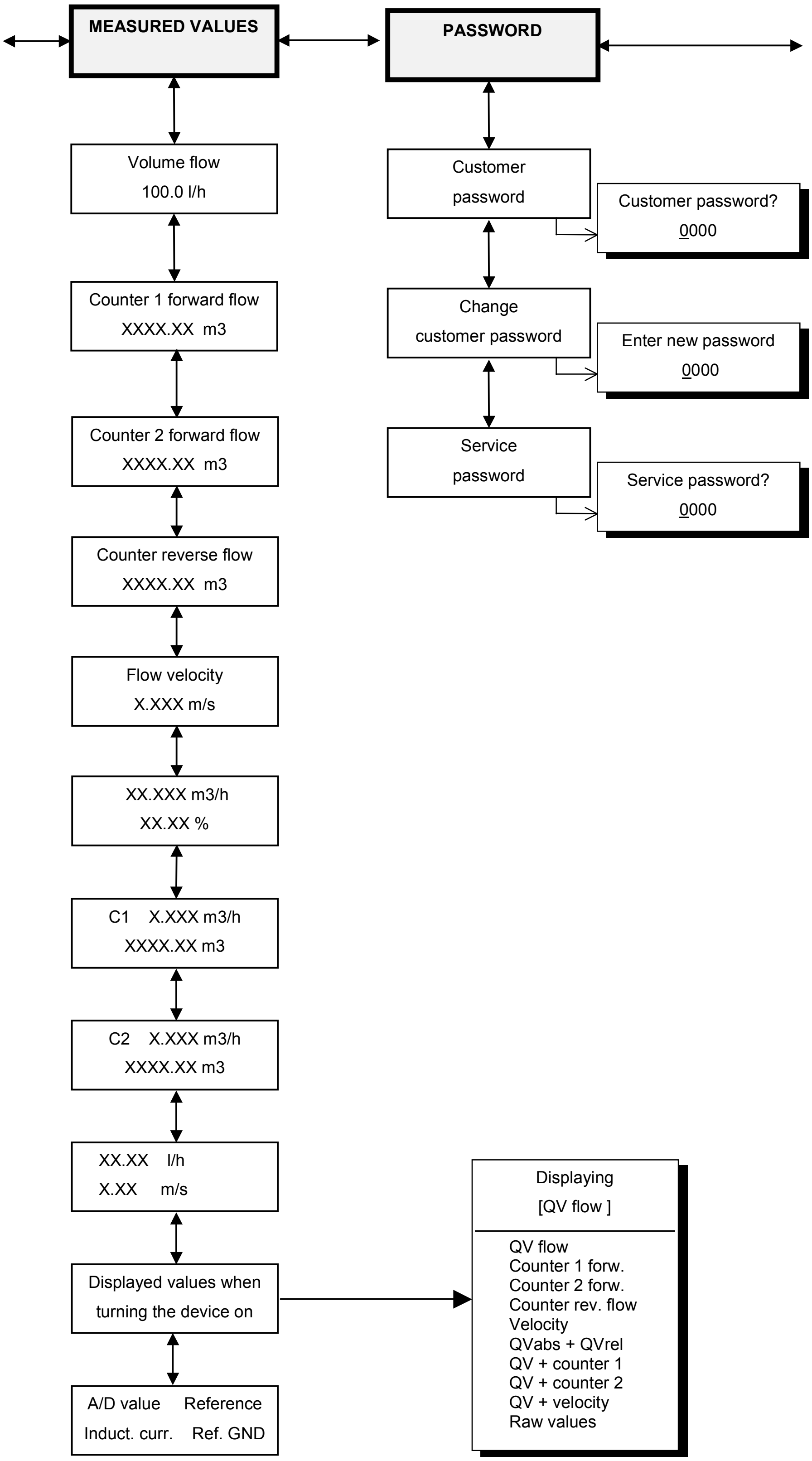


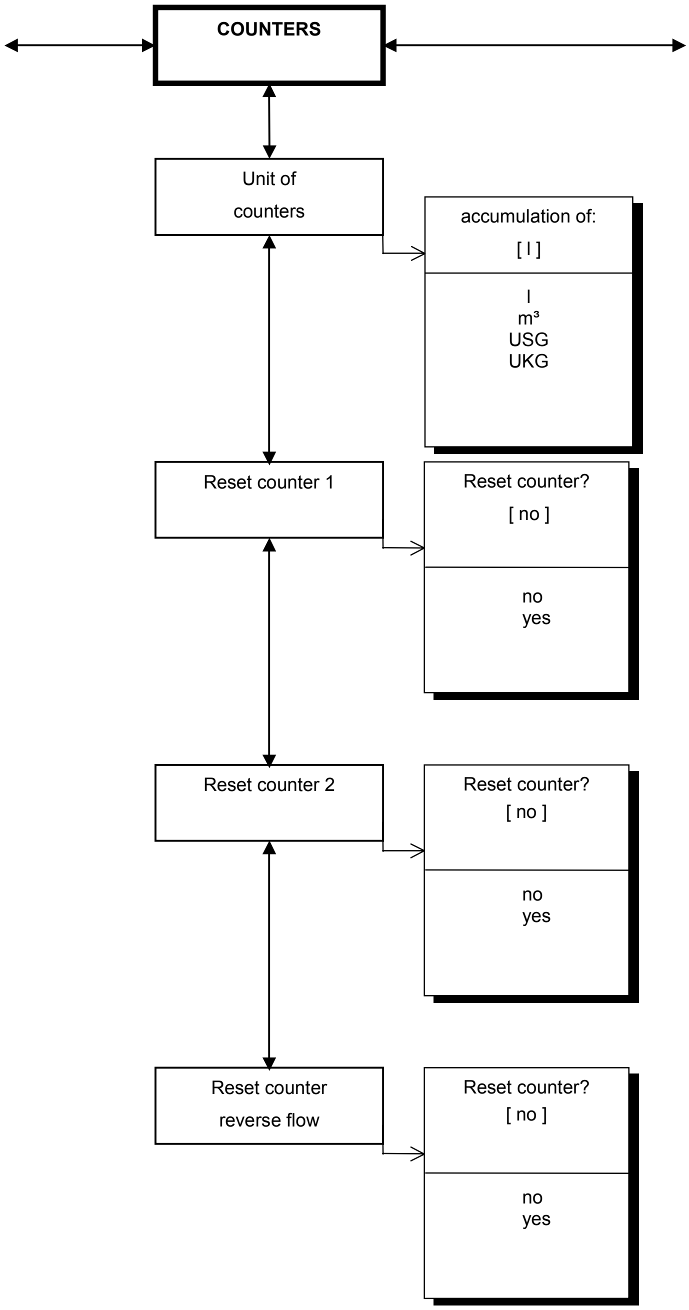
10.3.4 Operating example for changing the damping value

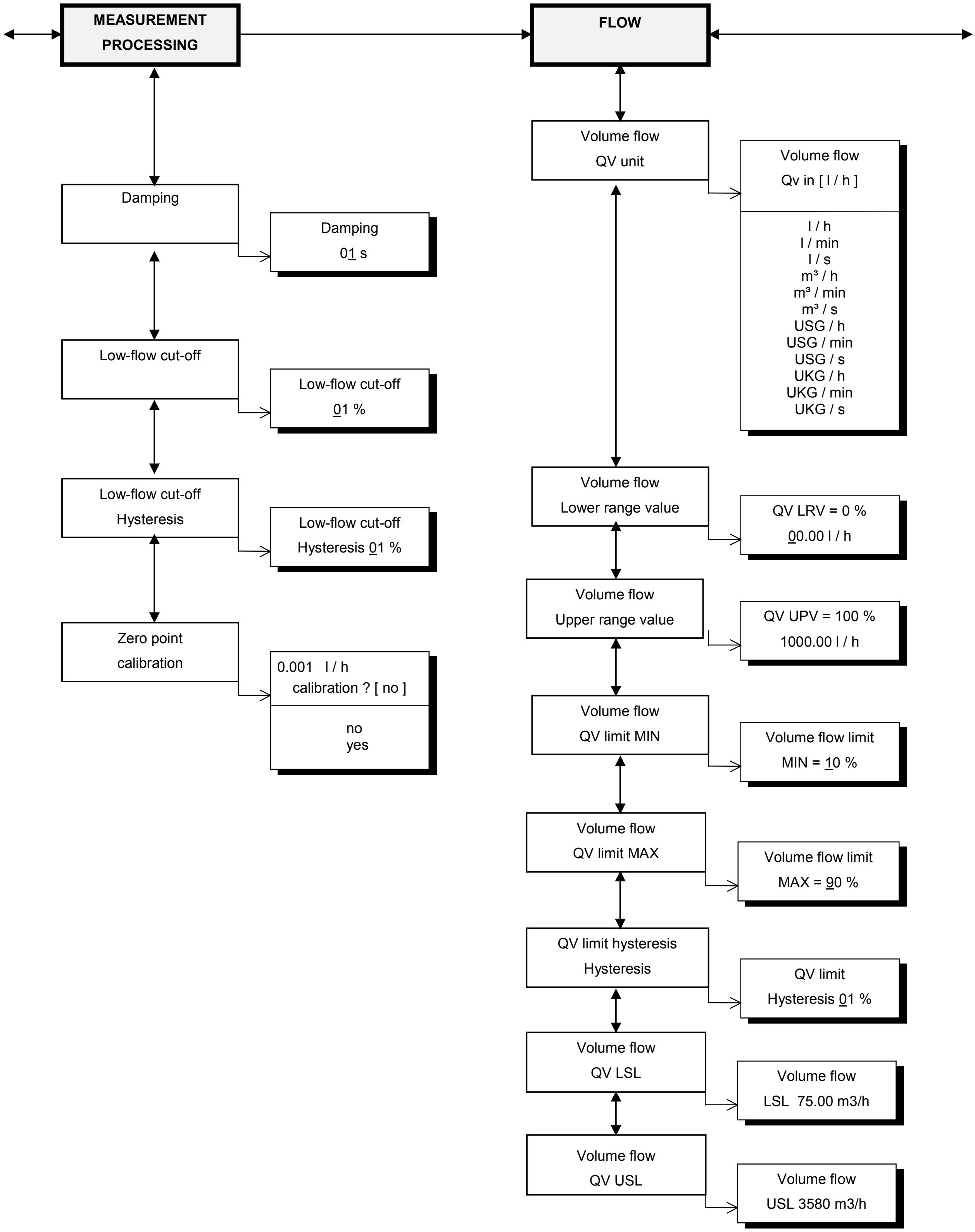
Key	Action
	The display is in display mode.
Esc	The Esc key moves you to the functional classes.
◀ ▶	Using the cursor keys, you select the functional class PASSWORD.
▼	Selecting the “customer password” function.
↵	Confirming an entry with the ENTER key.
▶ ▲	Setting the customer password 0002 with the cursor keys.
↵	Confirming the entry with the ENTER key. The message “password valid” will be displayed.
Esc	Pressing Esc moves you back to the functional classes.
◀ ▶	Using the cursor keys, you select the functional class MEASUREMENT PROCESSING.
▼	Using the cursor keys, you select the “damping” function.
↵	Confirming the entry with the ENTER key.
▶ ▲	Setting the desired value with the cursor key.
↵	Confirming the entry with the ENTER key.
Esc	Pressing Esc moves you back to the functional class MEASURED VALUES.
▼	Using the cursor keys, you select for example the “volume flow” function.

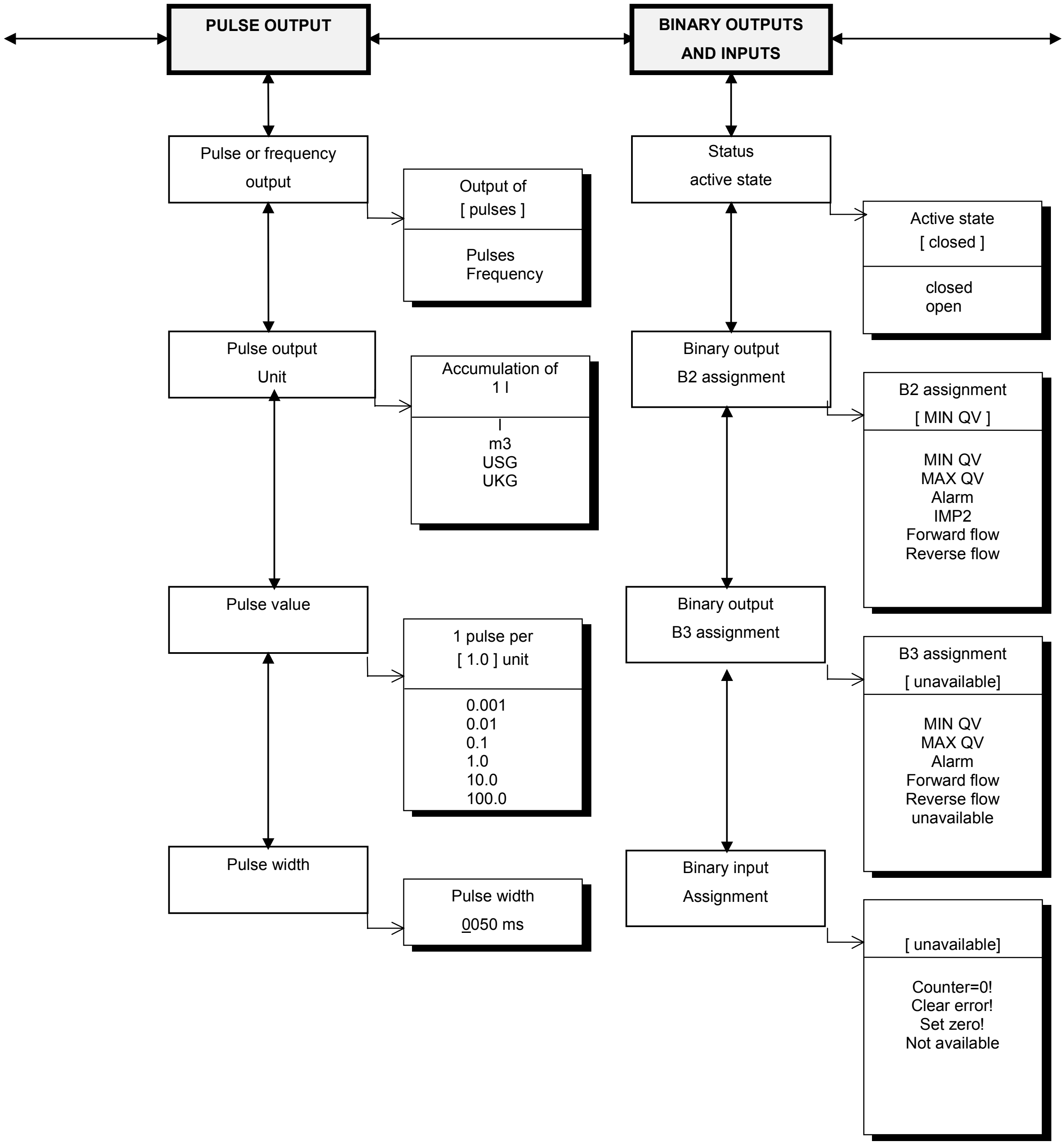
10.3.5 Functional classes of the UMF transmitter without service functions

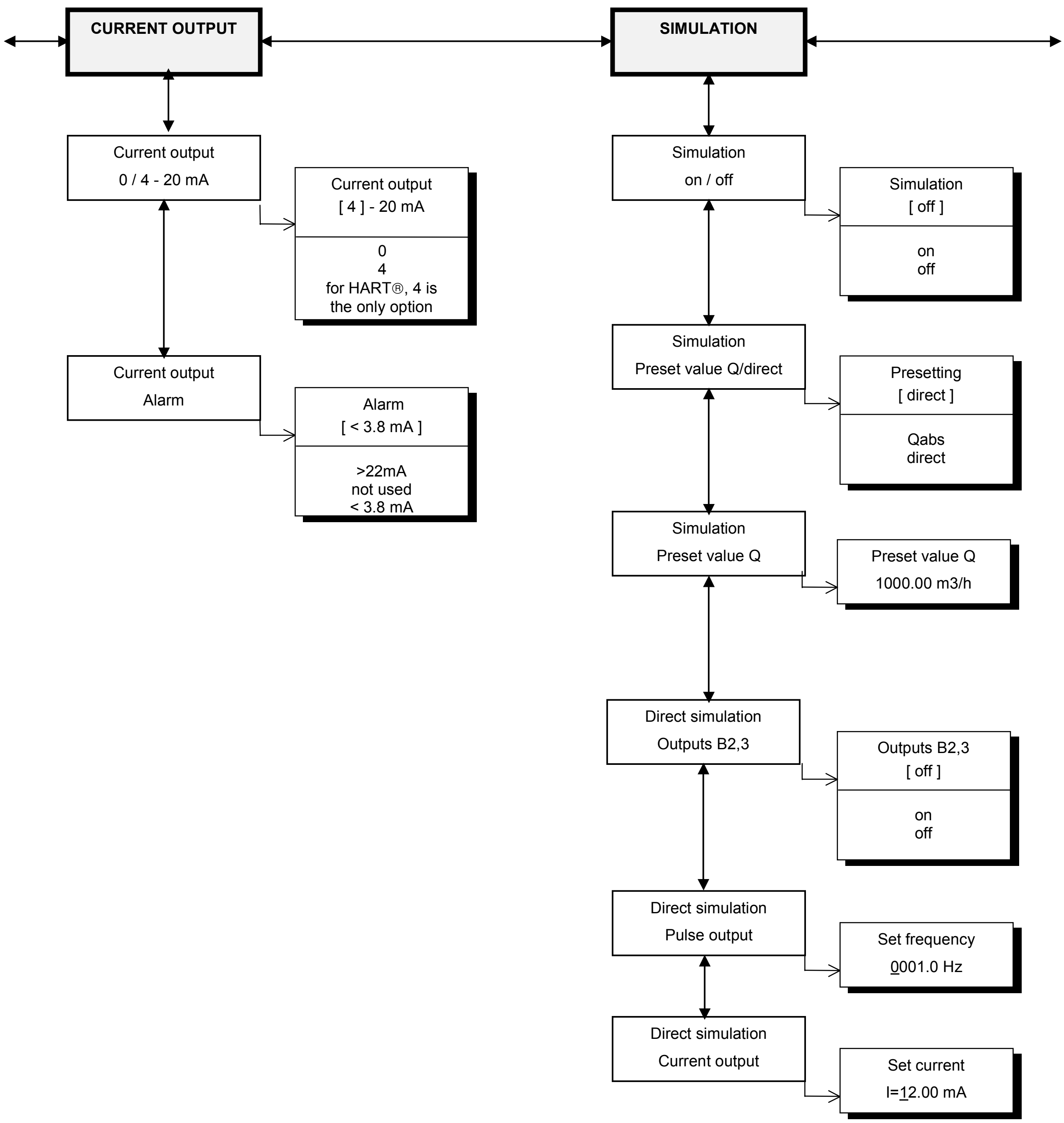


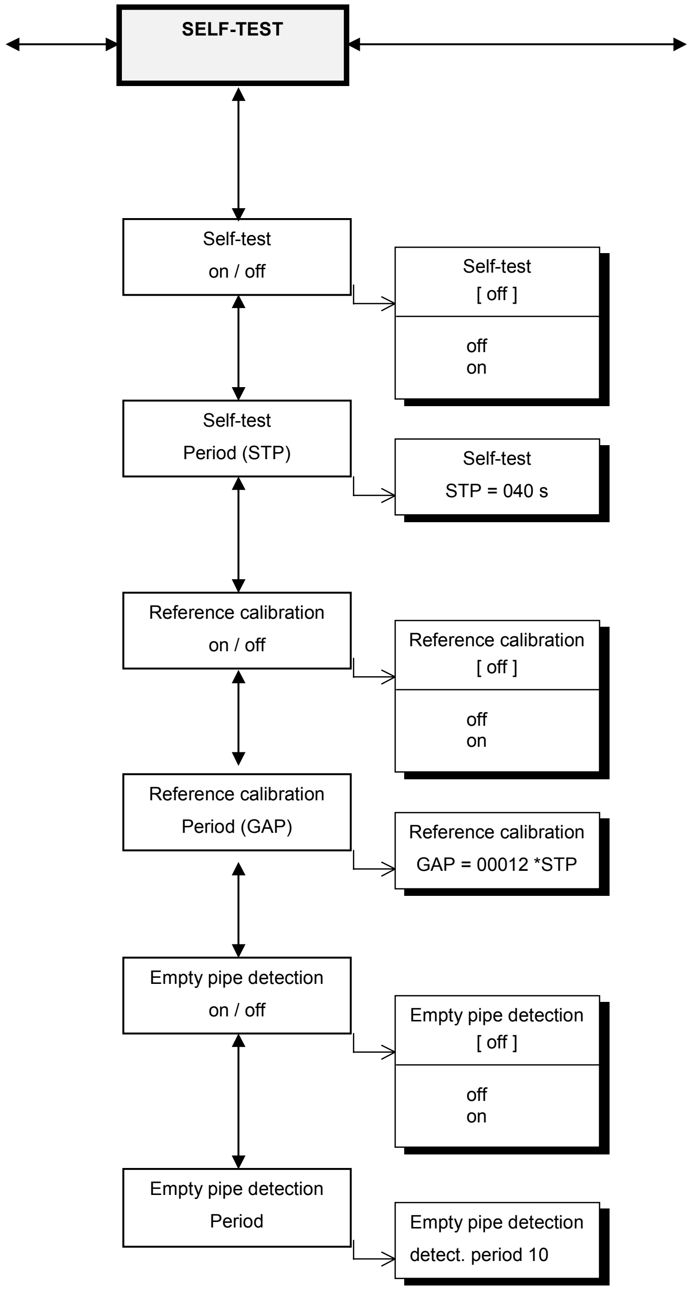

MEASURED VALUES
PASSWORD
Volume flow
100.0 l/h
Customer
password
Customer password?
0000
Counter 1 forward flow
XXXX.XX m3
Change
customer password
Enter new password
0000
Counter 2 forward flow
XXXX.XX m3
Service
password
Service password?
0000
Counter reverse flow
XXXX.XX m3
Flow velocity
X.XXX m/s
XX.XXX m3/h
XX.XX %
C1 X.XXX m3/h
XXXX.XX m3
C2 X.XXX m3/h
XXXX.XX m3
XX.XX l/h
X.XX m/s
Displayed values when
turning the device on
Displaying
[QV flow]
QV flow
Counter 1 forw.
Counter 2 forw.
Counter rev. flow
Velocity
QVabs + QVrel
QV + counter 1
QV + counter 2
QV + velocity
Raw values
A/D value Reference
Induct. curr. Ref. GND

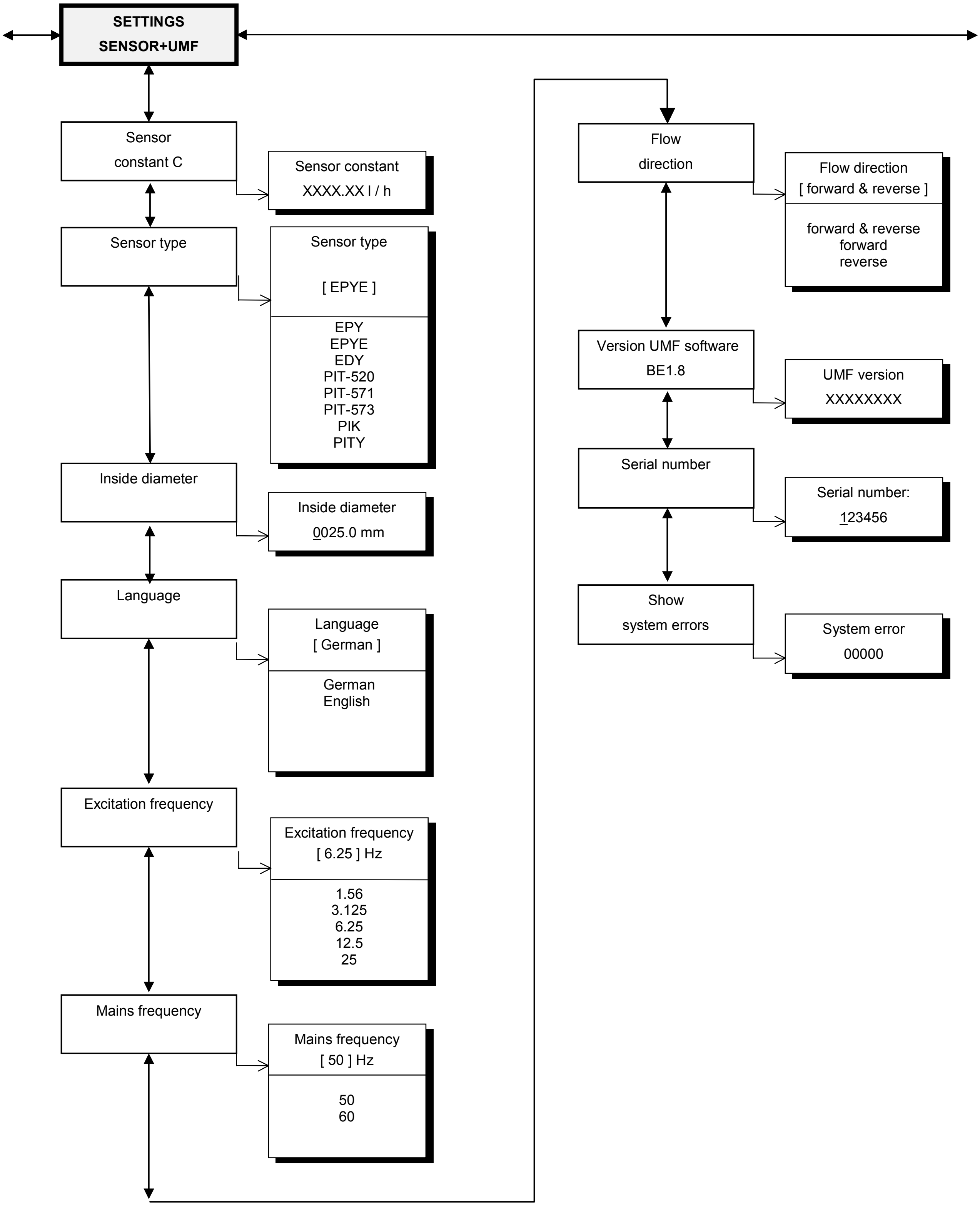

COUNTERS
Unit of counters
accumulation of:
[l]
l
m³
USG
UKG
Reset counter 1
Reset counter?
[no]
no
yes
Reset counter 2
Reset counter?
[no]
no
yes
Reset counter reverse flow
Reset counter?
[no]
no
yes


MEASUREMENT PROCESSING
FLOW
Damping
Damping 01 s
Low-flow cut-off
Low-flow cut-off 01 %
Low-flow cut-off Hysteresis
Low-flow cut-off Hysteresis 01 %
Zero point calibration
0.001 l / h calibration ? [no]
no
yes
Volume flow QV unit
Volume flow Qv in [l / h]
l / h
l / min
l / s
m³ / h
m³ / min
m³ / s
USG / h
USG / min
USG / s
UKG / h
UKG / min
UKG / s
Volume flow Lower range value
QV LRV = 0 %
00.00 l / h
Volume flow Upper range value
QV UPV = 100 %
1000.00 l / h
Volume flow QV limit MIN
Volume flow limit MIN = 10 %
Volume flow QV limit MAX
Volume flow limit MAX = 90 %
QV limit hysteresis Hysteresis
QV limit Hysteresis 01 %
Volume flow QV LSL
Volume flow LSL 75.00 m3/h
Volume flow QV USL
Volume flow USL 3580 m3/h


PULSE OUTPUT
BINARY OUTPUTS AND INPUTS
Pulse or frequency output
Output of [pulses]
Pulses
Frequency
Pulse output Unit
Accumulation of 1 l
l
m3
USG
UKG
Pulse value
1 pulse per [1.0] unit
0.001
0.01
0.1
1.0
10.0
100.0
Pulse width
Pulse width 0050 ms
Status active state
Active state [closed]
closed
open
Binary output B2 assignment
B2 assignment [MIN QV]
MIN QV
MAX QV
Alarm
IMP2
Forward flow
Reverse flow
Binary output B3 assignment
B3 assignment [unavailable]
MIN QV
MAX QV
Alarm
Forward flow
Reverse flow
unavailable
Binary input Assignment
[unavailable]
Counter=0!
Clear error!
Set zero!
Not available


CURRENT OUTPUT
Current output
0 / 4 - 20 mA
Current output
[4] - 20 mA
0
4
for HART®, 4 is the only option
Current output
Alarm
Alarm
[< 3.8 mA]
>22mA
not used
< 3.8 mA
SIMULATION
Simulation
on / off
Simulation
[off]
on
off
Simulation
Preset value Q/direct
Presetting
[direct]
Qabs
direct
Simulation
Preset value Q
Preset value Q
1000.00 m3/h
Direct simulation
Outputs B2,3
Outputs B2,3
[off]
on
off
Direct simulation
Pulse output
Set frequency
0001.0 Hz
Direct simulation
Current output
Set current
I=12.00 mA


SELF-TEST
Self-test
on / off
Self-test
[off]
off
on
Self-test
Period (STP)
Self-test
STP = 040 s
Reference calibration
on / off
Reference calibration
[off]
off
on
Reference calibration
Period (GAP)
Reference calibration
GAP = 00012 *STP
Empty pipe detection
on / off
Empty pipe detection
[off]
off
on
Empty pipe detection
Period
Empty pipe detection
detect. period 10


SETTINGS
SENSOR+UMF
Sensor
constant C
Sensor constant
XXXX.XX l / h
Sensor type
Sensor type
[EPYE]
EPY
EPYE
EDY
PIT-520
PIT-571
PIT-573
PIK
PITY
Inside diameter
Inside diameter
0025.0 mm
Language
Language
[German]
German
English
Excitation frequency
Excitation frequency
[6.25] Hz
1.56
3.125
6.25
12.5
25
Mains frequency
Mains frequency
[50] Hz
50
60
Flow
direction
Flow direction
[forward & reverse]
forward & reverse
forward
reverse
Version UMF software
BE1.8
UMF version
XXXXXXXX
Serial number
Serial number:
123456
Show
system errors
System error
00000

10.3.6 Software functions

The following is a description of the software functions that can be accessed with the customer password.

10.3.6.1 Functional class MEASURED VALUES

The functional class MEASURED VALUES contains all functions for displaying the measured values.

10.3.6.1.1 Volume flow rate

If you select the function “volume flow,” the following will be displayed (example):

volume flow 100.0 l/h

The LCD shows the current volume flow rate. You define the display unit in the functional class FLOW using the function “volume flow unit.”

10.3.6.1.2 Relative flow

The relative flow rate is the percentage ratio of the (current) volume flow and the entered upper range value of the volume flow. You set this upper range value in the functional class FLOW using the function “volume flow QV URV.”

The calculation of the relative flow rate is based on the following formula:

relative flow rate = 100% x (Qabs - LRV) / (URV - LRV)

If you select the function “relative flow,” the following will be displayed (example):

relative flow 95.3%

10.3.6.1.3 Forward flow counter 1

Forward flow counter 1 and forward flow counter 2 are independent counters that can also be reset separately. With counter 1, for example, you can measure the yearly or monthly volume. If you select the function ”forward flow counter 1,” the following will be displayed (example):

counter 1 forw. + 000001.0 l

The LCD shows the current value of forward flow counter 1. You define the display unit in the functional class COUNTERS using the function “unit of counter.”

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10.3.6.1.4 Forward flow counter 2

The function is identical with the function of forward flow counter 1. For example, forward flow counter 2 can be used as a daily counter. If you select the function "forward flow counter 2," the following will be displayed (example):

counter 2 forw. + 000001.0 l

The LCD shows the current value of forward flow counter 2. You define the display unit in the functional class COUNTERS using the function "unit of counter."

10.3.6.1.5 Reverse flow counter

If you select the function "reverse flow counter," the following will be displayed (example):

counter reverse 000000.0 l

The LCD shows the current value of the reverse flow counter. You define the display unit in the functional class COUNTERS using the function "unit of counter."

10.3.6.1.6 Flow velocity

If you select the function "flow velocity," the following will be displayed (example):

flow velocity 1.5 m/s

The LCD shows the current value of the mean flow velocity of the medium. The display unit is always meters per second (m/s). The mean velocity is calculated from the measured volume flow and the flow area of the meter tube. In order to calculate the flow area of the meter tube, enter the inside diameter of the meter tube. To do so, use the "inside diameter" function in the functional class SETTINGS SENSOR + UMF.

10.3.6.1.7 Display during start-up

With the help of this function, you set the display mode that is activated automatically after a power failure. After choosing the function "display during start-up" and pressing ↵, the following selection field will be displayed:

display of [Qv]

After entering the customer or the service password and pressing ▲ or ▼, you can toggle between volume flow, forward flow counter 1, forward flow counter 2, reverse counter, volume flow and forward flow counter 1, volume flow and forward flow counter 2, volume flow and reverse flow counter, volume flow and presetting counter and the raw values. You confirm and save the selection by pressing ↵.

If you select the function “volume flow + forward flow counter 1,” the following will be displayed (example):

100. 0 l/h
1234.56 l

The first line of the LCD shows the current volume flow value and the second the value of forward flow counter 1. You define the display unit using the function “volume flow unit” in the functional class FLOW and the unit of the counter unit using the function “unit of counter.” The same procedure applies to the display options of other counters.

If you select the function “raw values,” the following will be displayed (example):

46509.0	248567
171454	-65.001

The values displayed are decimal values having the following meaning:

Upper left corner:	Measure for the measuring-circuit voltage at the electrodes
Lower left corner:	Measure for the inductive current to generate a magnetic field
Upper right corner:	Measure for the upper value of the reference calibration
Lower right corner:	Measure for the lower value of the reference calibration

10.3.6.2 Functional class PASSWORD

The functional class PASSWORD comprises the functions for entering and changing the customer password and entering the service password.

10.3.6.2.1 Customer password

After selecting the function “customer password” and pressing ↵, the following will be displayed:

customer
password?
0000

After entering the password, you confirm your entry with ↵. If the entered password is correct, the following message will be displayed:

password
valid

If the entered password is not correct, the following message will be displayed:

password
invalid

When shipping the device from the factory, the password is **0002**.

10.3.6.2.2 Changing the customer password

After selecting the function "change customer password" and pressing ↵, the following message will be displayed:

```
enter
new password 0000
```

After entering the new password, you confirm your entry with ↵. You have now saved the new password. Caution! Keep the new password available for reference in a safe place.

10.3.6.3 Functional class COUNTERS

The functional class COUNTERS comprises all counting functions with a totalizing function.

10.3.6.3.1 Unit of counter

After choosing the function "unit of counter" and pressing ↵, the following selection field will be displayed:

```
accumulation of:
[m3]
```

The current unit will be displayed. With the help of the cursor keys, you can toggle between the volume units l, m³, USG and UKG. You confirm and save the selection by pressing ↵. The counters will now show the unit you have set.
After changing the unit, the counter contents will be reset.

10.3.6.3.2 Resetting counter 1

After choosing the function "reset counter 1" and pressing ↵, the following selection field will be displayed:

```
reset counter?
[no]
```

You confirm and save the selection by pressing ↵. If you enter "yes", the counters will be reset to "zero."

10.3.6.3.3 Resetting counter 2

After choosing the function "reset counter 2" and pressing ↵, the following selection field will be displayed:

```
reset counter?
[no]
```

The same procedure as with counter 1.

10.3.6.3.4 Resetting the reverse flow counter

After choosing the function "reset reverse flow counter" and pressing ↵, the following selection field will be displayed:

reset counter?
[no]

The same procedure as with counter 1.

10.3.6.4 Functional class MEASUREMENT PROCESSING

The functional class MEASUREMENT PROCESSING comprises functions that affect the processing of the measured values.

10.3.6.4.1 Damping (time constant)

The time constant is intended to dampen abrupt flow rate changes or disturbances. The time constant affects the display and the signal outputs. It can be set in intervals of 1 second from 1 to 60 seconds. After choosing the function "damping" and pressing ↵, the following selection field will be displayed:

damping
01 s

The current time constant will be displayed.
After entering the customer password or the service password, you can change the time constant.
After setting the new time constant, you confirm your entry with ↵.

10.3.6.4.2 Low-flow cut-off

The value for low-flow cut-off is a limiting value stated as a percentage that relates to the upper range value of the flow rate. If the volume drops below this value, the measured values will be set to "ZERO." The value for low-flow cut-off can be set from 0 to 20% in 1-percent increments. After choosing the function "low-flow cut-off" and pressing ↵, the following selection field will be displayed:

low-flow cut-off
01 %

The current value for low-flow cut-off will be displayed. After setting the new value, you confirm your entry with ↵.

10.3.6.4.3 Hysteresis of low-flow cut-off

The hysteresis of the low-flow cut-off volume is the flow rate expressed as a percentage of the upper range value by which the set low-flow cut-off volume must be surpassed in order to deactivate the function. The hysteresis of the low-flow cut-off volume can be set in 0. 1-percent increments from 0 to

10%. After selecting the function “low-flow cut-off hysteresis” and pressing ↵, the following selection field will be displayed:

low-flow cut-off hysteresis 0,5 %

The current hysteresis will be displayed. After setting the hysteresis, you confirm your entry with ↵.

10.3.6.4.4 Calibrating the zero point

With the help of the function “zero point calibration,” the zero point of the meter can be recalibrated during normal operation.

CAUTION!: This function may only be carried out if it is certain that the medium in the sensor is not flowing. Otherwise, the flow rates measured subsequently will be incorrect.

After choosing the function “zero point calibration” and pressing ↵, the following selection field will be displayed:

x. xxx m3/h cal. ? [yes]

With the help of the cursor keys, you can toggle between “no” and “yes.” You confirm and save the selection by pressing ↵. If you enter “yes”, the zero point will be recalibrated. If you do not want the zero point to be calibrated, you must exit the function with “no.”

10.3.6.5 Functional class FLOW

In the functional class FLOW, you can define the unit, the upper range value, the minimum and maximum limiting value together with the corresponding hysteresis.

10.3.6.5.1 Volume flow unit

With this function, you define the physical unit for the measured value and the upper range value of the volume flow. After choosing the function “volume flow” and pressing ↵, the following selection field will be displayed:

volume flow in [l/h]

You can toggle between the following units:

l/h, l/min, l/s, m3/h, m3/min, m3/s, USG/h, USG/Min, USG/s, UKG/h, UKG/Min, UKG/s

You confirm and save the selection by pressing ↵.

10.3.6.5.2 Volume flow lower range value

With this function, you define the lower range value for the volume flow. This value defaults to zero. However, if you want the signal output to spread, the lower range value can be increased. This will affect the 0/4-20mA current output and the frequency output. The pulse output will not be changed by this measure.

QV LRV = 0%
0.0 l/h

You enter the lower range value in the second line and confirm your entry with ↵.

10.3.6.5.3 Volume flow upper range value

With this function, you define the upper range value for the volume flow. You enter the upper range value in the unit that you entered using the function “volume flow QV unit.”
After selecting the function “volume flow upper range value” and pressing ↵, the following selection field will be displayed:

QV URV=100%
XXXXX. XX m3/h

The current upper range value for the volume flow will be displayed. After setting the new upper range value for the volume flow, you confirm your entry with ↵.

10.3.6.5.4 Volume flow MIN limit

The minimum or the lower limiting value is a percentage and refers to the upper range value set for the volume flow. It can be evaluated via the status output. After choosing the function “volume flow” and pressing ↵, the following selection field will be displayed:

volume flow limit
MIN = 10 %

After setting the new MIN limiting value, you confirm your entry with ↵.

10.3.6.5.5 Volume flow QV MAX limit

The maximum or the upper limiting value is a percentage and refers to the upper range value set for the volume flow. It can be evaluated via the status output.
After choosing the function “volume flow QV limit MAX” and pressing ↵, the following selection field will be displayed:

volume flow limit
MAX = 90 %

After setting the new MAX limiting value, you confirm your entry with ↵.

10.3.6.5.6 QV limiting value hysteresis

The hysteresis of the limiting values is the flow rate in percent based on the upper range value and indicates the value which must fall below or surpass the set limiting values in order to activate or deactivate the function. The hysteresis of the limiting values can be set in 1-percent increments from 0 to 10%. After choosing the function “QV limit hysteresis” and pressing ↵, the following selection field will be displayed:

QV limit hysteresis 01 %

The current hysteresis will be displayed. After setting the hysteresis, you confirm your entry with ↵.

10.3.6.5.7 Volume flow LSL (information field)

Represents the minimum upper range value based on the inside diameter of the sensor.

QV LSL XX.XXX m3/h

10.3.6.5.8 Volume flow USL (information field)

Represents the maximum upper range value based on the inside diameter of the sensor.

QV USL XX.XXX m3/h

10.3.6.6 Functional class PULSE OUTPUT

The functional class PULSE OUTPUT comprises the function relating to the pulse output.

10.3.6.6.1 Pulse or frequency output

With the help of the function “pulse or frequency output,” you define whether pulses per unit counted or a frequency between 0 and 1 kHz will be output analogously to the measuring range.
After choosing the function “pulse or frequency output” and pressing ↵, the following selection field will be displayed:

output of [pulses]

By pressing ▲ or ▼, you can toggle between pulses and frequency. You confirm and save the selection by pressing ↵.

10.3.6.6.2 Pulse output unit

With this function you define the unit for counting. The setting is independent of the setting of the internal counters. After choosing the function “pulse output unit” and pressing ↵, the following selection field will be displayed:

accumulation of: [m3]

The current value will be displayed. You confirm and save the selection by pressing ↵.

10.3.6.6.3 Pulse value

With this function you define how many pulses will be output per unit counted. After choosing the function “pulse value” and pressing ↵, the following selection field will be displayed:

1 pulse per [1.0] unit

The current pulse value will be displayed. The pulse value is the reciprocal value of pulses per unit. By pressing ▲ or ▼ you can toggle between the following pulse values.

0.001, 0.01, 0.1, 1.0, 10.0, 100.0

You confirm and save the selection by pressing ↵.

Examples: 10 pulses per unit are requested. 0.1 units per pulse must be set.
1000 pulses per unit are requested. 0.001 units per pulse must be set.

10.3.6.6.4 Pulse width

With this function, you can change the width of the pulse to be output. If the pulse width of the set upper range value is too large for the actual pulse number, the error message “pulse output overload at 100%” will be displayed for approx. 2 seconds.
After choosing the function “pulse width” and pressing ↵, the following selection field will be displayed:

pulse width 0050 ms

The current pulse width will be displayed. After setting the new pulse width, you confirm your entry with ↵.

10.3.6.7 Functional class BINARY OUTPUTS AND INPUTS

The functional class BINARY OUTPUTS AND INPUTS comprises the functions for setting the status output, the pulse outputs and the binary inputs.

10.3.6.7.1 Binary output in active state

With the function “binary output active state,” you define whether the status output it to be closed or opened when the selected event occurs. Thus, safety functions can be supported because active signals can be used. After choosing the function “damping” and pressing ↵, the following selection field will be displayed:

binary output active [closed]

When you select “status output active [opened],” a power failure can also be detected.
You confirm and save the selection by pressing ↵.

10.3.6.7.2 Binary output B2 assignment (status output)

With this function you define to which event the output is to be assigned. The most general assignment is the alarm assignment because all limiting values set and the self-test function are then monitored via the status output. After choosing the function “binary output B2 assignment” and pressing ↵, the following selection field will be displayed:

B2 assignment [alarm]

The current status output assignment will be displayed. After entering the customer password or the service password, you can select one of the following assignments by pressing ▲ or ▼:

Forward flow, reverse flow, MIN Qv, MAX Qv, alarm, IMP2

Via the IMP2 settings, a second pulse output, which is by 90° out of phase, will be realized. This output can be used for controlling loading computers during custody transfer operations. You confirm and save the selection by pressing ↵.

10.3.6.7.3 Binary output B3 assignment (option for custody transfer operations)

During custody transfer operations, the status output will be realized via binary output 3 because B2 is needed for pulse output 2.
After choosing the function “binary output B3 assignment” and pressing ↵, the following selection field will be displayed:

B3 assignment [alarm]

The current binary output assignment will be displayed. You can toggle between the following assignments:

Forward flow, reverse flow, MIN QV, MAX QV, alarm, unavailable

You confirm and save the selection by pressing ↵.

10.3.6.7.4 Binary input assignment

The binary input (external resetter) is an option for custody transfer operations. It can be connected to a pushbutton.

Pressing the pushbutton for a short moment will change the counter display to higher accuracy. The display will return to normal operation after a few seconds of waiting time.

Pressing and holding the pushbutton for some moments will delete potential error messages and start the display test sequence.

With this function you define which event is to be assigned to the input. After choosing the function "binary input assignment" and pressing ↵, the following selection field will be displayed:

input assigned to [counter=0!]

You can toggle between the following assignments:
counter=0, zero point, clear error and not available

You confirm and save the selection by pressing ↵.

10.3.6.8 Functional class CURRENT OUTPUT

In the functional class CURRENT OUTPUT, you perform the settings for the current output of the UMF.

10.3.6.8.1 0/4-20 mA current output

With the function "0/4-20 mA current output", you define whether the measured values are to be assigned a current between 0 and 20 mA or between 4 and 20 mA. After choosing the function "0/4-20 mA current output" and pressing ↵, the following selection field will be displayed:

current output [4]-20 mA

You confirm and save the selection by pressing ↵.

10.3.6.8.2 Alarm current output

With the help of this function, you define the state taken on by the current output when a state of alarm is detected. This information can, for example, be analyzed in the control system. After choosing the function “alarm current output” and pressing ↵, the following selection field will be displayed:

Alarm [<3.8 mA]

The current function of the current output will be displayed. You can toggle between the following alarm functions: <3.8 mA, >22 mA and not used. You confirm and save the selection by pressing ↵.

10.3.6.9 Functional class SIMULATION

The functional class SIMULATION comprises the functions for simulating the outputs of the UMF. The peripherals connected to the device can be tested without a flowing medium.

10.3.6.9.1 Simulation on/off

With the help of the function “Simulation on/off,” you can activate or deactivate the simulation. After choosing the function “simulation on/off” and pressing ↵, the following selection field will be displayed:

Simulation [off]

You confirm and save the selection by pressing ↵. The current output, the pulse output and the status output take on states described in the following.

10.3.6.9.2 Simulation preset value Q/direct

After choosing the function “simulation preset value Q/direct” and pressing ↵, the following selection field will be displayed:

presetting [Qabs]

After choosing “presetting [Qabs]” and confirming your selection with ↵, you set the simulation value using “simulation preset value Q. ”

After choosing “presetting [direct]” and confirming your selection with ↵, you set the simulation value for the outputs B2 and B3, the pulse output or the current output using “direct simulation. ”

10.3.6.9.3 Simulation preset value Q

With the help of the function “simulation preset value Q,” you can set the simulation value for the signal outputs. After choosing the function and pressing ↵, the following selection field will be displayed:

preset value Q XXX. XX l/h

Set the value and confirm your entry with ↵.

10.3.6.9.4 Direct simulation outputs B2 and B3

With the help of this function, you can activate or deactivate the status output. After choosing the function “direct simulation outputs B2,3” and pressing ↵, the following selection field will be displayed:

outputs B2,3 [off]

You confirm and save the selection by pressing ↵.

10.3.6.9.5 Direct simulation pulse output

With the help of the function “direct simulation pulse output,” you can identify a frequency to be output at the pulse output. After choosing the function “direct simulation pulse output” and pressing ↵, the following selection field will be displayed:

set frequency 0000.0 Hz

After setting the new frequency, you confirm your entry with ↵.

10.3.6.9.6 Direct simulation current output

With the help of the function “direct simulation current output,” you can identify a current to be output at the current output. After choosing the function “direct simulation current output” and pressing ↵, the following selection field will be displayed:

set current 12.00 mA

After setting the new current signal, you confirm your entry with ↵.

10.3.6.10 Functional class SELF-TEST

The functional class SELF-TEST comprises the functions relating to the self-tests of the transmitter and the sensor.

10.3.6.10.1 Self-test on/off

With the help of the function “self-test on/off,” you can activate and deactivate the periodic monitoring of the field coil circuit. The measurement is intended to suppress temperature dependences of the transmitter. During the sampling time of 0. 5 seconds, the transmitter is offline; the last measured value will be displayed at the signal outputs. The function is activated by default. After choosing the function “self-test on/off” and pressing ↵, the following selection field will be displayed:

self-test [on]

You confirm and save the selection by pressing ↵.

10.3.6.10.2 Self-test period (STP)

With the help of this function, you set the time period after which the field coil current will be measured periodically. You can set periods between 35 seconds and 999 seconds. After choosing the function “self-test period” and pressing ↵, the following selection field will be displayed:

self-test STP = 040 s

You confirm and save the setting by pressing ↵.

10.3.6.10.3 Reference calibration on/off

With the help of the function “reference calibration on/off,” you activate or deactivate the periodic recalibration of the transmitter. The objectives of the function are periodic self-monitoring and an increase in long-term stability. During the automatic reference calibration of 30 seconds, the transmitter is offline; the last measured value will be displayed at the signal outputs. After choosing the function “reference calibration on/off” and pressing ↵, the following selection field will be displayed:

reference calibration [off]

You confirm and save the selection by pressing ↵.

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10.3.6.10.4 Reference calibration period (GAP)

The function “reference calibration period” is a multiplication of the function “self-test period.”
With the help of this function, you define after how many STP’s the reference calibration is to be performed.
Example:

The “self-test period” has been set to 40 seconds; a reference calibration is to be carried out every 6 hours.

GAP = 6 * 3600s / 40s = 5400

After choosing the function “reference calibration period” and pressing ↵, the following selection field will be displayed:

reference calibration
GAP = 05400*STP

You confirm and save the setting by pressing ↵.

10.3.6.10.5 Empty-pipe detection on/off

With the help of the function “empty-pipe detection on/off,” you can activate or deactivate continuous empty-pipe detection. After choosing the function “empty-pipe detection on/off” and pressing ↵, the following selection field will be displayed:

empty-pipe detection
[on]

You confirm and save the selection by pressing ↵.

10.3.6.10.6 Empty-pipe detection period

With the help of the function “empty-pipe detection period,” you can set the time after which the detection will be carried out. When you enter 00 minutes, the detection will be performed continuously.
After choosing the function “empty-pipe detection period” and pressing ↵, the following selection field will be displayed:

EPD period
10 min

You confirm and save the setting by pressing ↵.

10.3.6.11 Functional class SETTINGS SENSOR + UMF

The functional class SETTINGS SENSOR + UMF comprises the functions for the meter data related to the measuring point.

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10.3.6.11.1 Sensor constant C

The sensor constant C is the calibration value of the sensor connected to the transmitter. The calibration value must be entered in the UMF transmitter to ensure a correct measurement. The constant will be defined after the calibration of the meters and can be found on the type plate of the sensor. After choosing the function "sensor constant" and pressing ↵, the following selection field will be displayed:

sensor const/mV
01234.56 m3/h

You confirm and save the setting by pressing ↵.

10.3.6.11.2 Sensor type

The function "sensor type" contains the type of the sensor with which the transmitter has been shipped. This setting is needed for performing an inquiry via HART® or Profibus. After choosing the function "sensor type" and pressing ↵, the following selection field will be displayed:

sensor type
[EPYE]

You confirm and save the selection by pressing ↵.

10.3.6.11.3 Inside diameter

The inside diameter of the sensor connected to the transmitter is necessary for calculating the mean flow velocity. The inside diameter must be checked in the UMF transmitter to ensure a correct measurement. After choosing the function "inside diameter" and pressing ↵, the following selection field will be displayed:

inside diameter
50 mm

You confirm and save the setting by pressing ↵.

10.3.6.11.4 Language

With the help of the function "language," you can select among various languages. After choosing the function "language" and pressing ↵, the following selection field will be displayed:

language
[German]

You can toggle between the following languages: German and English
You confirm and save the selection by pressing ↵.

10.3.6.11.5 Excitation frequency

With the help of the function “excitation frequency,” you can set the excitation frequency of the field coil current. Since the excitation frequency depends on the sensor, it cannot be assigned freely. The excitation frequency defaults to 6. 25 Hz.
After choosing the function “excitation frequency” and pressing ↵, the following selection field will be displayed:

excitation frequency [6.25 Hz]

You confirm and save the selection by pressing ↵.

10.3.6.11.6 Mains frequency

When the sensor is connected to AC supply voltage, it automatically calculates the mains frequency in order to achieve optimum interference suppression. In order to ensure interference suppression for an auxiliary power of 24 V DC, the mains frequency of the environment (50 Hz or 50 Hz) can be set.
After choosing the function “mains frequency” and pressing ↵, the following selection field will be displayed:

mains frequency [50 Hz]

You confirm and save the selection by pressing ↵.

10.3.6.11.7 Flow direction

With the help of the function “flow direction,” you define the flow directions to be evaluated by the sensor. In order to exclude reverse flow measurement, you select, for example, “forward.” After choosing the function “flow direction” and pressing ↵, the following selection field will be displayed:

flow direction [forward]

You can toggle between the following flow directions: forward, reverse, forward & reverse.
You confirm and save the selection by pressing ↵.

10.3.6.11.8 Software version (information field)

With the help of this function, you can display the implemented software version. After choosing the function “version of UMF software” and pressing ↵, the following selection field will be displayed:

Version of UMF software 001

10.3.6.11.9 **Serial number (information field)**

With the help of the function “serial number,” the transmitter is assigned an order. This number provides access to internal manufacturer data if the device needs servicing or for other purposes. The serial number is printed on the type plate of the UMF transmitter. After choosing the function “language” and pressing ↵, the following selection field will be displayed:

serial number
000000

10.3.6.11.10 **Serial number of UMF (information field)**

With the help of the function “serial number,” the transmitter is assigned the original order. Thus, the transmitter can be tracked back to the correct order when it is replaced. After choosing the function “serial number UMF” and pressing ↵, the following selection field will be displayed:

UMF number
00000123

10.3.6.11.11 **Inquiry of system errors**

With the help of this function, you can show the error code of the system errors that have occurred.

10.4 Error messages of the UMF transmitter

If the error messages described in the following do not disappear, please contact the manufacturer.

10.4.1 Self-test error

A self-test of the transmitter is carried out continuously during normal operation. If an error is detected, it alternates with the measured value on the operator terminal display. In addition, the alarm output will be set.

The following errors will be recognized:

Error message	Reason
“curr. outp. overl. ”	When the alarm is released 2/22 mA, at 0/4-21.6 mA for I > 21.6 mA, at 4-20. 4 mA for I > 20.4 mA
“pulse outp. overl. ”	If the pulse duty factor of the pulse output is <1:1 or F > 1 kHz
“induct. current ?”	If the field coil current < normal value –10% (break) or >normal value +10%. The signal outputs will be set to zero.
“meas. circ. sat. ”	The AD converter is overloaded ((>262000). The signal outputs will be set to zero.
“missing EEPROM”	The EEPROM with the measuring point data is missing or check sum error. The signal outputs will be set to zero.
“params inconsist”	If the password is invalid or one of the errors is generated during the plausibility test. The signal outputs will be set to zero.

10.4.1.1 System error

System errors generate an error code that is shown in the following table. When a system error occurs, there is a serious defect that needs qualified service.

In development

Error code	Possible reason

11 Certificates and approvals

CE Mark: The transmitter complies with the legal requirements of the EU directives. Heinrichs-Messtechnik confirms the successful test by using the CE Mark.
EMC Directive 89/336 EEC, 92/31 EEC, 93/68 EEC
EN 50 081 Part 1 and 2
EN 50 082 Part 1 and 2
NAMUR recommendation NE21
Directive 94/9/EC (safety directive)

Safety class: UMF transmitter:
DMT 99 ATEX E 107 X
EEx de [ia] IIC / IIB T6 - T3
EEx d [ia] IIC / IIB T6 - T3

Sensor:
See separate data sheet for sensor

12 External standards and guidelines

EN 60529 IP degrees of protection
EN 61010 – safety requirements for electrical measuring, control and laboratory devices
EN 50 081 Part 1
EN 50,082 Part 2
NAMUR recommendation NE21 (Standards Work Group for Measuring and Control Technology in the chemical industry)

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14 Notes

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